Data Validation Summary Report Revision 1
Soil Background Concentration Study
Nevada Environmental Response Trust (NERT)
Henderson, Nevada

Prepared for

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January 31, 2019

Response to NDEP Comments on the Soil Background Concentration Study DVSR and EDD

Nevada Environmental Response Trust Site (Former Tronox LLC Site) Henderson, Nevada

Nevada Environmental Response Trust (NERT) Representative Certification

I certify that this document and all attachments submitted to the Division were prepared at the request of, or under the direction or supervision of NERT. Based on my own involvement and/or my inquiry of the person or persons who manage the system(s) or those directly responsible for gathering the information or preparing the document, or the immediate supervisor of such person(s), the information submitted and provided herein is, to the best of my knowledge and belief, true, accurate, and complete in all material respects.

Office of the Nevada Environmental Response Trust

Le Petomane XXVII, Inc., not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

Signature: Jay A Steinberg not individually, but solely as Pres. Sept, not individually, but solely in his representative capacity as President of the Nevada Environmental Response Trust Trustee

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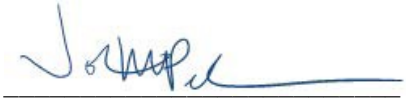
Date: 1/31/19

Response to NDEP Comments on the Soil Background Concentration Study DVSR and EDD

Nevada Environmental Response Trust Site (Former Tronox LLC Site) Henderson, Nevada

Responsible Certified Environmental Manager (CEM) for this Project

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and, to the best of my knowledge, comply with all applicable federal, state and local statutes, regulations and ordinances.



January 31, 2019

John M. Pekala, PG
Principal

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ATTACHMENTS

LIST OF ACRONYMS AND ABBREVIATIONS

CCB	Continuing Calibration Blank
CLPNFG	Contract Laboratory Program National Functional Guidelines
CRM	Certified Reference Material
DL	Detection Limit
DNR	Do Not Report
DQO	Data Quality Objectives
DUP	Laboratory Duplicate
DVR	Data Validation Report
DVSR	Data Validation Summary Report
FD	Field Duplicate
ICB	Initial Calibration Blank
ICV	Initial Calibration Verification
LCS/LCSD	Laboratory Control Sample / Laboratory Control Sample Duplicate
LDC	Laboratory Data Consultants, Inc.
MDC	Minimum Detectable Concentration
MDL	Method Detection Limit
MS/MSD	Matrix Spike / Matrix Spike Duplicate
NDEP	Nevada Department of Environmental Protection
NERT	Nevada Environmental Response Trust
PARCCS	Precision, Accuracy, Representativeness, Comparability, Completeness, Sensitivity
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance / Quality Control
QAPP	Quality Assurance Project Plan
RER	Relative Error Ratio
RPD	Relative Percent Difference
SDG	Sample Delivery Group
SQL	Sample Quantitation Limit
USEPA	United States Environmental Protection Agency
ug/Kg	Micrograms per Kilogram
mg/Kg	Milligrams per Kilogram
pCi/g	Picocuries per Gram
%RSD	Percent Relative Standard Deviation
%D	Percent Difference
%R	Percent Recovery

1.0 INTRODUCTION

This data validation summary report (DVSR) has been prepared by Laboratory Data Consultants, Inc. (LDC) to assess the validity and usability of laboratory analytical data from the Soil Background Concentration Study conducted at the Nevada Environmental Response Trust (NERT) site in Henderson, Nevada. The assessment was performed by Ramboll as a part of the *Quality Assurance Project Plan, Revision 2, Nevada Environmental Response Trust Site, Henderson, Nevada* dated October 2017 and included the collection and analyses of 46 environmental and quality control (QC) samples. The analyses were performed by the following methods:

Metals by EPA Methods 6010B/6020A/7471A
Hexavalent Chromium by EPA SW 846 Method 7199
Radium-226 by EPA Method 903.0
Radium-228 by EPA Method 904.0
Isotopic Thorium and Isotopic Uranium by Method A-01-R modified

Laboratory analytical services were provided by TestAmerica, Inc. The samples were grouped into sample delivery groups (SDGs). The soil samples are associated with quality assurance and quality control (QA/QC) samples designed to document the data quality of the entire SDG or a sub-group of samples within an SDG. Table I is a cross-reference table listing each sample, analysis, SDG, collection date, laboratory sample number, matrix, and validation level. An individual sample may be on multiple rows if it is reported on more than one SDG or if its analytes were validated at different validation levels. Table II is a reference table that identifies the QC elements reviewed for each validation level per method, as applicable.

The laboratory analytical data were validated in accordance with procedures described in the Nevada Division of Environmental Protection (NDEP) *Data Validation Guidance* established for the BMI Plant Sites and Common Areas Projects, Henderson, Nevada, July 13, 2018. Consistent with the NDEP requirements, approximately ninety percent of the analytical data were validated according to Stage 2B data validation procedures and approximately ten percent of the samples were validated according to Stage 4 data validation procedures. The number of samples and percentage of samples validated to Stage 2B and Stage 4 for each sampling event and for each method is presented in Table III.

The analytical data were evaluated for QA/QC based on the following documents: *Quality Assurance Project Plan, Revision 2, NERT Site, Henderson, Nevada,* October 2017; *Multi Agency Radiological Laboratory Analytical Protocols* (MARLAP) Manual, July 2014; a modified outline of the *USEPA National Functional Guidelines* (NFGs) *for Inorganic Superfund Data Review* (January 2017); and the *EPA SW 846 Third Edition, Test Methods for Evaluating Solid Waste,* update I, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IV, February 2007; update V, July 2014.

This report summarizes the QA/QC evaluation of the data according to precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) relative to the project data quality objectives (DQOs). This report provides a quantitative and qualitative assessment of the data and identifies potential sources of error, uncertainty, and bias that may affect the overall usability.

The PARCCS summary report evaluates and summarizes the results of QA/QC data validation for the entire sampling program. Each analytical fraction has a separate section for each of the PARCCS criteria. These sections interpret specific QC deviations and their effects on both individual data points and the analyses as a whole. Section 7 presents a summary of the PARCCS criteria by comparing quantitative parameters with acceptability criteria defined in the project DQO's. Qualitative PARCCS criteria are also summarized in this section.

Precision and Accuracy of Environmental Data

Environmental data quality depends on sample collection procedures, analytical methods and instrumentation, documentation, and sample matrix properties. Both sampling procedures and laboratory analyses contain potential sources of uncertainty, error, and/or bias, which affect the overall quality of a measurement. Errors for sample data may result from incomplete equipment decontamination, inappropriate sampling techniques, sample heterogeneity, improper filtering, and improper preservation. The accuracy of analytical results is dependent on selecting appropriate analytical methods, maintaining equipment properly, and complying with QC requirements. The sample matrix also is an important factor in the ability to obtain precise and accurate results within a given media.

Environmental and laboratory QA/QC samples assess the effects of sampling procedures and evaluate laboratory contamination, laboratory performance, and matrix effects. QA/QC samples include: field duplicates (FDs), laboratory blanks, laboratory duplicates (DUP), matrix spike/matrix spike duplicates (MS/MSD), and laboratory control samples (LCSs).

Before conducting the PARCCS evaluation, the analytical data were validated according to the QAPP (October 2017), NFG (USEPA 2017), and EPA Methods. Samples not meeting the acceptance criteria were qualified with a flag, an abbreviation indicating a deficiency with the data. The following are flags used in data validation.

J- Estimated The associated numerical value is an estimated quantity with a negative bias. The analyte was detected but the reported value may not be accurate or precise.

J+ Estimated The associated numerical value is an estimated quantity with a positive bias. The analyte was detected but the reported value may not be accurate or precise.

J Estimated The associated numerical value is an estimated quantity. It is not possible to assess the direction of the potential bias. The analyte was detected but the reported value may not be accurate or precise. The "J" qualification indicates the data fell outside the QC limits but the exceedance was not sufficient to cause rejection of the data.

R Rejected The data is unusable (the analyte may or may not be present). Use of the "R" qualifier indicates a significant variance from functional guideline acceptance criteria. Either resampling or reanalysis is necessary to determine the presence or absence of the rejected analyte.

U Nondetected Analyses were performed for the compound or analyte, but it was not detected.

UJ Estimated/Nondetected Analyses were performed for the analyte, but it was not detected and the sample quantitation or detection limit is an estimated quantity due to poor accuracy or precision.

DNR Do Not Report A more appropriate result is reported from another analysis or dilution.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

The hierarchy of flags is listed below:

R > J	The R flag will always take precedence over the J qualifier.
J+	The high bias (J+) flag is applied only to detected results.
J > J+ or J-	A non-biased (J) flag will always supersede biased (J+ or J-) flags since it is not possible to assess the direction of the potential bias.
J = J+ plus J-	Adding biased (J+, J-) flags with opposite signs will result in a non-biased flag (J).
UJ = U plus J	The UJ flag is used when a non-detected (U) flag is added to a non-biased flag (J).

Table IV lists the reason codes used. Reason codes explain why flags have been applied and allow data users to assess if a result is usable with qualification due to QA/QC outliers or not usable when rejected due to QA/QC outliers. Reason codes are cumulative except when one of the flags is R then only the reason code associated to the R flag will be used.

Table V presents the overall qualified results after all the flags or validation qualifiers and associated reason codes have been applied.

Once the data are reviewed and qualified according to the QAPP, NFG, and EPA Methods, the data set is then evaluated using PARCCS criteria. PARCCS criteria provide an evaluation of overall data usability. The following is a discussion of PARCCS criteria as related to the project DQOs.

Precision is a measure of the agreement or reproducibility of analytical results under a given set of conditions. It is a quantity that cannot be measured directly but is calculated from reported concentrations. Precision is expressed as the relative percent difference (RPD):

$$RPD = (D1-D2)/\{1/2(D1+D2)\} \text{ X } 100$$

where:
D1 = reported concentration for the sample
D2 = reported concentration for the duplicate

Precision is primarily assessed by calculating an RPD from the reported concentrations of the spiked compounds for each sample in the MS/MSD pair. In the absence of an MS/MSD pair, a laboratory duplicate or LCS/LCSD pair can be analyzed as an alternative means of assessing precision. An additional measure of sampling precision was obtained by collecting and analyzing field duplicate samples, which were compared using the RPD result as the evaluation criteria.

MS and MSD samples are field samples spiked by the laboratory with target analytes prior to preparation and analysis. These samples measure the overall efficiency of the analytical method in recovering target analytes from an environmental matrix. A LCS is similar to an MS/MSD sample in that the LCS is spiked with the same target analytes prior to preparation and analysis. However, the LCS is prepared using a controlled interference-free matrix instead of a field sample aliquot. Laboratory reagent water or solid matrix is used to prepare an LCS. The LCS measures laboratory efficiency in recovering target analytes from either matrix in the absence of matrix interferences.

DUPs measure laboratory precision. DUPs are replicate samples and are prepared by taking two aliquots from one sample container. The analytical results for DUPs are reported as the RPD between the results of the two aliquots.

Laboratory and field sampling precision are evaluated by calculating RPDs for field sample duplicate pairs. The sampler collects two field samples at the same location and under identically controlled conditions. The laboratory then analyzes the samples under identical conditions.

An RPD outside the numerical QC limit in the LCS/LCSD, MS/MSD, DUPs, or field duplicates indicates imprecision. Imprecision is the variance in the consistency with which the laboratory arrives at a particular reported result. Thus, the actual analyte concentration may be higher or lower than the reported result.

Possible causes of poor precision include sample heterogeneity, improper sample collection or handling, inconsistent sample preparation, and poor instrument stability. In some duplicate pairs, results may be reported in either the primary or duplicate samples at levels below the practical quantitation limit (PQL) or non-detected. Since these values are considered to be estimates, RPD exceedances from these duplicate pairs do not suggest a significant impact on the data quality.

Accuracy is a measure of the agreement of an experimental determination and the true value of the parameter being measured. It is used to identify bias in a given measurement system. Recoveries outside acceptable QC limits may be caused by factors such as instrumentation, analyst error, or matrix interference. Accuracy is assessed through the analysis of MS, MSD, and LCS. In some cases, samples from multiple SDGs were within one QC batch and therefore are associated with the same laboratory QC samples. Accuracy is determined using the percent recoveries of MS and LCS analyses. Percent recovery (%R) is calculated using the following equation:

$$\%R = (A-B)/C \times 100$$

where:
A = measured concentration in the spiked sample
B = measured concentration of the spike compound in the unspiked sample
C = concentration of the spike

The percent recovery of each analyte spiked in MS/MSD samples, and LCS/LCSD is evaluated with the acceptance criteria specified by the previously noted documents. Spike recoveries outside the acceptable QC accuracy limits provide an indication of bias, where the reported data may overestimate or underestimate the actual concentration of compounds detected or quantitation limits reported for environmental samples.

Representativeness is a qualitative parameter that expresses the degree to which the sample data are characteristic of a population. It is evaluated by reviewing the QC results of blanks, samples and holding times. Positive detects of compounds in the blank samples identify compounds that may have been introduced into the samples during sample collection, transport, preparation, or analysis. The QA/QC blanks collected and analyzed are method blanks, initial calibration blanks (ICB), and continuing calibration blanks (CCB).

A method blank is a laboratory grade water or solid matrix that contains the method reagents and has undergone the same preparation and analysis as the environmental samples. The method blank provides a measure of the combined contamination derived from the laboratory source water, glassware, instruments, reagents, and sample preparation steps. Method blanks are prepared for each sample of a similar matrix extracted by the same method at a similar concentration level.

Calibration blanks consist of acidified laboratory grade water, which are injected at the beginning and at a regular frequency during each 12 - hour sample analysis run. These blanks estimate residual contaminants from the previous sample or standards analysis and measure baseline shifts that commonly occur in emission and absorption spectroscopy.

Holding times are evaluated to assure that the sample integrity is intact for accurate sample preparation and analysis. Holding times will be specific for each method and matrix analyzed. Holding time exceedance can cause loss of sample constituents due to biodegradation, precipitation, volatilization, and chemical degradation.

Comparability is a qualitative expression of the confidence with which one data set may be compared to another. It provides an assessment of the equivalence of the analytical results to data obtained from other analyses. It is important that data sets be comparable if they are used in conjunction with other data sets. The factors affecting comparability include the following: sample collection and handling techniques, matrix type, and analytical method. If these aspects of sampling and analysis are carried out according to standard analytical procedures, the data are considered comparable. Comparability is also dependent upon other PARCCS criteria, because only when precision, accuracy, and representativeness are known can data sets be compared with confidence.

Completeness is defined as the percentage of acceptable sample results compared to the total number of sample results. Completeness is evaluated to determine if an acceptable amount of usable data were obtained so that a valid scientific site assessment can be completed. Completeness equals the total number of sample results for each fraction minus the total number of rejected sample results divided by the total number of sample results multiplied by 100. As specified in the project DQOs, the goal for completeness for target analytes in each analytical fraction is 90 percent.

Percent completeness is calculated using the following equation:

$$\%C = (T - R)/T \times 100$$

where:
%C = percent completeness
T = total number of sample results
R = total number of rejected sample results

Completeness is also determined by comparing the planned number of samples per method and matrix as specified in the QAPP, with the number determined above.

Sensitivity is the ability of an analytical method or instrument to discriminate between measurement responses representing different concentrations. This capability is established during the planning phase to meet the DQOs. It is important that calibration requirements, detection limits (DLs), and PQLs presented in the QAPP are achieved and that target analytes can be detected at concentrations necessary to support the DQOs. The method detection limits (MDLs) represent the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. Sample quantitation limits (SQLs) are adjusted MDL values that reflect sample specific actions, such as dilutions or varying aliquot sizes. PQLs are the lowest level at which the entire analytical system gives a recognizable signal and acceptable calibration point for the analyte. The laboratory is required to report detected analytes down to the SQL for this project. In addition, sample results are compared to method blank and field blank results to identify potential effects of laboratory background and field procedures on sensitivity.

The QA/QC criteria were met with the exceptions noted in the following sections for each analytical method.

2.0 METALS

A total of 46 soil were analyzed for metals by EPA SW-846 Methods 6010B, 6020A, and 7471A. All metal data were assessed to be valid with the exception of 46 of the 1,242 total results which were rejected based on MS/MSD %Rs. This section discusses the QA/QC supporting documentation as defined by the PARCCS criteria and evaluated based on the DQOs.

2.1 Precision and Accuracy

2.1.1 Instrument Calibration

Initial and continuing calibration verification results provide a means of evaluating accuracy within a particular SDG. Correlation coefficient (r) and percent recovery (%R) are the two major parameters used to measure the effectiveness of instrument calibration. The correlation coefficient indicates the linearity of the calibration curve. %R is used to verify the ongoing calibration acceptability of the analytical system. The most critical of the two calibration parameters, r, has the potential to affect data accuracy across an SDG when it is outside the acceptable QC limits. %R exceedances suggest more routine instrumental anomalies, which typically impact all sample results for the affected analytes.

The correlation coefficients in the initial calibrations were within the acceptance criteria of ≥ 0.995. The continuing calibration verifications %Rs were within the acceptance criteria of 90-110%.

2.1.2 MS/MSD Samples

As a result of grossly exceeded MS/MSD %R (i.e., 0%), 46 niobium results were qualified as rejected (R). Additionally, 124 results were qualified as detected estimated (J-) or non-detected estimated (UJ) due to MS/MSD %Rs below the QAPP acceptance criteria.

Eighty-one results were qualified as detected estimated (J+) due to MS/MSD %Rs above the laboratory acceptance criteria. Positive bias was removed for one barium result of 81 results since this result was also qualified as estimated (J) due to MS/MSD RPD above the QAPP acceptance criteria.

Two barium results were qualified as detected estimated (J) as a result of MS/MSD RPDs above the laboratory acceptance criteria.

The details regarding the qualification of results are provided in Attachment A.

2.1.3 LCS Samples/Certified Reference Material (CRM)

All LCS %Rs met the laboratory acceptance criteria.

All CRM results met the QC acceptance criteria.

2.1.4 ICP Interference Check Sample

All ICP interference check %Rs met the method acceptance criteria.

2.1.5 ICP Serial Dilution

All ICP serial dilution %Ds met the method acceptance criteria.

2.1.6 Internal Standards

All internal standard %Rs met the method acceptance criteria.

2.1.7 FD Samples

The field duplicate samples were evaluated for acceptable precision with RPDs for the analytes. The barium results for field duplicate samples RIBK-10-12.0-20180613 and RIBK-10-12.0-20180613-FD were qualified as detected estimated (J) due to RPDs above the QAPP acceptance criteria. The details regarding the qualification of results are provided in Attachment A.

Given the additional uncertainty in results reported below the PQL, no data were qualified when the RPDs were outside the QAPP acceptance criteria and the associated results in either the primary or duplicate samples were below the PQL or not detected.

2.1.8 Sample Result Verification

Raw data were evaluated for 26 samples for metals by EPA SW-846 Methods 6010B, 6020A, and 7471A. All reported sample results, detects and non-detects, were correctly calculated for these Stage 4 samples.

2.2 Representativeness

2.2.1 Sample Preservation and Holding Times

The evaluation of holding times to verify compliance with the method was conducted. All samples met the 28-day analysis holding time criteria for mercury and 180-day analysis holding time criteria for all other metals.

2.2.2 Blanks

Method blanks and ICB/CCBs were analyzed to evaluate representativeness. The concentration for an individual target compound in any of the types of QA/QC blanks was used for data qualification.

If contaminants were detected in a blank, corrective actions were made for the chemical analytical data during data validation. The corrective action consisted of amending the laboratory reported results based on the following criteria.

> Results Below the PQL - If a sample result and blank contaminant value were less than the PQL, the sample result was amended as estimated (J) at the reported concentration.
>
> Results Above the PQL - If a sample result and blank contaminant value were greater than the PQL and the sample result was less than 10 times the blank contaminant value, the sample result was qualified as detected estimated (J+) at the reported concentration.
>
> No Action - If blank contaminant values were less than the PQL and associated sample results were greater than the PQL, or if blank contaminant values were greater than the PQL and associated sample results were greater than 10 times the blank contaminant value, the result was not qualified.

2.2.2.1 Blanks

No data were qualified due to the contaminants detected in the method blanks and ICB/CCBs.

2.3 Comparability

The laboratory used standard analytical methods for all of the analyses. In all cases, the SQLs attained were at or below the PQLs. Target compounds detected below the PQLs flagged (J) by the laboratory should be considered estimated. The comparability of the metals data is regarded as acceptable.

2.4 Completeness

The completeness level attained for metal field samples was 96.3 percent. This percentage was calculated as the total number of accepted sample results divided by the total number of sample results multiplied by 100.

2.5 Sensitivity

The calibration was evaluated for instrument sensitivity and was determined to be technically acceptable. All laboratory PQLs met the specified requirements described in the QAPP.

3.0 HEXAVALENT CHROMIUM

A total of 46 soil samples were analyzed for hexavalent chromium by EPA Method SW-846 7199. All hexavalent chromium data were assessed to be valid since none of the 46 total results were rejected based on holding time and QC exceedances. This section discusses the QA/QC supporting documentation as defined by the PARCCS criteria and evaluated based on the DQOs.

3.1 Precision and Accuracy

3.1.1 Instrument Calibration

The correlation coefficients in the initial calibrations were within the acceptance criteria of ≥ 0.995. The continuing calibration verifications %Rs were within the acceptance criteria of 90-110%.

3.1.2 MS/MSD Samples

All MS/MSD %Rs and RPD met the laboratory acceptance criteria.

3.1.3 LCS Samples

All LCS %Rs met the laboratory acceptance criteria.

3.1.4 FD Samples

The field duplicate samples were evaluated for acceptable precision with RPDs. No hexavalent chromium was detected in three of four field duplicate pairs.

Given the additional uncertainty in results reported below the PQL, no data were qualified when the RPDs were outside the QAPP acceptance criteria and the associated results in either the primary or duplicate samples were below the PQL or not detected.

3.1.5 Sample Result Verification

Raw data were evaluated for 26 samples. All reported sample results, detects and non-detects, were correctly calculated for these Stage 4 samples.

3.2 Representativeness

3.2.1 Sample Preservation and Holding Times

The evaluation of holding times to verify compliance with the method was conducted. All samples met the 30-day extraction and 7-day analysis holding time criteria.

3.2.2 Blanks

Method blanks, and ICB/CCBs were analyzed to evaluate representativeness.

No contaminants were detected in the method blanks and ICB/CCBs.

3.3 Comparability

The laboratory used standard analytical methods for all of the analyses. In all cases, the SQLs attained were at or below the PQLs. Target compounds detected below the PQLs flagged (J) by the laboratory should be considered estimated. The comparability of the data is regarded as acceptable.

3.4 Completeness

The completeness level attained for hexavalent chromium field samples was 100 percent. This percentage was calculated as the total number of accepted sample results divided by the total number of sample results multiplied by 100.

3.5 Sensitivity

The calibration was evaluated for instrument sensitivity and was determined to be technically acceptable. All laboratory PQLs met the specified requirements described in the QAPP.

4.0 RADIUM-226 AND RADIUM-228

A total of 46 soil samples were analyzed for radium-226 by EPA Method 903.0 and radium-228 by EPA Method 904.0. All radium-226 and radium-228 data were assessed to be valid since none of the 92 total results were rejected based on holding time and QC exceedances. This section discusses the QA/QC supporting documentation as defined by the PARCCS criteria and evaluated based on the DQOs.

4.1 Precision and Accuracy

4.1.1 Instrument Calibration

All instruments and detectors were calibrated as required. Detector efficiency was determined for each radionuclide of interest. Continuing calibration and background determination was performed at the required frequencies. Results met the method acceptance criteria.

4.1.2 Carrier

All carrier %Rs met the method acceptance criteria.

4.1.3 MS/MSD Samples

All MS/MSD %Rs and RPD met the laboratory acceptance criteria.

4.1.4 DUP Samples

All DUP relative error ratios (RER) met the laboratory acceptance criteria.

4.1.5 LCS Samples

All LCS %Rs met the laboratory acceptance criteria.

4.1.6 FD Samples

The field duplicate samples were evaluated for acceptable precision with RPDs for the isotopes. All RPDs for results that were reported above the Requested Limit met the QAPP acceptance criteria.

Given the additional uncertainty in results reported below the Requested Limit, no data were qualified when the RPDs were outside the QAPP acceptance criteria and the associated results in either the primary or duplicate samples were below the Requested Limit or not detected.

4.1.7 Isotope Quantitation and Target Identification

Raw data were evaluated for 20 samples. All isotope quantitation and target identifications were acceptable and all reported sample results, detects and non-detects, were correctly calculated for these Stage 4 samples.

4.2 Representativeness

4.2.1 Sample Preservation and Holding Times

The evaluation of holding times to verify compliance with the method was conducted. All samples met the 180-day analysis holding time criteria.

4.2.2 Blanks

Method blanks were analyzed to evaluate representativeness.

If contaminants were detected in a blank, corrective actions were made for the chemical analytical data during data validation. The corrective action consisted of amending the laboratory reported results based on the following criteria.

> Results Below the Requested Limit - If a sample result and blank contaminant value were less than the Requested Limit, the sample result was amended as estimated (J) at the reported concentration.
>
> Results Above the Requested Limit - If a sample result and blank contaminant value were greater than the Requested Limit and the sample result was less than 10 times the blank contaminant value, the sample result was qualified as detected estimated (J+) at the reported concentration.
>
> No Action - If blank contaminant values were less than the Requested Limit and associated sample results were greater than the Requested Limit, or if blank contaminant values were greater than the Requested Limit and associated sample results were greater than 10 times the blank contaminant value, the result was not qualified.

4.2.2.1 Method blanks

As a result of contamination found in the method blanks, 17 radium-228 results were qualified as detected estimated (J). The details regarding the qualification of results are provided in Attachment C.

4.3 Comparability

The laboratory used standard analytical methods for all of the analyses. The laboratory reported non-detect results at the sample specific Minimum Detectable Concentration (MDC). The comparability of the data is regarded as acceptable.

4.4 Completeness

The completeness level attained for radium-226 and radium-228 field samples was 100 percent. This percentage was calculated as the total number of accepted sample results divided by the total number of sample results multiplied by 100.

4.5 Sensitivity

The calibration was evaluated for instrument sensitivity and was determined to be technically acceptable. All laboratory Requested Limits met the specified requirements described in the QAPP.

5.0 ISOTOPIC THORIUM AND ISOTOPIC URANIUM

A total of 46 soil samples were analyzed for isotopic thorium and isotopic uranium by Method A-01-R modified. All isotopic thorium and isotopic uranium data were assessed to be valid since none of the 276 total results were rejected based on holding time and QC exceedances. This section discusses the QA/QC supporting documentation as defined by the PARCCS criteria and evaluated based on the DQOs.

5.1 Precision and Accuracy

5.1.1 Instrument Calibration

All instruments and detectors were calibrated as required. Detector efficiency was determined for each radionuclide of interest. Continuing calibration and background determination was performed at the required frequencies. Results met the method acceptance criteria.

5.1.2 Tracer

All tracer %Rs met the method acceptance criteria.

5.1.3 MS/MSD Samples

All MS/MSD %Rs and RPDs met the QAPP acceptance criteria.

5.1.4 LCS/LCSD Samples

All LCS/LCSD %Rs and RPDs met the QAPP acceptance criteria.

5.1.5 FD Samples

The field duplicate samples were evaluated for acceptable precision with RPDs for the isotopes. All RPDs for results that were reported above the Requested Limit met the QAPP acceptance criteria.

Given the additional uncertainty in results reported below the Requested Limit, no data were qualified when the RPDs were outside the QAPP acceptance criteria and the associated results in either the primary or duplicate samples were below the Requested Limit or not detected.

5.1.6 Isotope Quantitation and Target Identification

Raw data were evaluated for 20 samples. All isotope quantitation and target identifications were acceptable and all reported sample results, detects and non-detects, were correctly calculated for these Stage 4 samples.

5.2 Representativeness

5.2.1 Sample Preservation and Holding Times

The evaluation of holding times to verify compliance with the method was conducted. All samples met the 180-day analysis holding time criteria.

5.2.2 Blanks

Method blanks were analyzed to evaluate representativeness.

No contaminants were detected in the method blanks.

5.3 Comparability

The laboratory used standard analytical methods for all of the analyses. The laboratory reported non-detect results at the sample specific MDC. The comparability of the data is regarded as acceptable.

5.4 Completeness

The completeness level attained for isotopic thorium and isotopic uranium field samples was 100 percent. This percentage was calculated as the total number of accepted sample results divided by the total number of sample results multiplied by 100.

5.5 Sensitivity

The calibration was evaluated for instrument sensitivity and was determined to be technically acceptable. All laboratory Requested Limits met the specified requirements described in the QAPP.

6.0 VARIANCES IN ANALYTICAL PERFORMANCE

The laboratory used standard analytical methods for all of the analyses throughout the project. No systematic variances in analytical performance were noted in the laboratory case narratives.

7.0 SUMMARY OF PARCCS CRITERIA

The validation reports present the PARCCS results for all SDGs. Each PARCCS criterion is discussed in detail in the following sections.

7.1 Precision and Accuracy

Precision and accuracy were evaluated using data quality indicators such as calibration, carrier/tracer, MS/MSD, DUP, LCS/LCSD, field duplicates and internal standards. The precision and accuracy of the data set were considered acceptable after integration of result qualification.

All calibrations were performed as required and met the acceptance criteria. All MS/MSD and LCS/LCSD percent recoveries and RPDs, internal standard, carrier, and tracer %Rs, and field duplicate RPDs met acceptance criteria with the exceptions noted in Sections 2.1.2 and 2.1.7.

7.2 Representativeness

All samples for each method and matrix were evaluated for holding time compliance. All holding times were met. All samples were associated with a method blank and in each individual SDG. The representativeness of the project data is considered acceptable.

7.3 Comparability

Sampling frequency requirements were met in obtaining necessary field duplicates. The laboratory used standard analytical methods for the analyses. The analytical results were reported in correct standard units. Sample integrity criteria were met. Sample preservation and holding times were within QC criteria. The overall comparability is considered acceptable.

7.4 Completeness

Of the 1,656 total analytes reported, 46 of the sample results were rejected. The completeness for the SDGs is as follows:

Parameter	Total Analytes	No. of Rejects	% Completeness
Metals	1,242	46	96.3
Hexavalent Chromium	46	0	100
Ra-226 and Ra-228	92	0	100
Isotopic Thorium/Uranium	276	0	100
Total	**1,656**	**0**	**100**

The completeness percentage based on rejected data met the 90 percent DQO goal. All niobium results were rejected, which will impact data usability. This data set cannot be used to perform a background analysis for niobium. Specific impacts will be evaluated in the forthcoming NERT Remedial Investigation report for Operable Units 1 and 2.

7.5 Sensitivity

Sensitivity was achieved by the laboratory to support the DQOs. Calibration concentrations and PQLs met the project requirements and low level contamination in the method and calibration blanks did not affect sensitivity.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The analytical data quality assessment for the soil sample laboratory analytical results generated during the Soil Background Concentration Study at the NERT site in Henderson, Nevada established that the overall project requirements and completeness levels were met. Sample results that were found to be rejected (R) are unusable for all purposes. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the Stage 2B and Stage 4 data validation all other results are considered valid and usable for all purposes.

9.0 REFERENCES

Ramboll 2017. Quality Assurance Project Plan, Revision 2, Nevada Environmental Response Trust Site, Henderson, Nevada. October.

NDEP 2018. NDEP Data Validation Guidance. July.

USEPA 2014. Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual. July.

USEPA 2017. USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review. January.

Region 9 Superfund Data Evaluation/Validation Guidance, R6QA/006.1, Draft. December 2001.

____.1996. EPA SW 846 Third Edition, Test Methods for Evaluating Solid Waste, update I, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IV, February 2007; update V, July 2014.

(Eaton et al., 1998) *Standard Method for the Examination of Water and Wastewater* (20th ed.). Washington, DC: American Public Health Association.

TABLES

Table I. Sample Cross-Reference

LDC	SDG	Client Sample ID	Lab ID	Sample Date	Validation Level	Matrix	QC Type	Metals (6010B)	Metals (6020A)	Metals (7471A)	CrVI (7199)	Ra-226 (903.0)	Ra-228 (904.0)	Iso. Th/U (A-01-R Mod)
43097A	4402136211	RIBK-10-12.0-20180613	440-213621-1	6/13/2018	Stage 2B	Soil	FD1	X	X	X	X			
43097A	4402136211	RIBK-10-12.0-20180613-FD	440-213621-2	6/13/2018	Stage 2B	Soil	FD1	X	X	X	X			
43097A	4402136211	RIBK-10-15.0-20180613	440-213621-3	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-10-18.0-20180613	440-213621-4	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-10-21.0-20180613	440-213621-5	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-10-24.0-20180613	440-213621-6	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-10-27.0-20180613	440-213621-7	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-10-30.0-20180613	440-213621-8	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-10-33.0-20180613	440-213621-9	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-10-36.0-20180613	440-213621-10	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-12-8.0-20180613	440-213621-11	6/13/2018	Stage 2B	Soil	FD2	X	X	X	X			
43097A	4402136211	RIBK-12-8.0-20180613-FD	440-213621-12	6/13/2018	Stage 2B	Soil	FD2	X	X	X	X			
43097A	4402136211	RIBK-12-11.0-20180613	440-213621-13	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-12-14.0-20180613	440-213621-14	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-12-17.0-20180613	440-213621-15	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-12-20.0-20180613	440-213621-16	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-12-23.0-20180613	440-213621-17	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-12-26.0-20180613	440-213621-18	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-12-29.0-20180613	440-213621-19	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097A	4402136211	RIBK-12-32.0-20180613	440-213621-20	6/13/2018	Stage 2B	Soil		X	X	X	X			
43097B	4402136212	RIBK-10-12.0-20180613	440-213621-1	6/13/2018	Stage 4	Soil	FD1					X	X	X
43097B	4402136212	RIBK-10-12.0-20180613-FD	440-213621-2	6/13/2018	Stage 4	Soil	FD1					X	X	X
43097B	4402136212	RIBK-10-15.0-20180613	440-213621-3	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-10-18.0-20180613	440-213621-4	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-10-21.0-20180613	440-213621-5	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-10-24.0-20180613	440-213621-6	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-10-27.0-20180613	440-213621-7	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-10-30.0-20180613	440-213621-8	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-10-33.0-20180613	440-213621-9	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-10-36.0-20180613	440-213621-10	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-12-8.0-20180613	440-213621-11	6/13/2018	Stage 4	Soil	FD2					X	X	X
43097B	4402136212	RIBK-12-8.0-20180613-FD	440-213621-12	6/13/2018	Stage 4	Soil	FD2					X	X	X
43097B	4402136212	RIBK-12-11.0-20180613	440-213621-13	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-12-14.0-20180613	440-213621-14	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-12-17.0-20180613	440-213621-15	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-12-20.0-20180613	440-213621-16	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-12-23.0-20180613	440-213621-17	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-12-26.0-20180613	440-213621-18	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-12-29.0-20180613	440-213621-19	6/13/2018	Stage 4	Soil						X	X	X
43097B	4402136212	RIBK-12-32.0-20180613	440-213621-20	6/13/2018	Stage 4	Soil						X	X	X
43097C	4402137551	RIBK-7-26.0-20180614	440-213755-1	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-7-29.0-20180614	440-213755-2	6/14/2018	Stage 4	Soil	FD4	X	X	X	X			
43097C	4402137551	RIBK-7-29.0-20180614-FD	440-213755-3	6/14/2018	Stage 4	Soil	FD4	X	X	X	X			
43097C	4402137551	RIBK-7-32.0-20180614	440-213755-4	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-7-35.0-20180614	440-213755-5	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-7-38.0-20180614	440-213755-6	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-7-41.0-20180614	440-213755-7	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-7-44.0-20180614	440-213755-8	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-7-47.0-20180614	440-213755-9	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-8-16.0-20180614	440-213755-11	6/14/2018	Stage 4	Soil	FD3	X	X	X	X			
43097C	4402137551	RIBK-8-16.0-20180614-FD	440-213755-12	6/14/2018	Stage 4	Soil	FD3	X	X	X	X			
43097C	4402137551	RIBK-8-19.0-20180614	440-213755-13	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-8-22.0-20180614	440-213755-14	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-8-25.0-20180614	440-213755-15	6/14/2018	Stage 4	Soil		X	X	X	X			

Table I. Sample Cross-Reference

LDC	SDG	Client Sample ID	Lab ID	Sample Date	Validation Level	Matrix	QC Type	Metals (6010B)	Metals (6020A)	Metals (7471A)	CrVI (7199)	Ra-226 (903.0)	Ra-228 (904.0)	Iso. Th/U (A-01-R Mod)
43097C	4402137551	RIBK-8-28.0-20180614	440-213755-16	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-8-31.0-20180614	440-213755-17	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-8-34.0-20180614	440-213755-18	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-8-37.0-20180614	440-213755-19	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-13-14.0-20180614	440-213755-20	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-13-17.0-20180614	440-213755-21	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-13-20.0-20180614	440-213755-22	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-13-23.0-20180614	440-213755-23	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-13-26.0-20180614	440-213755-24	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-13-29.0-20180614	440-213755-25	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-13-32.0-20180614	440-213755-26	6/14/2018	Stage 4	Soil		X	X	X	X			
43097C	4402137551	RIBK-13-35.0-20180614	440-213755-27	6/14/2018	Stage 4	Soil		X	X	X	X			
43097D	4402137552	RIBK-7-26.0-20180614	440-213755-1	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-7-29.0-20180614	440-213755-2	6/14/2018	Stage 2B	Soil	FD4					X	X	X
43097D	4402137552	RIBK-7-29.0-20180614-FD	440-213755-3	6/14/2018	Stage 2B	Soil	FD4					X	X	X
43097D	4402137552	RIBK-7-32.0-20180614	440-213755-4	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-7-35.0-20180614	440-213755-5	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-7-38.0-20180614	440-213755-6	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-7-41.0-20180614	440-213755-7	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-7-44.0-20180614	440-213755-8	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-7-47.0-20180614	440-213755-9	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-8-16.0-20180614	440-213755-11	6/14/2018	Stage 2B	Soil	FD3					X	X	X
43097D	4402137552	RIBK-8-16.0-20180614-FD	440-213755-12	6/14/2018	Stage 2B	Soil	FD3					X	X	X
43097D	4402137552	RIBK-8-19.0-20180614	440-213755-13	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-8-22.0-20180614	440-213755-14	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-8-25.0-20180614	440-213755-15	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-8-28.0-20180614	440-213755-16	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-8-31.0-20180614	440-213755-17	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-8-34.0-20180614	440-213755-18	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-8-37.0-20180614	440-213755-19	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-13-14.0-20180614	440-213755-20	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-13-17.0-20180614	440-213755-21	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-13-20.0-20180614	440-213755-22	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-13-23.0-20180614	440-213755-23	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-13-26.0-20180614	440-213755-24	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-13-29.0-20180614	440-213755-25	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-13-32.0-20180614	440-213755-26	6/14/2018	Stage 2B	Soil						X	X	X
43097D	4402137552	RIBK-13-35.0-20180614	440-213755-27	6/14/2018	Stage 2B	Soil						X	X	X

Table II. Stage 2B & Stage 4 Validation Elements

Quality Control Elements	Stage 2B		
	Metals	**CrVI[1]**	**Rad[2]**
Sample Receipt & Technical Holding Time	√	√	√
Instrument Performance Check	√	√	√
Initial Calibration (ICAL)	√	√	√
Initial Calibration Verification (ICV)	√	√	√
Continuing Calibration Verification (CCV)	√	√	√
Laboratory Blanks	√	√	√
Initial Calibration Blank and Continuing Calibration Blank (ICB/CCB)	√	√	**N/A**
Field Blanks	√	√	√
Inductively Coupled Plasma (ICP) Interference Check Sample	√	**N/A**	**N/A**
Surrogate Spikes/ Carrier Recovery	**N/A**	√	√
Matrix Spike (MS)/ Matrix Spike Duplicate (MSD)	√	√	√
Laboratory Duplicate (DUP)	**N/A**	√	√
Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD)	√	√	√
Serial Dilution	√	**N/A**	**N/A**
Internal Standards	√	**N/A**	**N/A**
Field Duplicate	√	√	√
RPD Between Two Columns	**N/A**	**N/A**	**N/A**
Project Quantitation Limits (QL)[3]	√	√	√
Multiple Results for One Sample	√	√	√
Target Compound Identification	-	-	-
Compound Quantitation/ Sample Result Verification	-	-	-
Overall Data Usability Assessment	√	√	√

√ = Reviewed for Stage 2B review
N/A = Not applicable to method or not performed during this sampling event
- = Not applicable for Stage 2B review
[1]CrVI = Hexavalent Chromium
[2]Rad = Radium-226, Radium-228, Isotopic Thorium, and Isotopic Uranium
[3]PQLs verified for Metals, and CrVI. For Rad, Minimum Detectable Activity (MDA).

Table II. Stage 2B & Stage 4 Validation Elements

Quality Control Elements	Stage 4		
	Metals	**Wet Chemistry**	**Rad[1]**
Sample Receipt & Technical Holding Time	√	√	√
Instrument Performance Check	√	√	√
Initial Calibration (ICAL)	√	√	√
Initial Calibration Verification (ICV)	√	√	√
Continuing Calibration Verification (CCV)	√	√	√
Laboratory Blanks	√	√	√
Initial Calibration Blank and Continuing Calibration Blank (ICB/CCB)	√	√	**N/A**
Field Blanks	√	√	√
Inductively Coupled Plasma (ICP) Interference Check Sample	√	**N/A**	**N/A**
Surrogate Spikes/ Carrier Recovery	**N/A**	√	√
Matrix Spike (MS)/ Matrix Spike Duplicate (MSD)	√	√	√
Laboratory Duplicate (DUP)	**N/A**	√	√
Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD)	√	√	√
Serial Dilution	√	**N/A**	**N/A**
Internal Standards	√	**N/A**	**N/A**
Field Duplicate	√	√	√
RPD Between Two Columns	**N/A**	**N/A**	**N/A**
Project Quantitation Limits (QL)[2]	√	√	√
Multiple Results for One Sample	√	√	√
Target Compound Identification	**N/A**	**N/A**	**N/A**
Compound Quantitation/ Sample Result Verification	√	√	√
Overall Data Usability Assessment	√	√	√

√ = Reviewed for Stage 2B review
N/A = Not applicable to method or not performed during this sampling event
- = Not applicable for Stage 2B review
[1]CrVI = Hexavalent Chromium
[2]Rad = Radium-226, Radium-228, Isotopic Thorium, and Isotopic Uranium
[3]PQLs verified for Metals, and CrVI. For Rad, Minimum Detectable Activity (MDA).

Table III. Stage 2B & Stage 4 Validation Percentages

Parameter	Number of Samples			Validation Percentages	
	Stage 2B	Stage 4	Total	Stage 2B (%)	Stage 4 (%)
Metals	20	26	46	43	57
Hexavalent Chromium	20	26	46	43	57
Radium-226	26	20	46	57	43
Radium-228	26	20	46	57	43
Isotopic Thorium	26	20	46	57	43
Isotopic Uranium	26	20	46	57	43

Table IV. Reason Codes and Definitions

Reason Code	Explanation
a	qualified due to low abundance (radiochemical activity)
be	qualified due to equipment blank contamination
bf	qualified due to field blank contamination
bl	qualified due to lab blank contamination
bt	qualified due to trip blank contamination
bp	qualified due to pump blank contamination (wells w/o dedicated pumps, when contamination is detected in the Pump Blk)
br	qualified due to filter blank contamination (aqueous Hexavalent Chromium and Dissolved sample fractions)
c	qualified due to calibration problems
cp	qualified due to insufficient ingrowth (radiochemical only)
dc	dual column confirmation RPD exceeded
e	concentration exceeded the calibration range
fd	qualified due to field duplicate imprecision
h	qualified due to holding time exceedance
i	qualified due to internal standard areas
k	qualified as Estimated Maximum Possible Concentrations (dioxins and PCB congeners)
l	qualified due to LCS recoveries
ld	qualified due to lab duplicate imprecision (matrix duplicate, MSD, LCSD)
m	qualified due to matrix spike recoveries
nb	qualified due to negative lab blank contamination (nondetect results only)
nd	qualified due to non-detected target analyte
o	other
orr	other result reported
p	qualified as a false positive due to contamination during shipping
pH	sample preservation not within acceptance range
q	qualified due to quantitation problem
s	qualified due to surrogate recoveries
sd	serial dilution did not meet control criteria
sp	detected value reported >SQL <PQL
st	sample receipt temperature exceeded
t	qualified due to elevated helium tracer concentrations
vh	volatile headspace detected in aqueous sample containers submitted for VOC analysis
x	qualified due to low % solids
z	qualified due to ICS results

Table V. Overall Qualified Results

SDG	Client Sample ID	Sample Date	Method	Client Analyte ID	Analyte	Lab Result	Lab Qualifier	SQL	PQL	Units	Validator Qualifier	Reason Code	Data Quality Indicator	Qualification Finding	Acceptance Criteria	
4402136211	RIBK-10-12.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		UF1	6.2	25	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-10-12.0-20180613	6/13/2018	SW6010B	7440-39-3	Barium	29		1.8	3.7	mg/kg	J	fd	FD RPD	183	50	%
4402136211	RIBK-10-12.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	43	F1	1.2	2.5	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-10-12.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	170	F1	6.2	12	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-10-12.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	160	F1	2.5	4.9	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-10-12.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	41	F1	12	12	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-10-12.0-20180613-FD	6/13/2018	SW6010B	7440-47-3	Chromium (total)	56		0.63	1.3	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-10-12.0-20180613-FD	6/13/2018	SW6010B	7440-39-3	Barium	670		0.94	1.9	mg/kg	J	fd	FD RPD	183	50	%
4402136211	RIBK-10-12.0-20180613-FD	6/13/2018	SW6010B	7439-96-5	Manganese	190		1.3	2.5	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-10-12.0-20180613-FD	6/13/2018	SW6010B	7440-24-6	Strontium	150		3.1	6.3	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-10-12.0-20180613-FD	6/13/2018	SW6010B	7440-67-7	Zirconium	39		6.3	6.3	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-10-12.0-20180613-FD	6/13/2018	SW6010B	7440-33-7	Tungsten		U	3.1	13	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-10-15.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	3.2	13	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-10-15.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	36		0.64	1.3	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-10-15.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	810		1.3	2.6	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-10-15.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	160		3.2	6.4	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-10-15.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	38		6.4	6.4	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-10-18.0-20180613	6/13/2018	SW6010B	7440-50-8	Copper	19		1.5	2.6	mg/kg	J-	m	MS/MSD %R	48,54	75-125	%
4402136211	RIBK-10-18.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	170	F1	3.3	6.6	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-10-18.0-20180613	6/13/2018	SW6010B	7440-39-3	Barium	130	F2F1	0.99	2.0	mg/kg	J	ld,m	MS/MSD RPD & %R	49; 357,142	20; 75-125	%
4402136211	RIBK-10-21.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	29		0.63	1.3	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-10-21.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	150		3.1	6.3	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-10-21.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	48		6.3	6.3	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-10-21.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	440		1.3	2.5	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-10-21.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	3.1	13	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-10-24.0-20180613	6/13/2018	SW6010B	7440-42-8	Boron	4.9	J	3.0	6.0	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-10-24.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	34		6.0	6.0	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-10-24.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	520		1.2	2.4	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-10-24.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	130		3.0	6.0	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-10-24.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	26		0.60	1.2	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-10-24.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	3.0	12	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-10-27.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	170		2.9	5.8	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-10-27.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	490		1.2	2.3	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-10-27.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	19		0.58	1.2	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-10-27.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	2.9	12	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-10-27.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	44		5.8	5.8	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-10-30.0-20180613	6/13/2018	SW6010B	7440-42-8	Boron	4.2	J	2.8	5.7	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-10-30.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	31		5.7	5.7	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-10-30.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	440		1.1	2.3	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-10-30.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	130		2.8	5.7	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-10-30.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	16		0.57	1.1	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-10-30.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	2.8	11	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-10-33.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	730		1.1	2.2	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-10-33.0-20180613	6/13/2018	SW6010B	7440-42-8	Boron	3.3	J	2.8	5.6	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-10-33.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	27		0.56	1.1	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-10-33.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	110		2.8	5.6	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-10-33.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	27		5.6	5.6	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-10-33.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	2.8	11	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-10-36.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	23		5.7	5.7	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-10-36.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	97		2.9	5.7	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%

Table V. Overall Qualified Results

SDG	Client Sample ID	Sample Date	Method	Client Analyte ID	Analyte	Lab Result	Lab Qualifier	SQL	PQL	Units	Validator Qualifier	Reason Code	Data Quality Indicator	Qualification Finding	Acceptance Criteria	
4402136211	RIBK-10-36.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	1200		1.1	2.3	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-10-36.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	23		0.57	1.1	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-10-36.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	2.9	11	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-12-11.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	19		0.65	1.3	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-12-11.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	3.3	13	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-12-11.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	480		1.3	2.6	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-12-11.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	280		3.3	6.5	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-12-11.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	41		6.5	6.5	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-12-11.0-20180613	6/13/2018	SW6010B	7439-98-7	Molybdenum	2.4	J	1.3	2.6	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-12-14.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	36		12	12	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-12-14.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	230		2.5	4.9	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-12-14.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	140		6.2	12	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-12-14.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	18		1.2	2.5	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-12-14.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	6.2	25	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-12-17.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	110		15	30	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-12-17.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	16		3.0	5.9	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-12-17.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	780		5.9	12	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-12-17.0-20180613	6/13/2018	SW6010B	7440-42-8	Boron	19	J	15	30	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-12-17.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	15	59	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-12-20.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	2.9	12	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-12-20.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	40		5.8	5.8	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-12-20.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	210		1.2	2.3	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-12-20.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	150		2.9	5.8	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-12-20.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	22		0.58	1.2	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-12-23.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	150		5.5	11	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-12-23.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	340		2.2	4.4	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-12-23.0-20180613	6/13/2018	SW6010B	7440-42-8	Boron	6.0	J	5.5	11	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-12-23.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	29		11	11	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-12-23.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	5.5	22	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-12-23.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	17		1.1	2.2	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-12-26.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	330		1.2	2.3	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-12-26.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	2.9	12	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-12-26.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	19		0.58	1.2	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-12-26.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	42		5.8	5.8	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-12-26.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	150		2.9	5.8	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-12-26.0-20180613	6/13/2018	SW6010B	7440-42-8	Boron	4.2	J	2.9	5.8	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-12-29.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	16		0.61	1.2	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-12-29.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	150		3.1	6.1	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-12-29.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	380		1.2	2.4	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-12-29.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	33		6.1	6.1	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-12-29.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	3.1	12	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-12-32.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	2.9	12	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-12-32.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	17		0.58	1.2	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-12-32.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	100		2.9	5.8	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-12-32.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	380		1.2	2.3	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-12-32.0-20180613	6/13/2018	SW6010B	7440-67-7	Zirconium	29		5.8	5.8	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-12-32.0-20180613	6/13/2018	SW6010B	7440-42-8	Boron	5.1	J	2.9	5.8	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-12-8.0-20180613	6/13/2018	SW6010B	7440-33-7	Tungsten		U	15	60	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402136211	RIBK-12-8.0-20180613	6/13/2018	SW6010B	7440-42-8	Boron	28	J	15	30	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-12-8.0-20180613	6/13/2018	SW6010B	7439-92-1	Lead	6.6	J	6.0	12	mg/kg	J	sp	Detect <PQL			

Table V. Overall Qualified Results

SDG	Client Sample ID	Sample Date	Method	Client Analyte ID	Analyte	Lab Result	Lab Qualifier	SQL	PQL	Units	Validator Qualifier	Reason Code	Data Quality Indicator	Qualification Finding	Acceptance Criteria	
4402136211	RIBK-12-8.0-20180613	6/13/2018	SW6010B	7440-48-4	Cobalt	5.9	J	3.0	6.0	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-12-8.0-20180613	6/13/2018	SW6010B	7440-24-6	Strontium	580		15	30	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-12-8.0-20180613	6/13/2018	SW6010B	7440-47-3	Chromium (total)	16		3.0	6.0	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-12-8.0-20180613	6/13/2018	SW6010B	7439-96-5	Manganese	560		6.0	12	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-12-8.0-20180613-FD	6/13/2018	SW6010B	7440-67-7	Zirconium	28		12	12	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402136211	RIBK-12-8.0-20180613-FD	6/13/2018	SW6010B	7440-24-6	Strontium	410		6.0	12	mg/kg	J-	m	MS/MSD %R	69,60	75-125	%
4402136211	RIBK-12-8.0-20180613-FD	6/13/2018	SW6010B	7439-96-5	Manganese	440		2.4	4.8	mg/kg	J-	m	MS/MSD %R	-,70	75-125	%
4402136211	RIBK-12-8.0-20180613-FD	6/13/2018	SW6010B	7440-47-3	Chromium (total)	22		1.2	2.4	mg/kg	J+	m	MS/MSD %R	-,135	75-125	%
4402136211	RIBK-12-8.0-20180613-FD	6/13/2018	SW6010B	7440-33-7	Tungsten		U	6.0	24	mg/kg	UJ	m	MS/MSD %R	51,47	75-125	%
4402137551	RIBK-13-14.0-20180614	6/14/2018	SW6010B	7439-98-7	Molybdenum	1.7	J	1.4	2.8	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-13-14.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	3.5	14	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-13-14.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	38		7.1	7.1	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-13-14.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	53		0.71	1.4	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-13-17.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	35		14	14	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-13-17.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	32		1.4	2.8	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-13-17.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	7.0	28	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-13-32.0-20180614	6/14/2018	SW6010B	7440-42-8	Boron	7.6	J	6.2	12	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-13-35.0-20180614	6/14/2018	SW6010B	7440-42-8	Boron	3.0	J	2.9	5.9	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-7-26.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	41	F1	0.70	1.4	mg/kg	J+	m	MS/MSD %R	145,141	75-125	%
4402137551	RIBK-7-26.0-20180614	6/14/2018	SW6010B	7440-39-3	Barium	350	F2	1.0	2.1	mg/kg	J	ld	MS/MSD RPD	45	20	%
4402137551	RIBK-7-26.0-20180614	6/14/2018	SW6010B	7440-47-3	Chromium (total)	22	F1	0.70	1.4	mg/kg	J+	m	MS/MSD %R	128,-	75-125	%
4402137551	RIBK-7-26.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		UF1	3.5	14	mg/kg	UJ	m	MS/MSD %R	52,49	75-125	%
4402137551	RIBK-7-26.0-20180614	6/14/2018	SW6010B	7440-24-6	Strontium	160	F1	3.5	7.0	mg/kg	J+	m	MS/MSD %R	152,149	75-125	%
4402137551	RIBK-7-26.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	40	F1	7.0	7.0	mg/kg	J+	m	MS/MSD %R	157,149	75-125	%
4402137551	RIBK-7-26.0-20180614	6/14/2018	SW6010B	7440-50-8	Copper	19	F1	1.5	2.8	mg/kg	J+	m	MS/MSD %R	136,132	75-125	%
4402137551	RIBK-7-29.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		UF1	3.2	13	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-7-29.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	34	F1	0.63	1.3	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-7-29.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	28	F1	6.3	6.3	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-7-29.0-20180614-FD	6/14/2018	SW6010B	7440-33-7	Tungsten		U	3.3	13	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-7-29.0-20180614-FD	6/14/2018	SW6010B	7440-67-7	Zirconium	38		6.6	6.6	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-7-29.0-20180614-FD	6/14/2018	SW6010B	7440-62-2	Vanadium	42		0.66	1.3	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-7-32.0-20180614	6/14/2018	SW6010B	7440-42-8	Boron	4.6	J	2.8	5.7	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-7-32.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	46		0.57	1.1	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-7-32.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	29		5.7	5.7	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-7-32.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	2.8	11	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-7-35.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	38		0.59	1.2	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-7-35.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	32		5.9	5.9	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-7-35.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	3.0	12	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-7-35.0-20180614	6/14/2018	SW6010B	7440-42-8	Boron	5.7	J	3.0	5.9	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-7-38.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	3.2	13	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-7-38.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	38		6.3	6.3	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-7-38.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	60		0.63	1.3	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-7-38.0-20180614	6/14/2018	SW6010B	7440-42-8	Boron	4.5	J	3.2	6.3	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-7-41.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	42		6.3	6.3	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-7-41.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	3.2	13	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-7-41.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	40		0.63	1.3	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-7-44.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	3.6	14	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-7-44.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	34		7.1	7.1	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-7-44.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	40		0.71	1.4	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-7-47.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	18		13	13	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%

Table V. Overall Qualified Results

SDG	Client Sample ID	Sample Date	Method	Client Analyte ID	Analyte	Lab Result	Lab Qualifier	SQL	PQL	Units	Validator Qualifier	Reason Code	Data Quality Indicator	Qualification Finding	Acceptance Criteria	
4402137551	RIBK-7-47.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	23		1.3	2.6	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-7-47.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	6.5	26	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-7-47.0-20180614	6/14/2018	SW6010B	7440-42-8	Boron	9.9	J	6.5	13	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-8-16.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	37		6.7	6.7	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-8-16.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	3.4	13	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-8-16.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	38		0.67	1.3	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-8-16.0-20180614-FD	6/14/2018	SW6010B	7440-67-7	Zirconium	42		6.8	6.8	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-8-16.0-20180614-FD	6/14/2018	SW6010B	7440-33-7	Tungsten		U	3.4	14	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-8-16.0-20180614-FD	6/14/2018	SW6010B	7440-62-2	Vanadium	43		0.68	1.4	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-8-19.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	6.0	24	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-8-19.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	22		12	12	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-8-19.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	24		1.2	2.4	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-8-19.0-20180614	6/14/2018	SW6010B	7440-42-8	Boron	7.6	J	6.0	12	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-8-22.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	39		6.4	6.4	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-8-22.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	43		0.64	1.3	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-8-22.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	3.2	13	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-8-25.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	34		14	14	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-8-25.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	6.8	27	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-8-25.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	29		1.4	2.7	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-8-28.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	49		0.58	1.2	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-8-28.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	33		5.8	5.8	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-8-28.0-20180614	6/14/2018	SW6010B	7440-42-8	Boron	4.6	J	2.9	5.8	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-8-28.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	2.9	12	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-8-31.0-20180614	6/14/2018	SW6010B	7440-42-8	Boron	3.1	J	2.9	5.8	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-8-31.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	55		0.58	1.2	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-8-31.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	26		5.8	5.8	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-8-31.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	2.9	12	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-8-34.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	3.1	13	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402137551	RIBK-8-34.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	34		6.3	6.3	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-8-34.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	37		0.63	1.3	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-8-37.0-20180614	6/14/2018	SW6010B	7440-42-8	Boron	8.2	J	6.2	12	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-8-37.0-20180614	6/14/2018	SW6010B	7440-62-2	Vanadium	34		1.2	2.5	mg/kg	J+	m	MS/MSD %R	127,-	75-125	%
4402137551	RIBK-8-37.0-20180614	6/14/2018	SW6010B	7440-67-7	Zirconium	31		12	12	mg/kg	J+	m	MS/MSD %R	134,-	75-125	%
4402137551	RIBK-8-37.0-20180614	6/14/2018	SW6010B	7440-33-7	Tungsten		U	6.2	25	mg/kg	UJ	m	MS/MSD %R	52,47	75-125	%
4402136211	RIBK-10-12.0-20180613	6/13/2018	SW6020A	7782-49-2	Selenium	1.0	J	0.92	1.4	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-10-12.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.5	7.2	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-10-12.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.58	1.4	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-10-12.0-20180613-FD	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.60	1.5	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-10-12.0-20180613-FD	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.6	7.4	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-10-12.0-20180613-FD	6/13/2018	SW6020A	7782-49-2	Selenium	1.4	J	0.95	1.5	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-10-15.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.4	7.1	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-10-15.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.56	1.4	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-10-18.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		UF1	3.5	7.4	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-10-18.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		UF1	0.59	1.5	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-10-21.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.5	7.2	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-10-21.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.58	1.4	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-10-24.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.54	1.4	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-10-24.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.3	6.8	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-10-27.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.0	6.3	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-10-27.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.51	1.3	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%

Table V. Overall Qualified Results

SDG	Client Sample ID	Sample Date	Method	Client Analyte ID	Analyte	Lab Result	Lab Qualifier	SQL	PQL	Units	Validator Qualifier	Reason Code	Data Quality Indicator	Qualification Finding	Acceptance Criteria	
4402136211	RIBK-10-30.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.49	1.2	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-10-30.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.0	6.2	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-10-33.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.1	6.5	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-10-33.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.52	1.3	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-10-36.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.3	6.9	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-10-36.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.55	1.4	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-12-11.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.5	7.3	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-12-11.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.59	1.5	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-12-14.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.53	1.3	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-12-14.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.2	6.6	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-12-17.0-20180613	6/13/2018	SW6020A	7782-49-2	Selenium	1.2	J	0.90	1.4	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-12-17.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.4	7.0	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-12-17.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.56	1.4	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-12-20.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.0	6.3	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-12-20.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.50	1.3	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-12-23.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.49	1.2	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-12-23.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.0	6.2	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-12-26.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.3	6.8	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-12-26.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.54	1.4	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-12-29.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.54	1.3	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-12-29.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.2	6.7	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-12-32.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	2.9	6.0	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-12-32.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.48	1.2	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-12-8.0-20180613	6/13/2018	SW6020A	7782-49-2	Selenium	1.3	J	0.89	1.4	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-12-8.0-20180613	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.55	1.4	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-12-8.0-20180613	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.3	6.9	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402136211	RIBK-12-8.0-20180613-FD	6/13/2018	SW6020A	7782-49-2	Selenium	0.91	J	0.89	1.4	mg/kg	J	sp	Detect <PQL			
4402136211	RIBK-12-8.0-20180613-FD	6/13/2018	SW6020A	7440-36-0	Antimony		U	0.56	1.4	mg/kg	UJ	m	MS/MSD %R	52,51	75-125	%
4402136211	RIBK-12-8.0-20180613-FD	6/13/2018	SW6020A	7440-03-1	Niobium		U	3.3	7.0	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-13-14.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.6	7.6	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-13-14.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.60	1.5	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-13-17.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.63	1.6	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-13-17.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.8	7.9	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-13-20.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		UF1	4.0	8.3	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-13-20.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		UF1	0.66	1.7	mg/kg	UJ	m	MS/MSD %R	37,35	75-125	%
4402137551	RIBK-13-23.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.60	1.5	mg/kg	UJ	m	MS/MSD %R	37,35	75-125	%
4402137551	RIBK-13-23.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.6	7.6	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-13-23.0-20180614	6/14/2018	SW6020A	7782-49-2	Selenium	1.4	J	0.97	1.5	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-13-26.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.7	7.8	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-13-26.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.62	1.6	mg/kg	UJ	m	MS/MSD %R	37,35	75-125	%
4402137551	RIBK-13-29.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.59	1.5	mg/kg	UJ	m	MS/MSD %R	37,35	75-125	%
4402137551	RIBK-13-29.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.5	7.4	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-13-29.0-20180614	6/14/2018	SW6020A	7782-49-2	Selenium	1.3	J	0.95	1.5	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-13-32.0-20180614	6/14/2018	SW6020A	7782-49-2	Selenium	1.1	J	0.94	1.5	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-13-32.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.5	7.4	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-13-32.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.59	1.5	mg/kg	UJ	m	MS/MSD %R	37,35	75-125	%
4402137551	RIBK-13-35.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.58	1.4	mg/kg	UJ	m	MS/MSD %R	37,35	75-125	%
4402137551	RIBK-13-35.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.5	7.2	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-7-26.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		UF1	4.0	8.3	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-7-26.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		UF1	0.66	1.7	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%

Table V. Overall Qualified Results

SDG	Client Sample ID	Sample Date	Method	Client Analyte ID	Analyte	Lab Result	Lab Qualifier	SQL	PQL	Units	Validator Qualifier	Reason Code	Data Quality Indicator	Qualification Finding	Acceptance Criteria	
4402137551	RIBK-7-29.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.60	1.5	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-7-29.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.6	7.5	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-7-29.0-20180614-FD	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.5	7.2	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-7-29.0-20180614-FD	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.58	1.4	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-7-32.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	2.9	6.1	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-7-32.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.49	1.2	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-7-35.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.51	1.3	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-7-35.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.0	6.4	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-7-38.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.54	1.4	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-7-38.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.2	6.8	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-7-41.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.5	7.3	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-7-41.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.58	1.5	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-7-44.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.67	1.7	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-7-44.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	4.0	8.4	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-7-47.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.55	1.4	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-7-47.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.3	6.9	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-8-16.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.60	1.5	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-8-16.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.6	7.5	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-8-16.0-20180614-FD	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.61	1.5	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-8-16.0-20180614-FD	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.7	7.7	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-8-19.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.4	7.1	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-8-19.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.57	1.4	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-8-22.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.63	1.6	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-8-22.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.8	7.9	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-8-25.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.6	7.5	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-8-25.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.60	1.5	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-8-28.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.51	1.3	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-8-28.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.1	6.4	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-8-31.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.55	1.4	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-8-31.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.3	6.9	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-8-34.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.5	7.3	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-8-34.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.59	1.5	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-8-37.0-20180614	6/14/2018	SW6020A	7440-36-0	Antimony		U	0.59	1.5	mg/kg	UJ	m	MS/MSD %R	36,35	75-125	%
4402137551	RIBK-8-37.0-20180614	6/14/2018	SW6020A	7440-03-1	Niobium		U	3.5	7.3	mg/kg	R	m	MS/MSD %R	0,0	75-125	%
4402137551	RIBK-13-26.0-20180614	6/14/2018	SW7471A	7439-97-6	Mercury	0.022	J	0.017	0.028	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-7-29.0-20180614	6/14/2018	SW7471A	7439-97-6	Mercury	0.016	J	0.015	0.025	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-7-29.0-20180614-FD	6/14/2018	SW7471A	7439-97-6	Mercury	0.015	J	0.015	0.026	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-7-41.0-20180614	6/14/2018	SW7471A	7439-97-6	Mercury	0.021	J	0.015	0.026	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-13-26.0-20180614	6/14/2018	SW7199	18540-29-9	Chromium VI	0.31	J	0.21	0.42	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-7-26.0-20180614	6/14/2018	SW7199	18540-29-9	Chromium VI	0.27	J	0.21	0.42	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-8-28.0-20180614	6/14/2018	SW7199	18540-29-9	Chromium VI	0.21	J	0.18	0.35	mg/kg	J	sp	Detect <PQL			
4402137551	RIBK-8-31.0-20180614	6/14/2018	SW7199	18540-29-9	Chromium VI	0.20	J	0.18	0.35	mg/kg	J	sp	Detect <PQL			
4402136212	RIBK-10-12.0-20180613-FD	6/13/2018	E904.0	15262-20-1	Radium-228	0.541		0.296	0.296	pci/g	J	bl	MB contamination	0.541	<1.00	pCi/g
4402136212	RIBK-10-15.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.965		0.295	0.295	pci/g	J	bl	MB contamination	0.965	<1.00	pCi/g
4402136212	RIBK-10-18.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.708		0.322	0.322	pci/g	J	bl	MB contamination	0.708	<1.00	pCi/g
4402136212	RIBK-10-21.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.806		0.353	0.353	pci/g	J	bl	MB contamination	0.806	<1.00	pCi/g
4402136212	RIBK-10-24.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.951		0.312	0.312	pci/g	J	bl	MB contamination	0.951	<1.00	pCi/g
4402136212	RIBK-10-27.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.825		0.292	0.292	pci/g	J	bl	MB contamination	0.825	<1.00	pCi/g
4402136212	RIBK-10-30.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.560		0.301	0.301	pci/g	J	bl	MB contamination	0.560	<1.00	pCi/g
4402136212	RIBK-10-36.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.852		0.364	0.364	pci/g	J	bl	MB contamination	0.852	<1.00	pCi/g

Table V. Overall Qualified Results

SDG	Client Sample ID	Sample Date	Method	Client Analyte ID	Analyte	Lab Result	Lab Qualifier	SQL	PQL	Units	Validator Qualifier	Reason Code	Data Quality Indicator	Qualification Finding	Acceptance Criteria	
4402136212	RIBK-12-11.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.615		0.304	0.304	pci/g	J	bl	MB contamination	0.615	<1.00	pCi/g
4402136212	RIBK-12-14.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.798		0.462	0.462	pci/g	J	bl	MB contamination	0.798	<1.00	pCi/g
4402136212	RIBK-12-17.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.644		0.352	0.352	pci/g	J	bl	MB contamination	0.644	<1.00	pCi/g
4402136212	RIBK-12-20.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.810		0.302	0.302	pci/g	J	bl	MB contamination	0.810	<1.00	pCi/g
4402136212	RIBK-12-23.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.531		0.329	0.329	pci/g	J	bl	MB contamination	0.531	<1.00	pCi/g
4402136212	RIBK-12-29.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.718		0.275	0.275	pci/g	J	bl	MB contamination	0.718	<1.00	pCi/g
4402136212	RIBK-12-32.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.889		0.310	0.310	pci/g	J	bl	MB contamination	0.889	<1.00	pCi/g
4402136212	RIBK-12-8.0-20180613	6/13/2018	E904.0	15262-20-1	Radium-228	0.419		0.363	0.363	pci/g	J	bl	MB contamination	0.419	<1.00	pCi/g
4402136212	RIBK-12-8.0-20180613-FD	6/13/2018	E904.0	15262-20-1	Radium-228	0.457		0.319	0.319	pci/g	J	bl	MB contamination	0.457	<1.00	pCi/g

ATTACHMENT A

Metals Data Validation Report

Aluminum, Antimony, Arsenic, Boron, Barium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Nickel, Niobium, Palladium, Phosphorus, Selenium, Silver, Strontium, Thallium, Tungsten, Uranium, Vanadium, and Zirconium by Environmental Protection Agency (EPA) SW 846 Methods 6010B/6020A
Mercury by EPA SW 846 Method 7471A

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Instrument Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

IV. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

SDG	Blank ID	Analyte	Maximum Concentration	Associated Samples
440-213621-1	PB (prep blank)	Iron	14.8 mg/Kg	RIBK-10-12.0-20180613 RIBK-10-12.0-20180613-FD RIBK-10-15.0-20180613 RIBK-10-21.0-20180613 RIBK-10-24.0-20180613 RIBK-10-27.0-20180613 RIBK-10-30.0-20180613 RIBK-10-33.0-20180613 RIBK-10-36.0-20180613 RIBK-12-8.0-20180613 RIBK-12-8.0-20180613-FD RIBK-12-11.0-20180613 RIBK-12-14.0-20180613 RIBK-12-17.0-20180613 RIBK-12-20.0-20180613 RIBK-12-23.0-20180613 RIBK-12-26.0-20180613 RIBK-12-29.0-20180613 RIBK-12-32.0-20180613
440-213755-1	ICB/CCB	Magnesium	0.0171 mg/L	RIBK-7-29.0-20180614** RIBK-7-29.0-20180614-FD** RIBK-7-32.0-20180614**
440-213755-1	ICB/CCB	Magnesium	0.0183 mg/L	RIBK-7-35.0-20180614** RIBK-7-38.0-20180614** RIBK-7-41.0-20180614** RIBK-7-44.0-20180614** RIBK-8-16.0-20180614** RIBK-8-16.0-20180614-FD** RIBK-8-22.0-20180614** RIBK-8-28.0-20180614** RIBK-8-31.0-20180614** RIBK-8-34.0-20180614** RIBK-13-14.0-20180614**

Sample concentrations were compared to concentrations detected in the laboratory blanks. The sample concentrations were either not detected or were significantly greater than the concentrations found in the associated laboratory blanks.

VI. Field Blanks

No field blanks were identified in these SDGs.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

SDG	Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
440-213621-1	RIBK-10-12.0-20180613MS/MSD (RIBK-10-12.0-20180613 RIBK-10-12.0-20180613-FD RIBK-10-15.0-20180613 RIBK-10-21.0-20180613 RIBK-10-24.0-20180613 RIBK-10-27.0-20180613 RIBK-10-30.0-20180613 RIBK-10-33.0-20180613 RIBK-10-36.0-20180613 RIBK-12-8.0-20180613 RIBK-12-8.0-20180613-FD RIBK-12-11.0-20180613 RIBK-12-14.0-20180613 RIBK-12-17.0-20180613 RIBK-12-20.0-20180613 RIBK-12-23.0-20180613 RIBK-12-26.0-20180613 RIBK-12-29.0-20180613 RIBK-12-32.0-20180613)	Strontium Tungsten Manganese	69 (75-125) 51 (75-125) -	60 (75-125) 47 (75-125) 70 (75-125)	J- (all detects) UJ (all non-detects)	A
440-213621-1	RIBK-10-12.0-20180613MS/MSD (RIBK-10-12.0-20180613 RIBK-10-12.0-20180613-FD RIBK-10-15.0-20180613 RIBK-10-21.0-20180613 RIBK-10-24.0-20180613 RIBK-10-27.0-20180613 RIBK-10-30.0-20180613 RIBK-10-33.0-20180613 RIBK-10-36.0-20180613 RIBK-12-8.0-20180613-FD RIBK-12-11.0-20180613 RIBK-12-14.0-20180613 RIBK-12-20.0-20180613 RIBK-12-23.0-20180613 RIBK-12-26.0-20180613 RIBK-12-29.0-20180613 RIBK-12-32.0-20180613)	Zirconium	128 (75-125)	-	J+ (all detects)	A
440-213621-1	RIBK-10-12.0-20180613MS/MSD (RIBK-10-12.0-20180613 RIBK-10-12.0-20180613-FD RIBK-10-15.0-20180613 RIBK-10-21.0-20180613 RIBK-10-24.0-20180613 RIBK-10-27.0-20180613 RIBK-10-30.0-20180613 RIBK-10-33.0-20180613 RIBK-10-36.0-20180613 RIBK-12-8.0-20180613 RIBK-12-8.0-20180613-FD RIBK-12-11.0-20180613 RIBK-12-14.0-20180613 RIBK-12-17.0-20180613 RIBK-12-20.0-20180613 RIBK-12-23.0-20180613 RIBK-12-26.0-20180613 RIBK-12-29.0-20180613 RIBK-12-32.0-20180613)	Chromium	-	135 (75-125)	J+ (all detects)	A
440-213621-1	RIBK-10-18.0-20180613MS/MSD (RIBK-10-18.0-20180613)	Barium Strontium	357 (75-125) 128 (75-125)	142 (75-125) -	J+ (all detects) J+ (all detects)	A

SDG	Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
440-213621-1	RIBK-10-18.0-20180613MS/MSD (RIBK-10-18.0-20180613)	Copper	48 (75-125)	54 (75-125)	J- (all detects)	A
440-213621-1	RIBK-10-18.0-20180613MS/MSD (All samples in SDG 440-213621-1)	Antimony	52 (75-125)	51 (75-125)	UJ (all non-detects)	A
440-213621-1	RIBK-10-18.0-20180613MS/MSD (All samples in SDG 440-213621-1)	Niobium	0 (75-125)	0 (75-125)	R (all non-detects)	A
440-213755-1	RIBK-7-26.0-20180614MS/MSD** (RIBK-7-26.0-20180614**)	Chromium Copper Strontium Vanadium Zirconium	128 (75-125) 136 (75-125) 152 (75-125) 145 (75-125) 157 (75-125)	- 132 (75-125) 149 (75-125) 141 (75-125) 149 (75-125)	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	A
440-213755-1	RIBK-7-26.0-20180614MS/MSD** (RIBK-7-26.0-20180614**)	Tungsten	52 (75-125)	49 (75-125)	UJ (all non-detects)	A
440-213755-1	RIBK-7-26.0-20180614MS/MSD** (RIBK-7-26.0-20180614** RIBK-7-29.0-20180614** RIBK-7-29.0-20180614-FD** RIBK-7-32.0-20180614** RIBK-7-35.0-20180614** RIBK-7-38.0-20180614** RIBK-7-41.0-20180614** RIBK-7-44.0-20180614** RIBK-7-47.0-20180614** RIBK-8-16.0-20180614** RIBK-8-16.0-20180614-FD** RIBK-8-19.0-20180614** RIBK-8-22.0-20180614** RIBK-8-25.0-20180614** RIBK-8-28.0-20180614** RIBK-8-31.0-20180614** RIBK-8-34.0-20180614** RIBK-8-37.0-20180614** RIBK-13-14.0-20180614** RIBK-13-17.0-20180614**)	Antimony	36 (75-125)	35 (75-125)	UJ (all non-detects)	A
440-213755-1	RIBK-7-26.0-20180614MS/MSD** (RIBK-7-26.0-20180614** RIBK-7-29.0-20180614** RIBK-7-29.0-20180614-FD** RIBK-7-32.0-20180614** RIBK-7-35.0-20180614** RIBK-7-38.0-20180614** RIBK-7-41.0-20180614** RIBK-7-44.0-20180614** RIBK-7-47.0-20180614** RIBK-8-16.0-20180614** RIBK-8-16.0-20180614-FD** RIBK-8-19.0-20180614** RIBK-8-22.0-20180614** RIBK-8-25.0-20180614** RIBK-8-28.0-20180614** RIBK-8-31.0-20180614** RIBK-8-34.0-20180614** RIBK-8-37.0-20180614** RIBK-13-14.0-20180614** RIBK-13-17.0-20180614**)	Niobium	0 (75-125)	0 (75-125)	R (all non-detects)	A

** Samples underwent Stage 4 data validation

SDG	Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
440-213755-1	RIBK-7-29.0-20180614MS/MSD** (RIBK-7-29.0-20180614** RIBK-7-29.0-20180614-FD** RIBK-7-32.0-20180614** RIBK-7-35.0-20180614** RIBK-7-38.0-20180614** RIBK-7-41.0-20180614** RIBK-7-44.0-20180614** RIBK-7-47.0-20180614** RIBK-8-16.0-20180614** RIBK-8-16.0-20180614-FD** RIBK-8-19.0-20180614** RIBK-8-22.0-20180614** RIBK-8-25.0-20180614** RIBK-8-28.0-20180614** RIBK-8-31.0-20180614** RIBK-8-34.0-20180614** RIBK-8-37.0-20180614** RIBK-13-14.0-20180614** RIBK-13-17.0-20180614**)	Tungsten	52 (75-125)	47 (75-125)	UJ (all non-detects)	A
440-213755-1	RIBK-7-29.0-20180614MS/MSD** (RIBK-7-29.0-20180614** RIBK-7-29.0-20180614-FD** RIBK-7-32.0-20180614** RIBK-7-35.0-20180614** RIBK-7-38.0-20180614** RIBK-7-41.0-20180614** RIBK-7-44.0-20180614** RIBK-7-47.0-20180614** RIBK-8-16.0-20180614** RIBK-8-16.0-20180614-FD** RIBK-8-19.0-20180614** RIBK-8-22.0-20180614** RIBK-8-25.0-20180614** RIBK-8-28.0-20180614** RIBK-8-31.0-20180614** RIBK-8-34.0-20180614** RIBK-8-37.0-20180614** RIBK-13-14.0-20180614** RIBK-13-17.0-20180614**)	Vanadium Zirconium	127 (75-125) 134 (75-125)	- -	J+ (all detects) J+ (all detects)	A
440-213755-1	RIBK-13-20.0-20180614MS/MSD** (RIBK-13-20.0-20180614** RIBK-13-23.0-20180614** RIBK-13-26.0-20180614** RIBK-13-29.0-20180614** RIBK-13-32.0-20180614** RIBK-13-35.0-20180614**)	Antimony	37 (75-125)	35 (75-125)	UJ (all non-detects)	A
440-213755-1	RIBK-13-20.0-20180614MS/MSD** (RIBK-13-20.0-20180614** RIBK-13-23.0-20180614** RIBK-13-26.0-20180614** RIBK-13-29.0-20180614** RIBK-13-32.0-20180614** RIBK-13-35.0-20180614**)	Niobium	0 (75-125)	0 (75-125)	R (all non-detects)	A

** Samples underwent Stage 4 data validation

Relative percent differences (RPD) were within QC limits with the following exceptions:

SDG	Spike ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
440-213621-1	RIBK-10-18.0-20180613MS/MSD (RIBK-10-18.0-20180613)	Barium	49 (≤20)	J (all detects)	A
440-213755-1	RIBK-7-26.0-20180614MS/MSD** (RIBK-7-26.0-20180614**)	Barium	45 (≤20)	J (all detects)	A

VIII. Duplicate Sample Analysis

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in these SDGs, and therefore duplicate analyses were not performed for these SDGs.

IX. Serial Dilution

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits.

X. Laboratory Control Samples/Certified Reference Materials

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Certified reference materials (CRM) were analyzed as required by the methods. The results were within QC limits.

XI. Field Duplicates

Samples RIBK-10-12.0-20180613 and RIBK-10-12.0-20180613-FD (both from SDG 440-213621-1), samples RIBK-12-8.0-20180613 and RIBK-12-8.0-20180613-FD (both from SDG 440-213621-1), samples RIBK-7-29.0-20180614** and RIBK-7-29.0-20180614-FD** (both from SDG 440-21362-1), and samples RIBK-8-16.0-20180614** and RIBK-8-16.0-20180614-FD** (both from SDG 440-21362-1)were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

SDG	Analyte	Concentration (mg/Kg)		RPD (Limits)	Flag	A or P
		RIBK-10-12.0-20180613	RIBK-10-12.0-20180613-FD			
440-213621-1	Aluminum	17000	17000	0 (≤50)	-	-
	Arsenic	11	12	9 (≤50)	-	-
	Barium	29	670	183 (≤50)	J (all detects)	A
	Boron	12	13	8 (≤50)	-	-
	Chromium	43	56	26 (≤50)	-	-
	Cobalt	5.8	4.8	19 (≤50)	-	-
	Copper	8.4	9.3	10 (≤50)	-	-
	Iron	15000	14000	7 (≤50)	-	-
	Lead	6.2	6.8	9 (≤50)	-	-
	Magnesium	12000	12000	0 (≤50)	-	-
	Manganese	160	190	17 (≤50)	-	-
	Nickel	15	15	0 (≤50)	-	-
	Phosphorus	570	540	5 (≤50)	-	-
	Selenium	1.0	1.4	33 (≤50)	-	-
	Strontium	170	150	13 (≤50)	-	-
	Uranium	1.7	1.6	6 (≤50)	-	-
	Vanadium	22	24	9 (≤50)	-	-
	Zirconium	41	39	5 (≤50)	-	-

SDG	Analyte	Concentration (mg/Kg)		RPD (Limits)	Flag	A or P
		RIBK-12-8.0-20180613	RIBK-12-8.0-20180613-FD			
440-213621-1	Aluminum	11000	13000	17 (≤50)	-	-
	Arsenic	31	32	3 (≤50)	-	-
	Barium	81	80	1 (≤50)	-	-
	Boron	28	33	16 (≤50)	-	-
	Chromium	16	22	32 (≤50)	-	-
	Cobalt	5.9	4.9	19 (≤50)	-	-
	Copper	6.6U	7.0	200 (≤50)	NQ	
	Iron	12000	13000	8 (≤50)	-	-
	Lead	6.6	6.6	0 (≤50)	-	-
	Magnesium	12000	13000	8 (≤50)	-	-
	Manganese	560	440	24 (≤50)	-	-
	Nickel	14	14	0 (≤50)	-	-
	Phosphorus	680	720	6 (≤50)	-	-
	Selenium	1.3	0.91	35 (≤50)	-	-
	Strontium	580	410	34 (≤50)	-	-
	Uranium	5.3	5.5	4 (≤50)	-	-
	Vanadium	25	29	15 (≤50)	-	-
	Zirconium	30U	28	200 (≤50)	NQ	-

SDG	Analyte	Concentration (mg/Kg)		RPD (Limits)	Flag	A or P
		RIBK-7-29.0-20180614**	RIBK-7-29.0-20180614-FD**			
440-213755-1	Aluminum	18000	23000	24 (≤50)	-	-
	Arsenic	37	38	3 (≤50)	-	-
	Barium	78	83	6 (≤50)	-	-
	Boron	9.5	13	31 (≤50)	-	-
	Chromium	19	24	23 (≤50)	-	-
	Cobalt	8.7	9.9	13 (≤50)	-	-
	Copper	15	20	29 (≤50)	-	-
	Iron	18000	21000	15 (≤50)	-	-
	Lead	9.5	11	15 (≤50)	-	-
	Magnesium	17000	20000	16 (≤50)	-	-
	Manganese	420	460	9 (≤50)	-	-
	Nickel	19	25	27 (≤50)	-	-
	Phosphorus	830	1000	19 (≤50)	-	-
	Selenium	2.5	2.5	0 (≤50)	-	-
	Strontium	170	180	6 (≤50)	-	-
	Uranium	1.3	1.2	8 (≤50)	-	-
	Vanadium	34	42	21 (≤50)	-	-
	Zirconium	28	38	30 (≤50)	-	-
	Mercury	0.016	0.015	6 (≤50)	-	-

** Samples underwent Stage 4 data validation

SDG	Analyte	Concentration (mg/Kg)		RPD (Limits)	Flag	A or P
		RIBK-8-16.0-20180614**	RIBK-8-16.0-20180614-FD**			
440-213755-1	Aluminum	20000	23000	14 (≤50)	-	-
	Arsenic	32	40	22 (≤50)	-	-
	Barium	52	60	14 (≤50)	-	-
	Boron	17	21	21 (≤50)	-	-
	Chromium	24	26	8 (≤50)	-	-
	Cobalt	7.7	9.1	17 (≤50)	-	-
	Copper	16	20	22 (≤50)	-	-
	Iron	20000	23000	14 (≤50)	-	-
	Lead	8.5	9.8	14 (≤50)	-	-
	Magnesium	17000	20000	16 (≤50)	-	-
	Manganese	330	430	26 (≤50)	-	-
	Nickel	20	24	18 (≤50)	-	-
	Phosphorus	960	1100	14 (≤50)	-	-
	Selenium	1.8	2.3	24 (≤50)	-	-
	Strontium	140	160	13 (≤50)	-	-
	Uranium	1.3	1.6	21 (≤50)	-	-
	Vanadium	38	43	12 (≤50)	-	-
	Zirconium	37	42	13 (≤50)	-	-

NQ = No data were qualified when either the primary or duplicate result was not detected or was below the practical quantitation limit (PQL).

XII. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits.

XIII. Sample Result Verification

All sample result verifications were acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the methods.

Due to MS/MSD %R, data were rejected in forty-six samples

Due to MS/MSD %R and RPD and field duplicate RPD, data were qualified as estimated in forty-six samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

NERT, Soil Background Concentration Study
Metals - Data Qualification Summary - SDGs 440-213621-1, 440-213755-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
440-213621-1	RIBK-10-12.0-20180613 RIBK-10-12.0-20180613-FD RIBK-10-15.0-20180613 RIBK-10-21.0-20180613 RIBK-10-24.0-20180613 RIBK-10-27.0-20180613 RIBK-10-30.0-20180613 RIBK-10-33.0-20180613 RIBK-10-36.0-20180613 RIBK-12-8.0-20180613 RIBK-12-8.0-20180613-FD RIBK-12-11.0-20180613 RIBK-12-14.0-20180613 RIBK-12-17.0-20180613 RIBK-12-20.0-20180613 RIBK-12-23.0-20180613 RIBK-12-26.0-20180613 RIBK-12-29.0-20180613 RIBK-12-32.0-20180613	Strontium Tungsten Manganese	J- (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R) (m)
440-213621-1	RIBK-10-12.0-20180613 RIBK-10-12.0-20180613-FD RIBK-10-15.0-20180613 RIBK-10-21.0-20180613 RIBK-10-24.0-20180613 RIBK-10-27.0-20180613 RIBK-10-30.0-20180613 RIBK-10-33.0-20180613 RIBK-10-36.0-20180613 RIBK-12-8.0-20180613-FD RIBK-12-11.0-20180613 RIBK-12-14.0-20180613 RIBK-12-20.0-20180613 RIBK-12-23.0-20180613 RIBK-12-26.0-20180613 RIBK-12-29.0-20180613 RIBK-12-32.0-20180613	Zirconium	J+ (all detects)	A	Matrix spike/Matrix spike duplicate (%R) (m)
440-213621-1	RIBK-10-12.0-20180613 RIBK-10-12.0-20180613-FD RIBK-10-15.0-20180613 RIBK-10-21.0-20180613 RIBK-10-24.0-20180613 RIBK-10-27.0-20180613 RIBK-10-30.0-20180613 RIBK-10-33.0-20180613 RIBK-10-36.0-20180613 RIBK-12-8.0-20180613 RIBK-12-8.0-20180613-FD RIBK-12-11.0-20180613 RIBK-12-14.0-20180613 RIBK-12-17.0-20180613 RIBK-12-20.0-20180613 RIBK-12-23.0-20180613 RIBK-12-26.0-20180613 RIBK-12-29.0-20180613 RIBK-12-32.0-20180613	Chromium	J+ (all detects)	A	Matrix spike/Matrix spike duplicate (%R) (m)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
440-213621-1	RIBK-10-18.0-20180613	Barium Strontium	J+ (all detects) J+ (all detects)	A	Matrix spike/Matrix spike duplicate (%R) (m)
440-213621-1	RIBK-10-18.0-20180613	Copper	J- (all detects)	A	Matrix spike/Matrix spike duplicate (%R) (m)
440-213621-1	RIBK-10-12.0-20180613 RIBK-10-12.0-20180613-FD RIBK-10-15.0-20180613 RIBK-10-18.0-20180613 RIBK-10-21.0-20180613 RIBK-10-24.0-20180613 RIBK-10-27.0-20180613 RIBK-10-30.0-20180613 RIBK-10-33.0-20180613 RIBK-10-36.0-20180613 RIBK-12-8.0-20180613 RIBK-12-8.0-20180613-FD RIBK-12-11.0-20180613 RIBK-12-14.0-20180613 RIBK-12-17.0-20180613 RIBK-12-20.0-20180613 RIBK-12-23.0-20180613 RIBK-12-26.0-20180613 RIBK-12-29.0-20180613 RIBK-12-32.0-20180613	Antimony	UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R) (m)
440-213621-1	RIBK-10-12.0-20180613 RIBK-10-12.0-20180613-FD RIBK-10-15.0-20180613 RIBK-10-18.0-20180613 RIBK-10-21.0-20180613 RIBK-10-24.0-20180613 RIBK-10-27.0-20180613 RIBK-10-30.0-20180613 RIBK-10-33.0-20180613 RIBK-10-36.0-20180613 RIBK-12-8.0-20180613 RIBK-12-8.0-20180613-FD RIBK-12-11.0-20180613 RIBK-12-14.0-20180613 RIBK-12-17.0-20180613 RIBK-12-20.0-20180613 RIBK-12-23.0-20180613 RIBK-12-26.0-20180613 RIBK-12-29.0-20180613 RIBK-12-32.0-20180613	Niobium	R (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R) (m)
440-213755-1	RIBK-7-26.0-20180614**	Chromium Copper Strontium Vanadium Zirconium	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	A	Matrix spike/Matrix spike duplicate (%R) (m)

** Samples underwent Stage 4 data validation

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
440-213755-1	RIBK-7-26.0-20180614 RIBK-7-29.0-20180614** RIBK-7-29.0-20180614-FD** RIBK-7-32.0-20180614** RIBK-7-35.0-20180614** RIBK-7-38.0-20180614** RIBK-7-41.0-20180614** RIBK-7-44.0-20180614** RIBK-7-47.0-20180614** RIBK-8-16.0-20180614** RIBK-8-16.0-20180614-FD** RIBK-8-19.0-20180614** RIBK-8-22.0-20180614** RIBK-8-25.0-20180614** RIBK-8-28.0-20180614** RIBK-8-31.0-20180614** RIBK-8-34.0-20180614** RIBK-8-37.0-20180614** RIBK-13-14.0-20180614** RIBK-13-17.0-20180614**	Tungsten	UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R) (m)
440-213755-1	RIBK-7-26.0-20180614** RIBK-7-29.0-20180614** RIBK-7-29.0-20180614-FD** RIBK-7-32.0-20180614** RIBK-7-35.0-20180614** RIBK-7-38.0-20180614** RIBK-7-41.0-20180614** RIBK-7-44.0-20180614** RIBK-7-47.0-20180614** RIBK-8-16.0-20180614** RIBK-8-16.0-20180614-FD** RIBK-8-19.0-20180614** RIBK-8-22.0-20180614** RIBK-8-25.0-20180614** RIBK-8-28.0-20180614** RIBK-8-31.0-20180614** RIBK-8-34.0-20180614** RIBK-8-37.0-20180614** RIBK-13-14.0-20180614** RIBK-13-17.0-20180614** RIBK-13-20.0-20180614** RIBK-13-23.0-20180614** RIBK-13-26.0-20180614** RIBK-13-29.0-20180614** RIBK-13-32.0-20180614** RIBK-13-35.0-20180614**	Antimony	UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R) (m)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
440-213755-1	RIBK-7-26.0-20180614** RIBK-7-29.0-20180614** RIBK-7-29.0-20180614-FD** RIBK-7-32.0-20180614** RIBK-7-35.0-20180614** RIBK-7-38.0-20180614** RIBK-7-41.0-20180614** RIBK-7-44.0-20180614** RIBK-7-47.0-20180614** RIBK-8-16.0-20180614** RIBK-8-16.0-20180614-FD** RIBK-8-19.0-20180614** RIBK-8-22.0-20180614** RIBK-8-25.0-20180614** RIBK-8-28.0-20180614** RIBK-8-31.0-20180614** RIBK-8-34.0-20180614** RIBK-8-37.0-20180614** RIBK-13-14.0-20180614** RIBK-13-17.0-20180614** RIBK-13-20.0-20180614** RIBK-13-23.0-20180614** RIBK-13-26.0-20180614** RIBK-13-29.0-20180614** RIBK-13-32.0-20180614** RIBK-13-35.0-20180614**	Niobium	R (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R) (m)
440-213755-1	RIBK-7-29.0-20180614** RIBK-7-29.0-20180614-FD** RIBK-7-32.0-20180614** RIBK-7-35.0-20180614** RIBK-7-38.0-20180614** RIBK-7-41.0-20180614** RIBK-7-44.0-20180614** RIBK-7-47.0-20180614** RIBK-8-16.0-20180614** RIBK-8-16.0-20180614-FD** RIBK-8-19.0-20180614** RIBK-8-22.0-20180614** RIBK-8-25.0-20180614** RIBK-8-28.0-20180614** RIBK-8-31.0-20180614** RIBK-8-34.0-20180614** RIBK-8-37.0-20180614** RIBK-13-14.0-20180614** RIBK-13-17.0-20180614**	Vanadium Zirconium	J+ (all detects) J+ (all detects)	A	Matrix spike/Matrix spike duplicate (%R) (m)
440-213621-1	RIBK-10-18.0-20180613	Barium	J (all detects)	A	Matrix spike/Matrix spike duplicate (RPD) (ld)
440-213755-1	RIBK-7-26.0-20180614**	Barium	J (all detects)	A	Matrix spike/Matrix spike duplicate (RPD) (ld)
440-213621-1	RIBK-10-12.0-20180613 RIBK-10-12.0-20180613-FD	Barium	J (all detects)	A	Field duplicates (RPD) (fd)

** Samples underwent Stage 4 data validation

NERT, Soil Background Concentration Study
Metals - Laboratory Blank Data Qualification Summary - SDGs 440-213621-1, 440-213755-1

No Sample Data Qualified in this SDG

NERT, Soil Background Concentration Study
Metals - Field Blank Data Qualification Summary - SDGs 440-213621-1, 440-213755-1

No Sample Data Qualified in these SDGs

ATTACHMENT B

Hexavalent Chromium Data Validation Report

Hexavalent Chromium by Environmental Protection Agency (EPA) SW 846 Method 7199

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in these SDGs.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in these SDGs, and therefore duplicate analyses were not performed for these SDGs.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples RIBK-10-12.0-20180613 and RIBK-10-12.0-20180613-FD (both from SDG 440-213621-1), samples RIBK-12-8.0-20180613 and RIBK-12-8.0-20180613-FD (both from SDG 440-213621-1), samples RIBK-7-29.0-20180614** and RIBK-7-29.0-20180614-FD** (both from SDG 440-213755-1), and samples RIBK-8-16.0-20180614** and RIBK-8-16.0-20180614-FD** (both from SDG 440-213755-1) were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

SDG	Analyte	Concentration (mg/Kg)		RPD (Limits)	Flag	A or P
		RIBK-7-29.0-20180614**	RIBK-7-29.0-20180614-FD**			
440-213755-1	Hexavalent chromium	0.72	0.20U	200 (≤50)	NQ	-

NQ = No data were qualified when either the primary or duplicate result was not detected or was below the practical quantitation limit (PQL).

X. Sample Result Verification

All sample result verifications were acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in these SDGs.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

** Samples underwent Stage 4 data validation

NERT, Soil Background Concentration Study
Hexavalent Chromium - Data Qualification Summary - SDGs 440-213621-1, 440-213755-1

No Sample Data Qualified in these SDGs

NERT, Soil Background Concentration Study
Hexavalent Chromium - Laboratory Blank Data Qualification Summary - SDGs 440-213621-1

No Sample Data Qualified in these SDGs

NERT, Soil Background Concentration Study
Hexavalent Chromium - Field Blank Data Qualification Summary - SDGs 440-213621-1

No Sample Data Qualified in these SDGs

** Samples underwent Stage 4 data validation

ATTACHMENT C

Radium-226 and Radium-228 Data Validation Report

Radium-226 by Environmental Protection Agency (EPA) Method 903.0
Radium-228 by EPA Method 904.0

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable concentration (MDC) with the following exceptions:

SDG	Blank ID	Isotope	Concentration	Associated Samples
440-213621-2	PB (prep blank)	Radium-228	0.6590 pCi/g	All samples in SDG 440-213621-2

Sample activities were compared to activities detected in the laboratory blanks. The sample activities were either not detected or were significantly greater than the activities found in the associated laboratory blanks with the following exceptions:

SDG	Sample	Isotope	Reported Concentration	Modified Final Concentration
440-213621-2	RIBK-10-12.0-20180613-FD**	Radium-228	0.541 pCi/g	0.541J pCi/g
440-213621-2	RIBK-10-15.0-20180613**	Radium-228	0.965 pCi/g	0.965J pCi/g
440-213621-2	RIBK-10-18.0-20180613**	Radium-228	0.708 pCi/g	0.708J pCi/g
440-213621-2	RIBK-10-21.0-20180613**	Radium-228	0.806 pCi/g	0.806J pCi/g
440-213621-2	RIBK-10-24.0-20180613**	Radium-228	0.951 pCi/g	0.951J pCi/g

** Samples underwent Stage 4 data validation

SDG	Sample	Isotope	Reported Concentration	Modified Final Concentration
440-213621-2	RIBK-10-27.0-20180613**	Radium-228	0.825 pCi/g	0.825J pCi/g
440-213621-2	RIBK-10-30.0-20180613**	Radium-228	0.560 pCi/g	0.560J pCi/g
440-213621-2	RIBK-10-36.0-20180613**	Radium-228	0.852 pCi/g	0.852J pCi/g
440-213621-2	RIBK-12-8.0-20180613**	Radium-228	0.419 pCi/g	0.419J pCi/g
440-213621-2	RIBK-12-8.0-20180613-FD**	Radium-228	0.457 pCi/g	0.457J pCi/g
440-213621-2	RIBK-12-11.0-20180613**	Radium-228	0.615 pCi/g	0.615J pCi/g
440-213621-2	RIBK-12-14.0-20180613**	Radium-228	0.798 pCi/g	0.798J pCi/g
440-213621-2	RIBK-12-17.0-20180613**	Radium-228	0.644 pCi/g	0.644J pCi/g
440-213621-2	RIBK-12-20.0-20180613**	Radium-228	0.810 pCi/g	0.810J pCi/g
440-213621-2	RIBK-12-23.0-20180613**	Radium-228	0.531 pCi/g	0.531J pCi/g
440-213621-2	RIBK-12-29.0-20180613**	Radium-228	0.718 pCi/g	0.718J pCi/g
440-213621-2	RIBK-12-32.0-20180613**	Radium-228	0.889 pCi/g	0.889J pCi/g

V. Field Blanks

No field blanks were identified in these SDGs.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples RIBK-10-12.0-20180613** and RIBK-10-12.0-20180613-FD** (both from SDG 440-213621-2), samples RIBK-12-8.0-20180613** and RIBK-12-8.0-20180613-FD** (both from SDG 440-213621-2), samples RIBK-7-29.0-20180614 and RIBK-7-29.0-20180614-FD (both from SDG 440-213621-2), and samples RIBK-8-16.0-20180614 and RIBK-8-16.0-20180614-FD (both from SDG 440-213621-2) were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

SDG	Isotope	Concentration (pCi/g)		RPD (Limits)	Flag	A or P
		RIBK-10-12.0-20180613**	RIBK-10-12.0-20180613-FD**			
440-213621-2	Radium-226	0.918	0.493	60 (≤50)	NQ	-
	Radium-228	0.488U	0.541	200 (≤50)	NQ	-

SDG	Isotope	Concentration (pCi/g)		RPD (Limits)	Flag	A or P
		RIBK-12-8.0-20180613**	RIBK-12-8.0-20180613-FD**			
440-213621-2	Radium-226	0.991	0.736	30 (≤50)	-	-
	Radium-228	0.419	0.457	0 (≤50)	-	-

SDG	Isotope	Concentration (pCi/g)		RPD (Limits)	Flag	A or P
		RIBK-7-29.0-20180614	RIBK-7-29.0-20180614-FD			
440-213755-2	Radium-226	0.666	0.812	20 (≤50)	-	-
	Radium-228	0.611	0.648	6 (≤50)	-	-

SDG	Isotope	Concentration (pCi/g)		RPD (Limits)	Flag	A or P
		RIBK-8-16.0-20180614	RIBK-8-16.0-20180614-FD			
440-213755-2	Radium-226	0.554	0.726	27 (≤50)	-	-
	Radium-228	0.892	1.10	21 (≤50)	-	-

NQ = No data were qualified when either the primary or duplicate result was not detected or was below the QAPP Requested Limit (1.0pCi/g).

X. Carrier Recovery

All carrier recoveries were within validation criteria.

XI. Minimum Detectable Concentration

All MDCs met the QAPP Requested Limits.

XII. Sample Result Verification

All sample result verifications were acceptable for samples on which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in these SDGs.

Due to laboratory blank contamination, data were qualified as estimated in seventeen samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Based upon the data validation all other results are considered valid and usable for all purposes.

NERT, Soil Background Concentration Study
Radium-226 & Radium-228 - Data Qualification Summary - SDG 440-213621-2, 440-213755-2

No Sample Data Qualified in these SDGs

NERT, Soil Background Concentration Study
Radium-226 & Radium-228 - Laboratory Blank Data Qualification Summary - SDG 440-213621-2, 440-213755-2

SDG	Sample	Isotope	Modified Final Concentration	A or P	Code
440-213621-2	RIBK-10-12.0-20180613-FD**	Radium-228	0.541J pCi/g	A	bl
440-213621-2	RIBK-10-15.0-20180613**	Radium-228	0.965J pCi/g	A	bl
440-213621-2	RIBK-10-18.0-20180613**	Radium-228	0.708J pCi/g	A	bl
440-213621-2	RIBK-10-21.0-20180613**	Radium-228	0.806J pCi/g	A	bl
440-213621-2	RIBK-10-24.0-20180613**	Radium-228	0.951J pCi/g	A	bl
440-213621-2	RIBK-10-27.0-20180613**	Radium-228	0.825J pCi/g	A	bl
440-213621-2	RIBK-10-30.0-20180613**	Radium-228	0.560J pCi/g	A	bl
440-213621-2	RIBK-10-36.0-20180613**	Radium-228	0.852J pCi/g	A	bl
440-213621-2	RIBK-12-8.0-20180613**	Radium-228	0.419J pCi/g	A	bl
440-213621-2	RIBK-12-8.0-20180613-FD**	Radium-228	0.457J pCi/g	A	bl
440-213621-2	RIBK-12-11.0-20180613**	Radium-228	0.615J pCi/g	A	bl
440-213621-2	RIBK-12-14.0-20180613**	Radium-228	0.798J pCi/g	A	bl
440-213621-2	RIBK-12-17.0-20180613**	Radium-228	0.644J pCi/g	A	bl
440-213621-2	RIBK-12-20.0-20180613**	Radium-228	0.810J pCi/g	A	bl
440-213621-2	RIBK-12-23.0-20180613**	Radium-228	0.531J pCi/g	A	bl
440-213621-2	RIBK-12-29.0-20180613**	Radium-228	0.718J pCi/g	A	bl
440-213621-2	RIBK-12-32.0-20180613**	Radium-228	0.889J pCi/g	A	bl

** Samples underwent Stage 4 data validation

NERT, Soil Background Concentration Study
Radium-226 & Radium-228 - Field Blank Data Qualification Summary - SDG 440-213621-2, 440-213755-2

No Sample Data Qualified in these SDGs

ATTACHMENT D

Isotopic Thorium and Isotopic Uranium Data Validation Report

Isotopic Thorium and Isotopic Uranium by Method A-01-R Modified

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable concentration (MDC).

V. Field Blanks

No field blanks were identified in these SDGs.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples RIBK-10-12.0-20180613** and RIBK-10-12.0-20180613-FD** (both from SDG 440-213621-2), samples RIBK-12-8.0-20180613** and RIBK-12-8.0-20180613-FD** (both from SDG 440-213621-2), samples RIBK-7-29.0-20180614 and RIBK-7-29.0-20180614-FD (both from SDG 440-213621-2), and samples RIBK-8-16.0-20180614 and RIBK-8-16.0-20180614-FD (both from SDG 440-213621-2) were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

SDG	Isotope	Concentration (pCi/g)		RPD (Limits)	Flag	A or P
		RIBK-10-12.0-20180613**	RIBK-10-12.0-20180613-FD**			
440-213621-2	Thorium-228	0.989	1.03	4 (≤50)	-	-
	Thorium-230	0.454	0.936	69 (≤50)	NQ	-
	Thorium-232	0.430	1.04	83 (≤50)	NQ	-
	Uranium-233/234	0.789	0.918	15 (≤50)	-	-
	Uranium-238	0.723	0.879	19 (≤50)	-	-

SDG	Isotope	Concentration (pCi/g)		RPD (Limits)	Flag	A or P
		RIBK-12-8.0-20180613**	RIBK-12-8.0-20180613-FD**			
440-213621-2	Thorium-228	0.895	0.747	18 (≤50)	-	-
	Thorium-230	0.992	1.05	6 (≤50)	-	-
	Thorium-232	0.688	0.883	25 (≤50)	-	-
	Uranium-233/234	3.10	3.48	12 (≤50)	-	-
	Uranium-235/236	0.124	0.108	14 (≤50)	-	-
	Uranium-238	1.78	1.83	3 (≤50)	-	-

SDG	Isotope	Concentration (pCi/g)		RPD (Limits)	Flag	A or P
		RIBK-7-29.0-20180614	RIBK-7-29.0-20180614-FD			
440-213755-2	Thorium-228	1.27	1.15	10 (≤50)	-	-
	Thorium-230	0.743	0.892	18 (≤50)	-	-
	Thorium-232	1.14	1.31	14 (≤50)	-	-
	Uranium-233/234	0.896	0.763	16 (≤50)	-	-
	Uranium-238	0.679	0.780	14 (≤50)	-	-

SDG	Isotope	Concentration (pCi/g)		RPD (Limits)	Flag	A or P
		RIBK-8-16.0-20180614	RIBK-8-16.0-20180614-FD			
440-213755-2	Thorium-228	1.11	1.62	37 (≤50)	-	-
	Thorium-230	0.971	1.30	29 (≤50)	-	-
	Thorium-232	1.16	1.53	28 (≤50)	-	-
	Uranium-233/234	0.948	1.05	10 (≤50)	-	-
	Uranium-235/236	0.0592	0.0789	29 (≤50)	-	-
	Uranium-238	0.864	0.866	0 (≤50)	-	-

NQ = No data were qualified when either the primary or duplicate result was not detected or was below the QAPP Requested Limit (1.0pCi/g).

X. Tracer Recovery

All tracer recoveries were within validation criteria.

XI. Minimum Detectable Concentration

All MDCs met the QAPP Requested Limits.

XII. Sample Result Verification

All sample result verifications were acceptable for samples on which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in these SDGs.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

NERT, Soil Background Concentration Study
Isotopic Uranium & Isotopic Thorium - Data Qualification Summary - SDG 440-213621-2, 440-213755-2

No Sample Data Qualified in these SDGs

NERT, Soil Background Concentration Study
Isotopic Uranium & Isotopic Thorium - Laboratory Blank Data Qualification Summary - SDG 440-213621-2, 440-213755-2

No Sample Data Qualified in these SDGs

NERT, Soil Background Concentration Study
Isotopic Uranium & Isotopic Thorium - Field Blank Data Qualification Summary - SDG 440-213621-2, 440-213755-2

No Sample Data Qualified in these SDGs