REPORT

Monitored Natural Attenuation Evaluation for Arsenic and Molybdenum

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Submitted to:

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MNA Checklist

Elements of MNA Evaluation	Characterization	Applicable Section(s)
Pre-Tier 1 - Site Background Information		
Site Layout	Identify potential source(s)	2.0, 2.1, 2.2, 4.1
	Identify potential exposure points/receptors	2.0, 2.1, 2.2, 3.0
Site History	History and Inventory of contaminants released	1.0, 2.0, 2.1, 2.2
	Mode of contaminant release	2.0, 2.1, 2.2, 4.1
	Chemistry of CCR source and release	4.1, 5.0
Tier 1 - Demonstrate Active Contaminant Removal from Groundwater		
Hydrogeologic Elements	Potential migration pathways identified	3.0, 6.0, 7.2
	Nature and extent of contaminant plume	5.0, 7.2, 8.0
	Basic groundwater flow direction and aquifer hydrostratigraphy	3.0, 6.0
General Site Chemistry	General chemistry (groundwater, surface water, and/or aquifer solids) for preliminary evaluation of contaminant degradation	5.1, 5.2
	Trend evaluation of groundwater data	5.1, 7.3
	Distribution of contaminants between aqueous and solid phases	5.1, 5.2, 7.3
Tier 2 - Determine Mechanisms and Rate of Attenuation		
Define Contaminant/Aquifer Solid Interactions	Identify aquifer mineralogy, attenuation mechanisms, and microbiological processes (if applicable)	5.2, 7.1, 7.2, 9.0
Chemistry and Spatial Distribution of Contaminants	Groundwater characteristics for source(s) and contaminant plume, including field parameters, Appendix III parameters, Appendix IV parameters, major cations and anions, and speciation data (if applicable)	2.0, 2.1, 2.2, 4.1, 5.1, 7.2, 9.0
Detailed Hydrogeology	Groundwater flow regime, including direction, velocity, potentiometric surface, gradients, etc.	3.0, 6.0, 9.0
Tier 3 – Determine System Capacity and Stability of Attenuation		
Measurement of Attenuation Capacity	Determination of contaminant and dissolved reactant fluxes (concentration data and water flux)	5.1, 7.3, 8.0, 10.0
	Determination of mass of available solid phase reactant(s)	5.2, 7.0, 7.3, 10.0
Stability of Attenuated Contaminated Mass	Laboratory testing of immobilized contaminant stability	5.2, 7.0, 10.0
	Model analyses to characterize aquifer capacity and evaluation of immobilized contaminant stability	7.2, 7.3, 10.0
Tier 4 - Design of Performance Monitoring Program and Identify Alternative Remedy		
Long-Term Monitoring Program	Selection of monitoring locations and sampling frequency based on site conditions	Not applicable - provided in separate report.
	Selection of key monitoring parameters used to assess effectiveness of the remedy	
	Selection of monitoring criteria that would trigger re-evaluation of adequacy of the monitoring program and the remedy selected	

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1.0 INTRODUCTION

Based on the results of the Corrective Measures Assessment (Haley and Aldrich 2019; CMA) and Supplemental Remedy Selection Report (Haley and Aldrich 2024: SRSR) conducted under 40 CFR § 257.96, groundwater, Coal Combustion Residual (CCR) porewater, and solid materials were characterized and evaluated to determine the effectiveness and help predict the rate of Monitored Natural Attenuation (MNA) as a component of the remedial strategy for Ameren Missouri's (Ameren) RCPA bottom ash surface impoundment (RCPA or CCR Unit) located at Rush Island Energy Center (RIEC) in Jefferson County, Missouri (the Site). The structure of this evaluation closely follows the United States Environmental Protection Agency (USEPA) guidance on using MNA as a remedial strategy (USEPA 2007a, b) and considers best practices from the Interstate Technology Regulatory Council (ITRC) document: "A Decision Framework for Applying Monitored Natural Attenuation Processes to Metals and Radionuclides in Groundwater" (ITRC 2010). This MNA evaluation was completed using the following tiers (USEPA 2007a, b):

1) Demonstrate active constituent removal from groundwater and dissolved plume stability (Tier I)
2) Determine the mechanism(s) and rate(s) of the operative attenuation processes (Tier II)
3) Determine the long-term capacity for attenuation and the stability of immobilized constituents (Tier III)

Following the completion of this multi-tier evaluation, the fourth and final tier (Tier IV) of an MNA program, which involves the design of a performance monitoring program and the development of a contingency plan, will be updated as needed based on the findings of this evaluation.

2.0 SITE BACKGROUND AND CCR RULE COMPLIANCE

The RIEC is located approximately 40 miles south of downtown St. Louis in Jefferson, County, Missouri. The Facility encompasses approximately 960 acres and is located within the Mississippi River Valley and the adjacent upland areas to the west. The property is bounded to the east by the Mississippi River, to the south by Isle Du Bois Creek, to the north by Muddy Creek and extends into the bluffs to the west (Figure 1).

The Detection and Assessment Monitoring Well Network for the RCPA includes two background monitoring wells and seven compliance monitoring wells adjacent to the CCR Unit. There is also a Corrective Action Monitoring Well Network for the RCPA which consists of 18 monitoring wells. The well networks are summarized in Table 1 and shown on Figure 2.

Table 1: RCPA Monitoring Well Networks

Monitoring Well Network	Well IDs
Background (Compliance Monitoring Network)	MW-B1 and MW-B2
Compliance Monitoring Network Wells	MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, and MW-7/MW-7(R)
Corrective Action Monitoring Wells	P05S, P10S, P16S, P17S, P19S, P21S, P22S, P29S, P30S, P31S, P17I, P17D, P19I, P19D, P21I, P21D, P22D, and P29D

Note: P29S and P29D are background to the RCPA but not used for the background compliance monitoring network statistical evaluation.

Statistical analysis of the November 2023 RCPA detection monitoring results has identified the following statistically significant increases (SSIs) of Appendix III constituents over background:

- Boron – MW-1, MW-2, MW-3, MW-4, MW-6 and MW-7/MW-7(R)
- Fluoride – MW-2, MW-3, and MW-4
- pH – MW-1, MW-2, MW-3
- Sulfate – MW-1, MW-2, MW-3
- Total Dissolved Solids (TDS) – MW-3

Assessment monitoring of the RCPA in accordance with §257.95 was initiated on April 15th, 2018. Assessment monitoring has historically identified constituents present at a statistically significant level (SSL) as follows:

- Arsenic at MW-2, MW-3 and MW-7
- Molybdenum at MW-2, MW-3, and MW-7

As of the October 2020 sampling event, molybdenum at MW-7/MW-7(R) is no longer present at an SSL. Since that time, SSL exceedances for molybdenum have only been identified at MW-2 and MW-3.

On January 9, 2019, Ameren initiated its Corrective Measures Assessment (CMA) and posted the CMA report on May 20, 2019. A public meeting was held on May 31, 2019, and responses to public comments are posted on Ameren's CCR website. On August 30, 2019, Ameren published its “Remedy Selection Report – 40 CFR § 257.97 Rush Island, Labadie, Sioux and Meramec CCR Basins” (Remedy Selection Report) that identified source control through installation of a low permeability cover system, use of MNA, and installation of Supplemental Corrective Measures as its chosen corrective action remedial plan (Ameren 2019). The Remedy Selection Report’s remedial plan consists of two phases as follows:

1) Source control, stabilization, and containment of CCR by installation of a low permeability geomembrane cap (a minimum 1 x 10^{-7} centimeters per second (cm/sec) versus 1 x 10^{-5} cm/sec required by the CCR Rule).
2) Once source control is achieved, monitor the natural attenuation of groundwater concentrations to address limited and localized CCR-related impacts. Ongoing monitoring and modeling evaluations will document that concentrations are decreasing as modelled. MNA occurs due to naturally occurring processes within the aquifer.

Ameren commenced Phase 1 of the corrective action remedial plan in August 2019 by initiating closure at the RCPA. Closure of the RCPA was completed on December 15, 2020, thereby transitioning the RCPA into the post-closure care requirements of the CCR Rule. The initial Corrective Action groundwater sampling event was completed in April 2020, and a total of nine sampling events have been completed to-date for Corrective Action monitoring at the RCPA.

Phase 2 of the corrective measures remedial plan as outlined in the Remedy Selection Report began with the April 2021 Corrective Action Sampling event on April 22, 2021. Since that time, groundwater sampling and statistical evaluations have been completed semi-annually to determine if there are any Appendix IV constituents within the Corrective Action monitoring well network that are statistically exceeding their respective site Groundwater Protection Standard (GWPS).

As of November 2023, the wells with constituents exceeding the Site GWPS are as follows:

- Arsenic at R-P-05S, R-P-17I[1], R-P-17S, R-P-19I[2], and R-P-21S
- Lead at R-P-19I[2]
- Lithium at R-P-19I and R-P-21D
- Molybdenum at R-P-10S[2], R-P-17D, R-P-17I, R-P-19D[2], R-P-19I[2], P-P-21D, R-P-21I, and R-P-22D

Based on the evaluations completed at the RCPA, molybdenum and arsenic are the primary Appendix IV parameters statistically exceeding the groundwater protection standard, therefore they are the focus of this MNA evaluation and are considered the Constituents of Concern (COC).

2.1 Supplemental Corrective Measures

As outlined in Ameren's Remedy Selection Report, once source control is achieved, Ameren planned to monitor natural attenuation of groundwater and complete supplemental corrective measures using groundwater treatment. Ameren began implementing the supplemental corrective measure for CCR groundwater compliance using ex-situ treatment technologies of chemical precipitation and selective-ion exchange by completing a pilot study at the Site. The results of this groundwater treatment pilot study displayed significant reductions in key CCR indicator concentrations. Due to the success, Ameren expanded this technology to the downgradient side (eastern side) of the RCPA and the full-scale treatment system began operation in February 2022. The groundwater treatment system was developed to successfully capture the CCR impacted groundwater from the RCPA, treat the water by removing contaminants, and return treated water to the same hydrogeologic horizon.

The design of the treatment system was completed by XDD Environmental, LLC (XDD, now Loureiro Engineering Associates, Inc (Loureiro)) and is based on groundwater monitoring and annual estimates of net groundwater velocities averaging approximately 34 ft/year as documented in the 2018 Annual Groundwater Monitoring and Corrective Action Report. This represents an average net movement of a water molecule in all directions over a given calendar year and it accounts for movement during normal, stagnant, flood and low-level river stages throughout a calendar year (More details on the groundwater flow at the Site is provided in Section 3.0). A combination of both extraction and injection wells to capture and control that movement is used to ensure a net-zero difference in overall groundwater flow conditions.

As discussed in Ameren's 2024 list of requested information, available on Ameren's publicly available website (Section 4.a.i), the treatment system is designed for internal capture with injection radially along the ash pond's downgradient perimeter. Essentially, groundwater that is extracted for treatment is re-introduced in the same area so that outside the small corridor of capture and injection there is no change in overall flow conditions.

In May of 2024, Haley and Aldrich prepared a Supplemental Remedy Selection Report that adds this groundwater treatment system as a Supplemental Corrective Measure to the Selection of Remedy for the Rush Island Site and discusses that the future remedy-related activities for the Site will include:

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[1] Arsenic results at R-P-17I are trending downward in a statistically significant manner and the upper limit of the confidence band is approaching the GWPS.

[2] These results display an overall downward trend since April 2020 that is not statistically significant at the 98% confidence level.

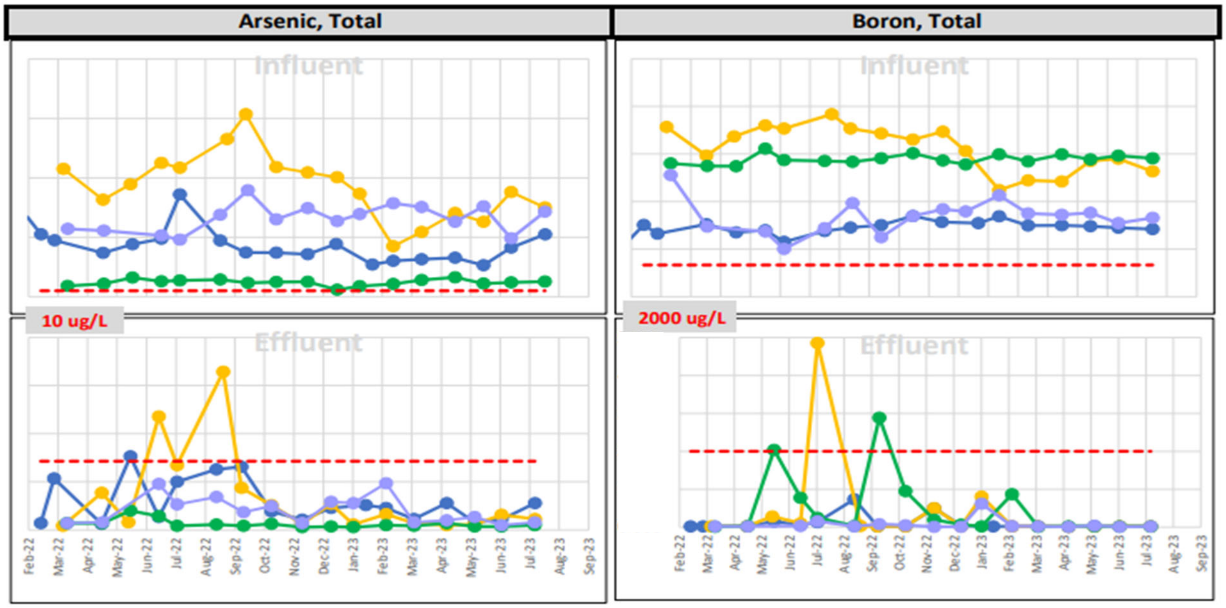
1) Extraction, ex-situ treatment, and re-injection of impacted groundwater downgradient to the east of the RCPA
2) Semi-annual Corrective Action Monitoring
3) Evaluation of Corrective Action effectiveness on CCR constituent concentrations in groundwater.
4) Annual groundwater monitoring and Corrective Action reports

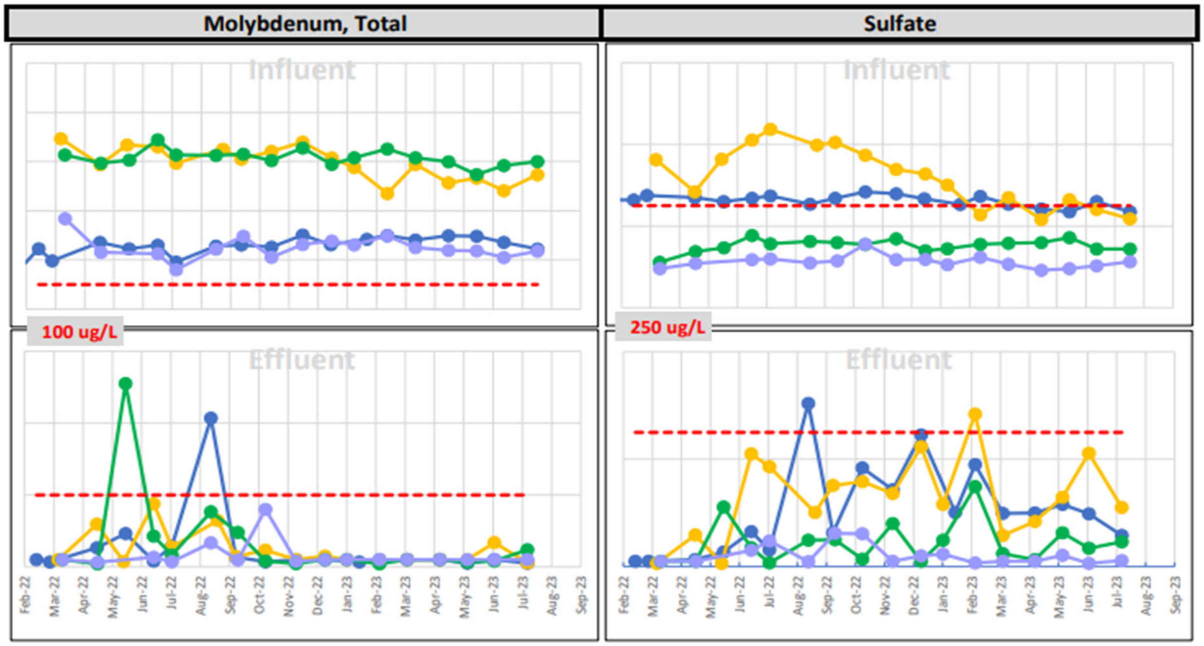
2.2 Summary of Remedial Results

As outlined in the Supplemental Remedy Selection Report, RCPA source control, ongoing MNA, and groundwater treatment have collectively contributed to a reduction in constituent concentrations in the groundwater near the RCPA. Since the remedy was selected in 2019, progress has been documented in the Annual Groundwater Monitoring and Corrective Measures Reports, available on Ameren's publicly available website.

Inset 1 shows the influent (top) and effluent (bottom) data from the RCPA groundwater treatment system collected over the optimization period through initial, full-scale operation from Loureiro (2023). The figure illustrates that after a few months of optimization, the system effluent concentrations have consistently been below the discharge target concentrations for groundwater (indicated in red). The discharge concentrations meet drinking water standards for the applicable constituents.

Inset 1: RCPA Groundwater Treatment System Influent and Effluent Concentrations – System Optimization Period and Full-Scale Operation





Note: The 4 colors represent four treatment system flows monitored by the system

The treatment system as currently operated is intended to prevent further CCR impacts from migrating downgradient of the RCPA in the alluvial aquifer.

2.3 Remedial Strategy for the RCPA

Currently, the remedial strategy for the RCPA consists of the following:

1) Cap and close the RCPA with a low-permeability geomembrane cover system. This effectively eliminates precipitation infiltration into the RCPA.
2) Installation of an active remedy (groundwater treatment system) that captures and treats porewater of the RCPA and prevents it from leaving the footprint of the CCR waste boundary and migrating downgradient in the alluvial aquifer. This system also targets the areas of highest boron, arsenic, and molybdenum concentrations on the eastern side of the RCPA, reducing concentrations below the GWPS.
3) Use of MNA to address CCR-related impacts outside of the influence of the treatment system. The effectiveness of MNA as a remedy for the distal portions of the plume is documented in this evaluation.

This MNA evaluation documents the physical and chemical attenuation present within the alluvial aquifer for the constituents of concern listed in Section 2.0. While both physical and chemical attenuation are occurring for these constituents, physical attenuation of dilution and dispersion appears to be a significant factor, especially at distal portions of the plume. Although physical attenuation (dilution and dispersion) is not typically appropriate as the primary mechanism, EPA has acknowledged that it can be appropriate as a “polishing step” if active remedies are in place in its 2015 report titled *“Use of Monitored Natural Attenuation for Inorganic Contaminants in Groundwater at Superfund Sites*” where it states the following (page 14):

“Dispersion and dilution resulting from mixing with influent precipitation, up- or cross-gradient groundwater or leakage from overlying surface water bodies may be elements of an MNA response action for inorganic

contaminants. However, dilution and dispersion generally are not appropriate as primary MNA mechanisms because they reduce concentrations through dispersal of contaminant mass rather than destruction or immobilization of contaminant mass. Dilution and dispersion may be appropriate as a "polishing step" for distal portions of a plume when an active remedy is being used at a site, source control is complete and appropriate land use and ground water use controls are in place. Results of conservative tracer studies can be used to estimate the contribution of dilution and dispersion to contaminant attenuation rates."

3.0 SUMMARY OF SITE HYDROGEOLOGIC CONDITIONS

A detailed discussion of the Site Hydrogeology is presented in the Corrective Measures Assessment (CMA, Haley and Aldrich, 2019), the Groundwater Monitoring Plan (GMP; Golder, 2017), and the Corrective Action Groundwater Monitoring Plan (CAGMP; Golder, 2020). In summary, geological and hydrogeological units present at the Site include two different geologic terrains: (1) floodplain deposits of the Mississippi River Valley and (2) older sedimentary bedrock formations. The alluvial floodplain deposits are typically comprised of sands and gravels with varying amounts of silts and clays, generally resulting in an overall fining-upward sequence. The bedrock formations are comprised of the 3 – 7-degree easterly dipping Ordovician-aged Plattin Group.

The alluvial deposits form the uppermost aquifer at the Site and are influenced by the nearby Mississippi River and Site groundwater conditions are directly controlled by river stage. Under typical alluvial aquifer conditions, groundwater flows slowly to the bluffs to the west or towards the Mississippi River to the east but fluctuations in direction can occur due to changing river levels.

Prior to closure of the RCPA, the surface impoundment ponded water at elevations higher than the static groundwater levels in the underlying alluvial aquifer resulting in mounding and localized radial groundwater flow. Since closure of the RCPA was completed, the mounding has been eliminated and groundwater flow has returned to natural conditions.

4.0 APPROACH

To assess the applicability of MNA at the RCPA, samples of aquifer materials and groundwater collected between March 2016 and November 2023 were evaluated to provide a geochemical dataset that was used for a supplemental evaluation. The MNA assessment included the following activities:

- **Groundwater and porewater:**
  - Characterization to identify temporal and geographical trends, where present, and to estimate site-wide attenuation rates based on groundwater quality data.
  - Geochemical modeling to identify the major chemical species and evaluate saturation indices of minerals relevant to attenuation of arsenic and molybdenum.
  - Determination of the capacity of different mechanisms to attenuate arsenic and molybdenum, including adsorption, precipitation and co-precipitation, and physical attenuation (dilution/dispersion).
  - Geochemical modeling to assess the stability & reversibility of arsenic and molybdenum attenuation due to adsorption.
- **Aquifer materials:**

- Mineralogical analysis of aquifer materials to identify and quantify the major mineral components.
- Chemical analysis of aquifer materials to quantify the total metal content, identify the environmentally available fraction of metals, and evaluate the attenuation of arsenic and molybdenum.

The results generated by this supplemental assessment were used by WSP to complete the Tier I, Tier II, and Tier III evaluation (USEPA 2007a, b & USEPA 2015). The results of the Tier I, Tier II, and Tier III are described in the subsequent sections of this report to establish a basis for the anticipated success of MNA at the Site.

4.1 Groundwater and Porewater Sampling

Groundwater samples were collected at the Site as a part of CCR Rule, NPDES Permitting process, and State Utility Waste Landfill (UWL) monitoring programs. For this evaluation, monitoring wells from the compliance, corrective action, and NPDES site characterization networks as well as porewater from the CCR Unit piezometers were evaluated. The network sampling locations and designations are presented on Figure 2 and in Table 2.

Table 2: Sampling Locations Used for the MNA Assessment

Monitoring Network	Background Monitoring Wells	RCPA Compliance Monitoring Network Wells (Detection and Assessment)	RCPA Corrective Action (Performance) Monitoring Well Network	RCPA Nature and Extent Monitoring Network	CCR Unit Porewater Piezometers
Years Data Is Available	**2016 – Present**	**2016 – Present**	**April 2018 – Present**	**November 2018 – August 2019**	**January 2018**
Well IDs	R-MW-B1 and R-MW-B2	R-MW-1, R-MW-2, R-MW-3, R-MW-4, R-MW-5, R-MW-6, R-MW-7/R-MW-7[r]	R-P-05S, R-P-10S, R-P-16S, R-P-17D, R-P-17I, R-P-17S, R-P-19D, R-P-19I, R-P-19S, R-P-21D, R-P-21I, R-P-21S, R-P-22D, R-P-22S, R-P-29D, R-P-29S, R-P-30S, and R-P-31S	R-P-01S, R-P-03D, R-P-03S, R-P-05I, R-P-08D, R-P-08S, R-P-13D, R-P-13I, R-P-13S, and R-P-22I	P-27S and P-28s

Note: All Corrective Action monitoring wells except R-P16S are included in both the RCPA Corrective Action and Nature and Extent Networks. For clarity in this report, the Compliance Monitoring Network is herein referred to as the Detection and Assessment Well Network and the Corrective Action and Nature and Extent Network are evaluated together and referred to as the Nature and Extent Monitoring Network. Additionally, MW-7[r] is a replacement well for MW-7 as described in the 2019 Annual Report.

4.1.1 Groundwater and Porewater Analysis

Geochemical analysis of groundwater and porewater samples included the determination of field parameters and the concentrations of total metals and major cations and anions. The rationale and methods used were as follows:

- **Field Parameters:** Parameters measured in the field included pH, dissolved oxygen, oxidation reduction potential (ORP), conductivity, and temperature. These parameters were used to determine general geochemical conditions in the groundwater and support geochemical modeling.
- **Metals:** Analysis of Appendix III and IV metals concentrations was conducted to understand the geochemical composition of groundwater and CCR Unit porewater. Metals analysis allows for the delineation of a potential plume, evaluation of mineral saturation indices through geochemical modeling, and evaluation of contributions from natural or anthropogenic sources.
- **Major Cations and Anions:** Geochemical modeling of mineral solubility, metals attenuation, and background contributions requires analysis of major cations and anions because they affect and participate in adsorption and mineral dissolution or precipitation reactions.

The groundwater and porewater samples were analyzed and the results and methods are provided in the Annual Reports for the RCPA from 2017 to 2023, which are available on Ameren's publicly available website at https://www.ameren.com/company/environment-and-sustainability/managing-coal-combustion/ccr-compliance-reports.

4.2 Soil Sampling and Analysis

4.2.1 Sample Collection

In October and November 2018, ten soil samples were collected from three boreholes to evaluate geochemical properties of the alluvial aquifer materials at the Site. Samples were obtained from BH-01, BH-02, and BH-03 (Figure 1) located near the RCPA and the Mississippi River. At least three depth intervals were selected in each boring: shallow, intermediate, and deep. Sample intervals are shown in Table 3 and soil sample analyses are described in Section 4.2.2.

Table 3: Boring Sample ID and Descriptions

Boring ID	Sample ID (Depth in Feet Below Ground Surface)	Geologic Material
BH-01	BH-01 (26-31)	*Poorly Graded Sand to Silty Sand*
	BH-01 (75-80)	*Poorly Graded Sand*
	BH-01 (130-135)	*Well Graded Sand*
BH-02	BH-02 (35-40)	*Poorly Graded Sand*
	BH-02 (70-72)	*Clayey Sand*
	BH-02 (72-75)	*Well Graded Sand*
	BH-02 (125-130)	*Well Graded Sand*
	BH-03 (30-32)	*Poorly Graded Sand*

Boring ID	Sample ID (Depth in Feet Below Ground Surface)	Geologic Material
BH-03	BH-03 (70-75)	*Poorly Graded Sand*
	BH-03 (110-115)	*Well Graded Sand*

4.2.2 Soil Analyses

Multiple analytical methods were used to assess the mineralogical and chemical composition of the shallow, intermediate, and deep intervals at the three alluvial aquifer borehole locations across the Site. The selected geochemical test methods included:

- **Mineralogical composition**: The purpose of the mineralogical analysis was to identify and quantify the crystalline mineral phases in each sample. This information is required for geochemical modeling as the release or attenuation of arsenic and molybdenum is influenced by the mineral phase(s) present in the aquifer (Hem 1985). The mineralogical analysis was performed using quantitative (Rietveld) X-ray diffraction (XRD) (ME-LR-MIN-MET-MN-DO5) and a Bruker AXS D8 Advance Diffractometer.
- **Sequential extraction (SEP):** This test consists of a seven-step metals extraction from solids as per Tessier et al. (1979) to identify the provenance of trace metals such as arsenic (i.e., the operationally defined fraction that contains the metal)[3] and determine their potential environmental mobility. For instance, metals bound in the carbonate fraction, or that are exchangeable, are much more likely to become mobile due to changes in groundwater conditions than metals bound within a sulfide or silicate fraction. The total concentration of a metal measured from all seven steps can be compared to the concentration determined from the total metal analysis for compositional accountability. Metals extracted in Steps 1 through 5 are considered environmentally available, whereas metals extracted in Steps 6 and 7 are not environmentally available under typical groundwater conditions (Tessier et al. 1979). The term environmentally available is used to describe steps 1 through 5 combined and implies the fraction available to participate in environmental reactions such as adsorption, desorption, ion exchange and other reactions that facilitate removal or attenuation of specific constituents. Acid/sulfide and residual fraction combines step 6 and 7, and generally

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[3] Sequential extraction of metals from aquifer materials consisted of seven discrete steps for this investigation:

Step 1 - Exchangeable Fraction: This extraction includes trace elements that are reversibly adsorbed to aquifer minerals, amorphous solids, and/or organic material by electrostatic forces.

Step 2 - Carbonate Fraction: This extraction targets trace elements that are adsorbed or otherwise bound to carbonate minerals.

Step 3 - Non-Crystalline Materials Fraction: This extraction targets trace elements that are complexed by amorphous minerals (e.g., iron).

Step 4 - Metal Hydroxide Fraction: Trace elements bound to hydroxides of iron, manganese, and/or aluminium.

Step 5 - Organic Fraction: This extraction targets trace elements strongly bound via chemisorption to organic material.

Step 6 - Acid/Sulfide Fraction: The extraction is used to identify trace elements precipitated as sulfide minerals.

Step 7 - Residual Fraction: Trace elements remaining in the solids after the previous extractions will be distributed between silicates, phosphates, and refractory oxides.

reflect the natural abundance of target constituents in silicates and sulfides, which do not readily interact with groundwater on short time scales.

5.0 GROUNDWATER AND POREWATER

5.1 Geochemical Evaluation

The water quality monitoring data used for the geochemical evaluation were obtained from site monitoring wells and CCR Unit piezometers. The results of that evaluation are discussed in this section for the Detection and Assessment Network Well Network, the Nature and Extent Well Monitoring Network, and for the porewater piezometers. Data used for this evaluation are provided in the *CCR Rule Annual Reports* which are available on Ameren's Public website.

- **pH:** In November 2023, the pH of groundwater samples collected from the RCPA Detection and Assessment Network ranged from 7.2 to 10.9 (Figure 3). Historically, the pH of the network has ranged from 6.0 to 11.0 (March 2016 to May 2023). The pH of groundwater collected from the RCPA Nature and Extent Monitoring Network in April and November 2023 ranged from 6.5 to 10.3. Historically, the pH of this network has ranged from 6.3 to 12.0 (October 2018 to January 2023), indicating a closer to circumneutral range more recently. The pH of groundwater at background monitoring well locations most recently ranged from 7.0 and 7.4 (November 2023) but historically has ranged from 6.5 to 7.4 (with a low outlier of 6.0 for MW-B1 on 7/29/2019). The pH of porewater collected from the RCPA in November 2018 ranged between 12.0 and 12.1.

- **ORP (Oxidation/Reduction Potential):** The ORP of groundwater samples collected from RCPA Detection and Assessment Network wells ranged from -151.9 to +91.4 millivolts (mV) in November 2023 (Figure 4). Historically, the ORP of groundwater at these locations has ranged from -227.5 to +192.5 mV (March 2016 to July 2023). The ORP of groundwater samples from the RCPA Nature and Extent Network has been similar, ranging from -211.6 to +114.9 mV in April and November 2023. Historically, the ORP of groundwater at wells in the Nature and Extent Network has had a much wider range, from –244.2 to +304.3 mV between October 2018 to July 2023. In November 2023 the ORP of groundwater at the background monitoring well locations ranged from –78.5 and-41.3 mV and had historically ranged from -182.3 to 61.1 mV. Porewater ORP in November 2018 was -52.1 and -47.3 mV.

- **Total Dissolved Solids (TDS):** The TDS concentration of groundwater samples from the RCPA Detection and Assessment Network ranged from 381 to 841 mg/L in November 2023 (Figure 5), while historically TDS has ranged from 99 to 992 mg/L (March 2016 to May 2023). Groundwater samples from the RCPA Nature and Extent Monitoring Network contained a wider range of TDS, measured at 127 to 1,720 mg/L in April and November 2023. Historically, TDS in groundwater at this network has had a wider range, measured at 14 to 3,840 mg/L from November 2018 to November 2022. The TDS of the background monitoring wells ranged from 437 to 743 mg/L in November 2023. The TDS of porewater in November 2018 was 510 and 732 mg/L.

- **Major ion chemistry:** A trilinear diagram (Piper plot) was generated for groundwater and porewater samples to facilitate the identification of water types and source contributions from the well network (Figure 6, Table 4). Among all the wells at the Site that were evaluated, 23 of the 36 wells are water type Ca-HCO_3, which includes the majority of the RCPA Nature and Extent Monitoring Network, background, and RCPA Detection and Assessment Network wells. The remainder of the groundwater samples had water types of Na-SO_4 and

Na-HCO_3. The porewater samples were both type Na-OH and one RCPA Nature and Extent well had a water type of Na-Cl (R-P-21D). Across the networks, generally, the upgradient, side gradient, and shallow downgradient sampling locations have similar geochemical signatures (Ca-HCO_3). Likewise, the downgradient sampling locations are sodium dominant but vary in anion compositions.

- **Arsenic:** Arsenic in groundwater samples from the RCPA Detection and Assessment Network has historically ranged from non-detect (variable ranging from <0.000052 to <0.0005 mg/L) to 0.277 mg/L (Figure 7a). Monitoring wells R-MW-2, R-MW-3, R-MW-6, R-MW-7 (now R-MW-7[r]) have exceeded the Site GWPS (0.03 mg/L) since sampling began March 2016. But only MW-2, MW-3, and MW-7[r] contain arsenic at a SSL. Arsenic concentrations in groundwater at wells in the Nature and Extent Monitoring Network have ranged from 0.00026 to 0.32 mg/L since CCR sampling began in 2018 (Figure 7b&c). Wells from the Nature and Extent Monitoring Network that have exceeded the GWPS for arsenic since 2016 include R-P-03S, R-P-05S, R-P-08S, R-P-17I, R-P-17S, R-P-19I, R-P-19S, R-P-21S, R-P-29S, and R-P-31S. Background groundwater arsenic concentrations have ranged from 0.0019 and 0.03 mg/L. Porewater concentrations of arsenic were measured at 0.0351 and 0.0445 mg/L in 2018 at piezometers R-P-27S and R-P-28S, respectively. Arsenic is expected to be present predominantly as an oxyanion ($HAsO_4^{2-}$), a form of arsenate, based on the measured pH and redox of groundwater (Figures 8 and 9).

- **Molybdenum:** Molybdenum in groundwater at wells in the RCPA Detection and Assessment Network has ranged from non-detect (variable ranging from<0.00052 to <0.0009 mg/L) to 1.05 mg/L (Figure 10a) since March 2016. While other Detection and Assessment Network wells have had detections above the GWPS, molybdenum is only present at an SSL at wells MW-2 and MW-3. Groundwater molybdenum concentrations in the Nature and Extent Monitoring Network ranged from non-detect (<0.001 mg/L) to 0.79 mg/L in April and November 2023 (Figure 10b&c). Since sampling began, background molybdenum concentrations have only been measured up to 0.0031 mg/L. Molybdenum in the porewater samples was measured at 0.123 and 0.258 mg/L within the RCPA. Molybdenum is expected to be predominately present in the form of the oxyanion molybdate (MoO_4^{-2}), based on the measured pH and redox of groundwater at the site (Figure 11 and 12).

5.1.1 Mineralogical Controls in Groundwater and Porewater

The results of evaluating the saturation indices of minerals potentially relevant to the attenuation of arsenic and molybdenum is presented in Table 4. Groundwater samples from the Detection and Assessment Monitoring Network, Nature and Extent Monitoring Network, and porewater samples were evaluated. The results of the saturation index evaluation can be summarized as follows:

- Iron-bearing minerals: Ferrihydrite was indicated to be at equilibrium or oversaturated in groundwater at all monitoring well locations. This indicates the strong potential for the precipitation of solid-phase iron oxides at the Site. It is therefore assumed that iron (hydr)oxides are ubiquitous in the Site aquifer.

- Other minerals: All groundwater and porewater samples were identified to be in equilibrium or oversaturated with respect to calcite [$CaCO_3$] and barite ([$BaSO_4$], with the exceptions of R-MW-4. Other carbonate minerals, i.e., rhodochrosite [$MnCO_3$] and siderite [$FeCO_3$], were oversaturated or in equilibrium with groundwater at various wells at the site (Table 4). The manganese mineral hydr(oxide) minerals birnessite [MnO_2] and manganite [MnOOH] were at equilibrium or oversaturated in porewater samples.

In summary, several mineral phases likely control the groundwater composition at some or all wells: barite, calcite, ferrihydrite, rhodochrosite, and siderite. In the case of ferrihydrite, the dissolved concentrations of arsenic and molybdenum can be attenuated through adsorption on this mineral.

5.2 Compositional Analysis of Alluvial Aquifer Soil

5.2.1 Mineralogical Composition

Soil samples were obtained to determine if any minerals are present that would potentially influence the attenuation of arsenic and molybdenum or the presence of minerals that could indicate a naturally occurring source of arsenic and molybdenum mobilizing into groundwater. Quantitative X-ray diffraction (XRD) with Rietveld refinement was used to evaluate the mineralogical composition of samples. Three borings were completed (BH-01, BH-02, and BH-03) and samples were collected at multiple depths from each (generally the shallow, middle, and deep).

The mineralogical composition of the aquifer materials predominately consists of quartz, with varying amounts of the silicate minerals plagioclase, potassium feldspar, and muscovite (Table 5). Laboratory analytical reports of these results are provided in Appendix A.

5.2.2 Chemical Composition and Sequential Extraction

Selective sequential extractions of metals/metalloids from soils were used to determine the chemical composition of the alluvial aquifer materials and the distribution of arsenic and molybdenum over the various operationally defined fractions. As described in Section 4.2, this testing was conducted on ten soil samples from three borehole locations. Results for arsenic and molybdenum, as well as the primary attenuation metals aluminum and iron are presented in Table 6. The laboratory report of the results is included as Appendix B.

A description of the individual operationally defined fractions determined by sequential extraction are described in Footnote 3 in Section 4.2.2. Generally, metals extracted in steps 1 through 5 are considered environmentally available, whereas metals extracted in steps 6 and 7 are present in refractory fractions and are not expected to be released under conditions typically encountered groundwater (Tessier et al. 1979). The sums of the sequential extraction steps are also presented for comparison but does not represent an analytically determined value as compared to the separate “Total” value that is also shown.

The results from the chemical analysis and sequential extraction can be summarized as follows:

General Chemistry Parameters

- **Aluminum**: Aluminum is not a constituent of interest (COI) at the Site, but it has been well studied as a potential sorbing medium in soils (e.g., Karamalidis and Dzombak 2010). Total aluminum in soils ranged from 25,316 to 41,717 mg/kg, and the environmentally available fraction ranged from 361 (BH-03) to 2,422 mg/kg (BH-02; Figure 13). Aluminum at the site is therefore largely (> 95%) present in the residual, or silicate-bound (associated) fraction. This fraction is likely partially represented by hydrous aluminum phyllosilicate minerals or clays intermixed in the silica sand matrix. Clays can represent an important sorptive reservoir for numerous trace metals and metalloids, including arsenic and molybdenum at this site (Uddin 2017).

- **Iron**: While not a COI, iron and its minerals commonly represent one of most abundant reservoirs for metal/metalloid attenuation in soils (Dzombak and Morel 1990; Smith 1999). Iron was present in all ten core samples analyzed, varying from 4,720 (BH-03) to 19,044 mg/kg (BH-02; Figure 14). The environmentally available fraction (carbonate, amorphous, metal hydroxide fractions) of iron in samples ranged from 1,441 to 6,744 mg/kg, representing 18 to 38% of total iron. These phases, part of the labile fraction in steps 1 through 5, can generally be considered representative of the amount of iron in soil that may be available as a sorbing medium and can, therefore, be important for attenuation of arsenic and molybdenum under certain conditions. The remainder of iron in the samples is present in either the acid/sulfide fraction or residual, indicating the potential for a reservoir of additional iron that may be present in a reduced form or bound in with silicate minerals.

Metals identified as an SSL

- **Arsenic:** Arsenic was present in all soil samples and ranged from 2.52 to 7.5 mg/kg (Figure 15). All environmentally available arsenic was present in the amorphous and metal hydroxide fractions, representing 32% and 57% of the total arsenic present in soil. The identification of arsenic in the amorphous and metal hydroxide fractions indicate that arsenic is adsorbed or attenuated on soils at the Site. As metal hydr(oxides) age, amorphous metal phases transition to more crystalline mineral forms which can prevent against remobilization of attenuated metals/metalloids.

- **Molybdenum**: Total molybdenum was low and present in four of the 10 samples (Figure 16). Where present, molybdenum in soil ranged from 0.12 to 1.27 mg/kg. Environmentally available molybdenum was only identified present in three samples and was contained primarily in the amorphous fraction, but in one sample (BH-03 110-115) also present in the metal hydroxide fraction. These results indicate that some attenuation of molybdenum by amorphous and metal hydroxide minerals may be occurring at the site.

The results of the SEP analysis confirm both potentially the natural occurrence of arsenic and molybdenum in the aquifer materials and that attenuation of arsenic and potentially molybdenum is occurring through adsorption/co-precipitation onto/with amorphous and metal hydroxide minerals.

6.0 GROUNDWATER MODELING

In January 2019 Golder Associates Inc (Golder, now WSP USA Inc (WSP)) submitted a detailed modeling Technical Memorandum entitled “Groundwater and Geochemical Modeling Summary for Ameren Rush Island Energy Center Corrective Measures Assessment”. Since the preparation of this initial Technical Memorandum, the following work has been completed related to the RIEC Groundwater Model:

- A March 2019 modeling summary update including different closure scenarios and flow around vs into the RCPA. Technical Memorandum was entitled “Groundwater and Geochemical Modeling Summary Updates for the Rush Island Energy Center Corrective Measures Assessment.”

- The groundwater model was used by XDD Environmental, LLC (XDD, now Loureiro Engineering Associates, Inc. (Loureiro)) to design the well locations, pumping rates, and screening elevations for the RIEC treatment system.

- In January 2020, the groundwater model was updated including the refining of the grid in the RCPA area, and inclusion of additional boreholes to further refine the RCPA Geometry. The updated model was used to predict the effects of floods on the geomembrane cap to design vents and rock ballast for Haley and Aldrich, Inc (Haley and Aldrich) as a part of the RCPA Closure efforts.

- In 2024, additional timesteps were added to the groundwater model. These groundwater flow timesteps were used by WSP in their 3D PHAST groundwater/geochemical model for MNA evaluation.

A Technical Memorandum summarizing the updates completed since the March 2019 Technical Memorandum is provided in Appendix C.

The numerical computer code MODFLOW – developed by the United States Geological Survey (USGS) – was selected for the groundwater modeling because it is well suited to represent a wide range of hydrologic and hydrogeologic conditions, has been widely tested and accepted in the professional hydrology community and by regulatory agencies, and has been scrutinized closely in a number of legal proceedings over the past 20 years. In total, five software packages were used for the groundwater investigation:

- Groundwater flow: USGS software package MODFLOW (McDonald and Harbaugh 1988, Harbaugh and McDonald 1996, Harbaugh et al. 2000, Harbaugh 2005). MODFLOW-2005 was the version used in the analyses presented here.
- Groundwater transport: USGS software package MT3DMS (Zheng and Wang 1999).
- Particle tracking: USGS software package MODPATH (Pollock 2012)
- Parameter estimation: PEST (Doherty 2010 and 2016)
- Graphical user interface: Groundwater Vistas (Environmental Simulations 2020, Rumbaugh and Rumbaugh 2011).

The groundwater model simulates steady-state and transient flow conditions for the site area. The groundwater model was developed and updated based on the following:

- Natural hydrologic boundaries wherever possible.
- Ground surface topography and CCR unit geometries.
- Geologic layers with representative hydrogeological properties based on boring logs.
- Hydraulic properties of geologic layers based on aquifer tests conducted at the site.
- Historical groundwater elevation measurements.

7.0 GEOCHEMICAL ANALYSIS AND MODELING

7.1 Empirical Attenuation Rates

To evaluate the attenuation of arsenic and molybdenum in groundwater at the Site and to assess the rate of attenuation, WSP applied the point decay method (Newell et al. 2002). The point decay method is used to determine the rate at which a constituent's concentrations are increasing or decreasing in groundwater at a single well between sampling events and this method can thus be used to predict when the constituent's concentrations will fall back below regulatory limits.

Equation 1 describes first-order decay for a constituent:

$$Ln(C_t) = k_t + Ln(C_0) \qquad \text{(Equation 1)}$$

where C_0 is the initial constituent concentration, Ct is the constituent concentration at time t, t is the amount of time in years that has passed since the initial concentration measurement, and k is the first-order decay rate constant (1 per year). Equation 2 shows Equation 1 reorganized to solve for the decay rate constant:

$$k = (Ln(C_t)\text{- } Ln(C_0))/t \qquad \text{(Equation 2)}$$

Groundwater water quality data from the Site wells collected between March 2016 and November 2023 were used to determine the mean first-order decay rate for each constituent of interest. Due to variable detection limits, results that were reported as below detection limits were not used in the point decay analysis. Using Equation 1 and the mean first-order decay rate, WSP calculated the approximate number of years that it would take for arsenic and molybdenum concentrations higher than their respective GWPS to decline below these values and these results are provided in Section 7.3.

7.2 Geochemical Modeling

Geochemical modeling was conducted to evaluate general groundwater and porewater quality, determine the potential for precipitation of sorbent media, evaluate the potential for mineral precipitation or adsorption in the aquifer, and determine the speciation of metals of interest. The geochemical computer code developed by the USGS, PHREEQC, was used for these simulations (Parkhurst and Appelo 2013). PHREEQC version 3.7 is a general-purpose geochemical modeling code used to simulate reactions in water and between water and solid mineral phases (e.g., rocks and sediments). Reactions include aqueous equilibria, mineral dissolution and precipitation, ion exchange, surface complexation, solid solutions, gas-water equilibrium, and kinetic biogeochemical reactions. The widely accepted thermodynamic database Minteq.v4, 2017 edition (USEPA 1998, as amended), was used as a basis for the thermodynamic constants required for modeling, with additions and modifications from recent literature as required.

The Geochemist's Workbench (Release 17; Bethke et al. 2024) was used to generate graphical representations of geochemical modeling outputs in the form of predominance, or Pourbaix diagrams (also known as Eh-pH diagrams) for the species of interest (i.e., arsenic and molybdenum) and trilinear plots (also known as Piper plots) displaying the relative abundance of major ions. The Minteq.v4 database was used as the basis for the Pourbaix diagrams.

7.2.1 Reactive Transport Modeling

Additional geochemical modeling was performed to assess viable attenuation mechanisms and predict the quantity and stability of the attenuated constituents of interest using the modeling code PHAST. PHAST is a three-dimensional reactive transport modeling computer program developed by the USGS that simulates multicomponent reactive solute transport in a three-dimensional saturated groundwater flow system (Parkhurst et al. 2010). It is a versatile groundwater flow and solute-transport simulator with capabilities to model a wide range of equilibrium and kinetic geochemical reactions. The flow and transport calculations are based on a modified version of HST3D that is restricted to constant fluid density and constant temperature. PHAST can be used to simulate both confined and unconfined flow using both a steady state and transient flow solution. The geochemical reactions are simulated with the geochemical model PHREEQC-RM (based on PHREEQC version

3.7), which is embedded in PHAST, resulting in a full three-dimensional reactive transport model. In the application used here, parameters from the site groundwater flow model developed in MODFLOW (i.e. hydraulic conductivities of layers, model layering, model architecture, water balance, groundwater velocities, and fluid head calculations) were directly used as initial and target model values to ensure seamless model coordination with MODFLOW, without the need to rebuild a groundwater flow model independently in another software package capable of simulating geochemical reactions.

Source control and treatment was modeled in PHAST using the same model architecture from the numerical groundwater flow model (Figure 20; Golder 2019). Calibration of the geochemical parameters is discussed in Section 7.2.4. The model includes closure activities and groundwater treatment that is currently underway. The model then continues for an additional 30 years with an end date of 2054 to evaluate the potential for remobilization and long-term stability of the site post-treatment and closure.

7.2.2 Surface Complexation Modeling

Adsorption is an important mechanism by which constituents in groundwater can be attenuated. The adsorptive partitioning between dissolved and solid phases was simulated using a two-layer surface complexation model (SCM). The SCM approach is described in Davis and Kent (1990), with additional parameterization based on Dzombak and Morel (1990) and Karamalidis and Dzombak (2010) utilizing iron (hydrous ferric oxide [Hfo]) as ferrihydrite [$Fe(OH)_{3(am)}$], and aluminum (hydrous aluminum oxide [Hao]) as gibbsite [$Al(OH)_{3(am)}$], as adsorbing surfaces.

The amounts of Hfo and Hao available at the site for attenuation were based on the amorphous and metal hydroxide phase iron and aluminum concentrations measured in the SEP as described in Section 5.2.2. The minimum, mean, and maximum concentrations in soil borings were used in the adsorption models to capture the range of expected site concentrations. The Hfo and Hao surface properties (i.e., surface area, site density, and types of sites) from Dzombak and Morel (1990) and Karamalidis and Dzombak (2010) were used to quantify the iron and aluminum adsorption sites per mole of mineral.

The calculation methodology of Appelo and Postma (2010) was used to determine the specific quantity of sites on each mineral surface type as a function of the amount of mineral available to participate in these reactions. The methodology assumes the number of surface sites (sites) equals the product of the moles of iron ([Fe]) and the moles of surface sites per mole of iron ([sites]/[Fe]= 0.2 moles of sites per mole of iron). For the amount of ferrihydrite available for adsorption, the Appelo and Postma methodology further assumes the mass of ferrihydrite (mHfo) in grams (g) available equals the product of the [Fe] and the molecular weight of ferrihydrite (mwHfo = 88.85 g/mole). The same approach was used to calculate the number of sites from gibbsite, assuming the [sites]/[Al] is 0.41 moles of sites per mole of aluminum and the molecular weight of gibbsite is 78.003 g/mole.

The geochemical thermodynamic database Minteq V.4 was used for adsorption modeling. However, new and updated thermodynamic data have been released in scientific literature. These new data are important to include in the geochemical modeling exercises for certain elements or minerals as they allow further refinement of potential reactions, or for correction of previous data that may have been less accurate or more broadly defined. For groundwater modeling at the Site, WSP made numerous updates to the Minteq V.4 database, including the addition of data relating to partitioning coefficients for metals on gibbsite, developed by Karamalidis and Dzombak (2010).

To quantify current levels of adsorption of arsenic and molybdenum, its adsorbed concentration (as milligram (mg) of constituent/kilogram (kg) of soil) was modeled for the minimum, maximum, and mean Hfo and Hao contents when equilibrated with the range of groundwater qualities observed at the Site. To quantify the capacity of soil to adsorb additional arsenic and molybdenum, a stepwise increase in arsenic and molybdenum concentrations was simulated, similar in concept to a titration. This was accomplished using the mean concentration of arsenic and molybdenum observed in porewater, as well as the concentrations of other constituents present in porewater, allowing for site competition. This simulated "titration" took place into the range of observed groundwater qualities while allowing equilibration with the adsorption surfaces in soils as shown in Table 7 (minimum, maximum and mean Hfo and Hao). The model was then used to predict the quantity of each constituent that would adsorb due to this titration of additional arsenic and molybdenum and other porewater constituents.

Table 7: Calculation of Ferrihydrite and Gibbsite Surface Parameters for Geochemical Modeling

Parameter	Unit	Ferrihydrite			Gibbsite		
		Minimum	Mean	Maximum	Minimum	Mean	Maximum
Geometric Mean of Aquifer Solids Composition	mg/kg X	1,430	2,529	6,000	312	537	2,370
	mol X	2.56E-02	4.53E-02	1.07E-01	1.16E-02	1.99E-02	8.78E-02
Surface Site Concentration	mol weak sites / mol X	0.2	0.2	0.2	0.41	0.41	0.41
	mol strong sites / mol X	0.005	0.005	0.005	---		
Surface Sites	mol weak	5.1E-03	9.1E-03	2.1E-02	4.7E-03	8.2E-03	3.6E-02
	mol strong	1.3E-04	2.3E-04	5.4E-04	---		
Mass of Ferrihydrite or Gibbsite	grams	2.28	4.02	9.55	0.902	1.55	6.85

Note: Gibbsite only has one site type

7.2.3 Mineral Precipitation and Co-precipitation

The potential for mineral precipitation was assessed in PHREEQC using a saturation index (SI) calculated according to Equation 3.

$$SI = \log (IAP/Ksp) \quad \text{(Equation 3)}$$

The saturation index is the ratio of the ion activity product (IAP) of a mineral to the solubility product (Ksp). An SI value greater than zero indicates that the solution is supersaturated with respect to a particular mineral phase and, therefore, precipitation of this mineral may occur. An evaluation of precipitation kinetics is then required to determine whether the supersaturated mineral will indeed form. An SI value less than zero indicates the solution is undersaturated with respect to a particular mineral phase. An SI value close to zero indicates equilibrium conditions exist between the mineral and the solution. SI values between -0.5 and 0.5 are considered to represent ‘equilibrium’ in this report to account for the uncertainties inherent in the analytical methods and geochemical modeling.

In addition to adsorption, co-precipitation, or the direct incorporation of trace metals such as arsenic and molybdenum into precipitated iron oxide-oxyhydroxides, has been previously identified as a process of potential importance in trace metal sequestration (e.g., Butt et al. 2000; Dzombak and Morel 1990; Smith 1999). Arsenic and molybdenum may also be attenuated during the formation of ferrihydrite through. coprecipitation) in addition to surface adsorption following initial mineral precipitation (Bennett and Dudas, 2015).

7.2.4 Model Calibration

Background groundwater quality was based on measured groundwater data from background monitoring well R-MW-B2. Calibration of the unconfined flow reactive transport model was completed by adjusting the concentration of the constituents of interest (arsenic, molybdenum, and boron) to best mimic the concentrations recently measured at target wells. Target values were determined using the average concentration of each constituent measured at the specific well between 2019 and 2024. As discussed in Section 7.2.1, results from the groundwater model were directly incorporated into PHAST, thus flow parameters were not recalculated. For calibration, the ash pond unit was divided into seven different zones based on the site history and groundwater flow model calibration.

Measured porewater quality was used to represent the initial baseline water quality within the ash pond. Boron, molybdenum, and arsenic concentrations were adjusted as appropriate within the seven zones for model calibration. Boron ranged from 1.81 to 32 mg/L based on the calibration of the groundwater flow model.

Adsorption across the domain used the mean aluminum and iron concentrations as described in section 7.2.2, equilibrated with background groundwater.

To achieve target arsenic concentrations at the wells in Table 8, it was necessary to add additional arsenic to the ash pond as a mineral, to mimic the arsenic content in CCR materials. The addition of scorodite ($FeAsO_4$), ranging from a concentration of $1x10^{-5}$ to 0.1 moles resulted in an increase in groundwater arsenic concentrations at the target wells. The molybdenum concentrations used for the RCPA was same as that of porewater at well R-P-28S (0.258 mg/L). The results of the model calibration for arsenic, molybdenum, and boron demonstrated good agreement with downgradient monitoring wells given variable flow velocities and screen depths as shown in Table 8.

Table 8: Calibration of Parameters in PHAST

Well Name	Units	Arsenic		Molybdenum		Boron	
		Target Value	Modeled Concentration	Target Value	Modeled Concentration	Target Value	Modeled Concentration
R-P-19I	mg/L	0.217	0.101	0.294	0.667	5.44	8.52
R-MW-2	mg/L	0.235	0.788	0.176	0.354	4.19	5.89
R-MW-7[r]	mg/L	0.083	0.033	0.079	0.070	2.13	1.31
R-MW-3	mg/L	0.082	0.072	0.847	0.677	14.05	9.45

The Peclet and Courant numbers were calculated based on the reactive transport parameterization to ensure model validity and to control numerical dispersion (Parkhurst and Appelo 2013). These values are calculated based on the cell size, time step, dispersivity, and average groundwater velocity. Equation 4 was used to evaluate numerical dispersion based on an upstream-in-space and backwards-in-time differencing solution. The final calculated Peclet and Courant numbers are 1.67 and 0.068 respectively.

$$\frac{\Delta X}{2} + \frac{V_x \Delta t}{2} \ll \alpha \qquad \text{(Equation 4)}$$

Where:

ΔX= Cell size (100ft)

V_x= Average Velocity (34 feet/year)

Δt = Timestep (0.2 year)

α= Longitudinal dispersivity (60 ft)

7.2.5 Long-Term Stability of Attenuated Constituents

Three sensitivity analyses were performed to assess the long-term stability of attenuated arsenic and molybdenum under variable pH, redox, and ionic strength conditions (Figures 17, 18, and 19). Variations in pH, redox, and ionic strength are the most likely types of changes that will occur in an aquifer over time, thereby potentially affecting the stability of arsenic and/or molybdenum (ITRC 2010). The sensitivity analyses were conducted applying the minimum, mean, and maximum Hfo and Hao contents determined for the Site soils, equilibrated with the groundwater qualities observed at the Site at the measured pH and redox conditions. For each sensitivity analysis, a single parameter was varied:

- **pH** - Hydrochloric acid or sodium hydroxide addition was used in the modeling simulations to vary the pH between 4 and 12. A pH range of 4 to 10 is the typical range considered for evaluating metal speciation, but at a pH lower than 5, Hfo tends to become unstable, limiting attenuation/adsorption, which causes an observed decrease in modeled attenuation at lower pH values. Hao remains stable until a pH range of approximately 3.5 and, as such, may provide attenuation capacity under more acidic conditions.
- **Redox** – Addition of dissolved oxygen (DO) was simulated to adjust redox (Eh) values between -200 and +700 millivolts (mV) based on the historical and anticipated range of Eh in the region.
- **Ionic Strength** - Total dissolved solids (TDS) concentrations were increased by titrating in calcium, magnesium, sodium, potassium, chloride, and sulfate in the proportions observed in porewater. TDS concentrations up to ~6,600 mg/L were evaluated, which is approximately 10 times the average TDS concentration observed in groundwater at the CCR Monitoring Network (643 mg/L).

7.2.6 Geochemical Modeling Assumptions and Data Handling

Geochemical modeling assumptions and data handling included the following:

- **Groundwater continuity:** Groundwater quality samples were collected from each well during multiple sampling events conducted between March 2016 and November 2023. Samples from this period were selected for the geochemical modeling because all wells within the Detection and Assessment and Nature and Extent Monitoring Well Networks were sampled and analyzed for the full suite of parameters required and the resulting data are assumed to provide a comprehensive overview of groundwater conditions. Temporal trend analysis for arsenic and molybdenum made use of all available sampling events between March 2016 and November 2023.
- **Porewater chemistry:** Porewater samples collected in November 2018 were assumed to be representative of porewater found in the CCR Unit.
- **Redox values:** ORP values measured in the field were converted to Eh by adding +200 mV to the field-measured values as per YSI Tech Note (YSI 2015).
- **Non-detect values:** Constituents with concentrations less than their respective method reporting limits were assumed to have a concentration one half the minimum detection limit in model simulations.

- **Total recoverable concentrations:** Total recoverable fraction results were used for geochemical modeling.
- **Charge balance:** Groundwater and porewater compositions with charge balance errors less than 5% were considered valid. Compositions with charge balance errors greater than 5% were flagged as potentially less reliable, but still included in the geochemical modeling effort (Table 4).
- All reactions occur at thermodynamic equilibrium (i.e., no kinetics or other time-dependent expressions were used to describe the chemical reactions).
- All adsorption reactions occur on Hfo and Hao, in the form of metal (hydr)oxide minerals. Other aquifer materials such as clays and particulate organics may play a role in metal attenuation, but these were not included in this modeling effort.
- All chemical reactions in the system are described using the equilibrium constants published by the USEPA Minteq v.4 thermodynamic database (USEPA 1988) as well as the additional thermodynamic data included in files from Dzombak and Morel (1990) and Karamalidis and Dzombak (2010).

7.3 Results

7.3.1 Empirical Attenuation Rate

The results of the point decay analysis for background, monitoring, and downgradient wells from between February 2022 (when pump and treat began) and November 2023 are provided in Table 9. Results are presented as mean, site-wide attenuation rates. This decay rate analysis does **NOT** consider the effects of groundwater flow direction/velocity The timeframe was chosen in order to evaluate the likely effects of the treatment system on current concentrations.

This evaluation demonstrates that, in the Detection and Assessment Monitoring Network, a net decrease in the concentration of arsenic and molybdenum at downgradient monitoring wells has been occurring, as indicated by negative point decay constants. Detection and Assessment wells are typically downgradient of the groundwater treatment zone and the effects of treatment are beginning to be observed at certain well locations (i.e. R-P-19I) where concentration levels have reduced by up to approximately 90.3% since the implementation of corrective measures[4]. Based on reactive transport modeling the effects of treatment should become more prevalent over the next few years as the treatment system has only been in operation since 2022 (see Section 7.2.1).

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[4] R-P-19I has decreased 90.3% in arsenic concentrations since the implementation of corrective measures at the RCPA (closure and treatment) from 302 µg/L in July 2019 to 29.2 µg/L November 2023.

Table 9: Empirical Attenuation Rate of Arsenic and Molybdenum in the Detection and Assessment Monitoring Network

Constituents	Units	Average Point Decay Rates				
		Background Wells	RCPA Compliance Monitoring Network Wells (Detection and Assessment)	Nature and Extent Monitoring Well Network	All Downgradient Wells	Time to Compliance (years)
February 2022 to November 2023						
Arsenic	yr^{-1}	-0.17	-0.32	-0.01	-0.09	6.6
Molybdenum	yr^{-1}	2.17	-0.06	-0.04	-0.05	35.2

Note: Wells that are only part of the Nature and Extent Network were only sampled at most twice and are not included in this evaluation

The mean downgradient decay rates can be used to estimate the number of years it would take for elevated groundwater arsenic and molybdenum concentrations to decrease to its GWPS for the Detection and Assessment Monitoring Network. At the maximum concentration of arsenic and molybdenum observed in downgradient wells in November 2023 (0.26 and 0.72 mg/L), this would require approximately 6.6 and 35.2 years based on the decay rate, which, as noted above, does not yet consider the full effects of treatment or groundwater flow direction/velocity. In addition, the estimate does not account for various changes to the chemical attenuation processes resulting from the treatment system that may further enhance attenuation (e.g., decrease in groundwater pH at some wells from alkaline to circumneutral).

7.3.2 Attenuation Rate

Attenuation rates for arsenic and molybdenum in groundwater were modeled by combining fate and transport modeling techniques with a 3-dimensional geochemical reactive transport model. Groundwater concentrations of arsenic and molybdenum are predicted to decrease (or continue to decrease) at wells both adjacent to the RCPA (Detection and Assessment Network) and within the arsenic and molybdenum plume (Corrective Action Network; Figures 22 and 23). The reactive transport model predicts that levels of arsenic and molybdenum will decrease to below each constituent's GWPS around approximately 2033 and 2032, respectively. However, these predictions are based on the current performance of the treatment system which can become more variable as concentration decrease overtime. Additionally, changes in groundwater flow and the geochemical dynamics of the RCPA can change post closure in ways that cannot be predicted at this time.

7.3.3 Capacity of Attenuation Mechanisms

Attenuation modeling was conducted using two approaches. The first approach utilizes a 1-D static PHREEQC titration model to evaluate the attenuation capacity of adding additional arsenic and molybdenum to groundwater at each well (e.g. into every groundwater quality sample) across the range of measured adsorption medium concentrations (minimum, mean and maximum from soil analyses) present day. In addition, a 3-dimensional reactive transport PHAST model was used to evaluate and predict the long-term capacity for attenuation (using the calibrated model discussed in Section 7.2.4), to take into account unit closure and ongoing groundwater treatment. The PHAST model further evaluates the capacity for attenuation once treatment has been completed for an additional 30 years. Results of the different modeling scenarios are presented in the following sections.

7.3.3.1 Static 1-D Modeling Using PHREEQC

Results of static PHREEQC modeling indicate a large range of attenuation capacity at wells based on the current SSL's of arsenic and molybdenum present at some wells. Figure 21 presents the predicted aqueous concentrations of arsenic and molybdenum at Detection and Assessment Monitoring and Nature and Extent Monitoring wells, respectively, if higher concentrations were introduced into groundwater (e.g. RCPA concentrations increased). The bold lines display the geometric means for all groundwater scenarios within each soil scenario (minimum, mean, and maximum adsorption site density). The grey shaded area represents the range of all soil scenarios utilizing the 5th to 95th percentiles.

The predicted trajectories are compared against the GWPS (shown in red) by increasing porewater concentrations of arsenic (0.045 mg/L) and molybdenum (0.260 mg/L) at to each groundwater sample (well sampling event) based on those measured at R-P-28S. On the plots, the further the predicted trajectories are below and flat, as compared to the diagonal 1:1 line, the greater the attenuation on aquifer solids as concentrations of the constituent increases. For example, a constituent that is a conservative tracer and does not attenuate would follow the 1:1 line.

The results of static (current conditions) attenuation capacity modeling can be summarized as follows:

- **Arsenic:** Models indicated that aqueous arsenic concentrations would on average remain below the GWPS even if concentrations increased up to 4 or 9 mg/L based on the minimum and maximum adsorption capacity measured, respectively (Figure 21). Adsorption capacity of arsenic however would decrease if ongoing contributions at this elevated level were ongoing. Arsenic concentrations in all potential sources, including in porewater, have remained below 0.350 mg/L since monitoring began in 2016.
- **Molybdenum:** For the minimum and mean adsorption cases, the trajectories run nearly parallel to the 1:1 line, indicating that adsorption capacity is directly proportional to the concentration before adsorption as sites become filled (Figure 21). The modeling results suggest that adsorption has the capacity to reduce molybdenum concentrations by some, more so in locations where molybdenum levels are currently low and higher concentrations of iron and aluminum exist in soils.

7.3.3.2 3-D Reactive Transport Modeling Using PHAST

Adsorption modeling in PHAST revealed adequate capacity to attenuate arsenic and molybdenum based on the current performance of the treatment system. The term "adequate", as used in this document, refers to the capacity needed to attenuate constituents in groundwater to a level that meets the site-specific GWPS. Figures 22 and 23 present the predicted concentrations of arsenic and molybdenum over time, respectively, for the downgradient compliance monitoring network wells.

The results of the attenuation capacity modeling can be summarized as follows:

- **Arsenic:** As shown in Figure 22, modeling indicates there is adequate adsorption at the Site to attenuate arsenic to below the GWPS across the site by approximately 2032, approximately 10 years after treatment began (based on the Detection, Assessment and Corrective Action monitoring networks). Additionally, modeling results further indicate that once attenuated, aqueous arsenic concentrations will stay below the

GWPS and will likely not remobilize under the modeled site conditions throughout the modeled timeframe. (Only those wells that currently exceed the GWPS from the Detection and Assessment and Corrective Action monitoring networks are shown on Figure 22 for clarity).

- **Molybdenum:** Results of modeling indicate there is adequate adsorption at the Site to attenuate molybdenum to below the GWPS across the site by approximately 2038 (based on the Detection, Assessment, and Corrective Action monitoring networks; Figure 23). Based on model results, molybdenum concentrations were also indicated to stay below the GWPS throughout the modeled timeframe, indicating that once attenuated, molybdenum will not remobilize under the modeled site conditions. (Only those wells that currently exceed the GWPS from the Detection and Assessment and Corrective Action monitoring networks are shown on Figure 23 for clarity)

7.3.4 Long-Term Stability of Attenuated Constituents

To determine the long-term stability of sequestered arsenic and molybdenum, static PHREEQC simulations were conducted varying three variables known to affect its attenuation: pH, redox, and TDS. The modeled variations in dissolved arsenic and molybdenum concentrations as a function of change in pH, Eh, and TDS are shown in Figures 17, 18, and 19 respectively. Results are presented along with the GWPS and the range of pH, Eh, or TDS values (5th percentile to 95th percentile) observed at the Site.

The results of the attenuation stability modeling for arsenic and molybdenum as a function of changes in pH, Eh and TDS using 1-D static PHREEQC modeling can be summarized as follows:

- **Arsenic** (Figures 17-19)**:** Neutral to slightly alkaline pH values are generally more favorable for adsorption. Under more acidic and alkaline conditions (pH lower than 6.5 and greater than 9.5), arsenic can desorb and be present at concentrations potentially to exceeding GWPS. It is expected that the pH of groundwater across the Site will become more circumneutral due to active treatment, increasing the likelihood for increasing arsenic attenuation. Arsenic attenuation is generally stable under the redox conditions measured at the Site. If conditions become more reducing or oxidizing, the change in redox will likely have minimal impact on arsenic concentrations. Arsenic adsorption is predicted to be minimally affected by any increases in groundwater TDS concentration. Results of PHAST modeling indicate that aqueous arsenic concentrations will remain stable after treatment is complete and will not exceed the GWPS.
- **Molybdenum** (Figures 17-19)**:** Lower pH values (more acidic conditions) are generally more favorable for adsorption. Under more alkaline conditions (pH greater than 8), molybdenum desorbs and is present in the dissolved phase in concentrations potentially to exceed the GWPS. After groundwater treatment, it is expected that pH values across the Site will become more circumneutral, increasing the potential for molybdenum attenuation. Aqueous molybdenum concentrations are generally stable under the redox conditions measured at the Site. Molybdenum adsorption is affected by increases in TDS concentrations and modeling indicates that aqueous concentrations could increase above the GWPS when TDS concentrations reach ~3,000 mg/L. Notably, the average TDS concentration at the Site is nearly five times lower (614 mg/L). Results of PHAST modeling indicate that aqueous molybdenum concentrations will remain stable after treatment is complete and will not exceed the GWPS.

8.0 TIER I EVALUATION SUMMARY

The evaluation of natural attenuation of arsenic and molybdenum was completed in accordance with recommended practices and guidance promulgated by the USEPA and the ITRC (USEPA 2007a, b; USEPA 2015; ITRC 2010). According to USEPA (USEPA 2007a), the purpose of the Tier 1 evaluation is to "Demonstrate that the groundwater plume is not expanding and that attenuation of the contaminant onto aquifer solids is occurring where immobilization is the predominant attenuation process." Based on this definition, the following observations support further MNA for the CCR Unit in coordination with other closure and corrective measure efforts (treatment) that are currently being undertaken:

- **Plume Stability:** Based on the water quality monitoring data presented in this assessment, groundwater concentrations of arsenic and molybdenum at the Site appear to be stable or decreasing due likely in part to the closure and active treatment. Arsenic is best adsorbed between pHs of 6 – 9, above or below this range can result in desorption of arsenic from solids leading to a GWPS exceedance at the Site. Likewise, alkaline conditions (pH > 7) can result in desorption of molybdenum from solids and can contribute to concentrations above the GWPS at the Site. Groundwater treatment at the Site is actively correcting groundwater pH in the vicinity of the RCPA to circumneutral, and, consequently, arsenic and molybdenum concentrations are anticipated to continue to decline. Further, both arsenic and molybdenum show a decreasing trend site-wide based on a 1st order decay constant. The observed decreasing trend is predicted to continue or accelerate (based on 3-dimensional reactive transport modeling) as treatment continues (Figures 22 and 23). Based on the decreasing trend determined using empirical site data and modeling, concentrations of arsenic and molybdenum in the aquifer are deemed to be stable or decreasing across the Site.
- **Magnitude of Exceedances:** The highest molybdenum concentrations in the Detection and Assessment Monitoring Network was observed at downgradient well R-MW-3 in November 2019 at 1.05 mg/L. However, results from the most recent sampling have indicated that the concentration in this well has decreased to 0.722 mg/L. Wells R-MW-2 and R-MW-3 also continue demonstrating a molybdenum GWPS exceedance since closure efforts began in February 2020. But, due to closure, the arsenic concentration in groundwater at well R-P-19I has decreased by 90.3% since the implementation of corrective measures at the RCPA (closure and treatment) from 302 µg/L in July 2019 to 29.2 µg/L November 2023. Based on the results of closure and treatment at this well, it is expected that the combination of closure, treatment, and MNA will be adequate to decrease both arsenic and molybdenum in groundwater at wells in the Detection and Assessment and Corrective Action monitoring networks to below their respective GWPS's.

  Porewater: Historical records are not available for ash additions or porewater concentrations over the lifespan of the RCPA surface impoundment. However, based on 2018 porewater data, arsenic concentrations in porewater ranged from 0.035 mg/L to 0.045 mg/L and molybdenum concentrations in porewater ranged from 0.120 mg/L and 0.260 mg/L. These data likely indicate variable concentrations of arsenic and molybdenum in the CCR Unit. While in the past the RCPA may have been a source for arsenic and molybdenum in groundwater, it is currently not considered to be an active source due to the lack groundwater predominantly flowing around instead of into the RCPA after closure, and the installation of injection wells from the treatment system downgradient of the RCPA. As demonstrated by decreasing site-wide concentrations of both constituents, the RCPA is no longer an active source of porewater at the Site.

- **Groundwater Chemistry:** Groundwater monitoring data and the results of geochemical modeling support the potential for natural attenuation of arsenic and molybdenum. Groundwater was identified to be in equilibrium with calcite and ferrihydrite at all monitoring locations included in this assessment. The presence of ferrihydrite is consistent with the results of soil sequential extraction analysis that indicate the presence of amorphous and metal hydroxide fractions likely attenuating arsenic and potentially molybdenum.

- **Confirmation of Attenuation/Immobilization:** Based on both mineralogical and chemical analysis, it is demonstrated that attenuation of arsenic and molybdenum by aquifer materials is occurring. Iron and aluminum, capable of forming (hydr)oxide phases that facilitate metals attenuation (Dzombak and Morel 1990; Karamalidis and Dzombak 2010), was identified in all soil samples. This indicates that it is likely aquifer solids have been and are actively attenuating arsenic and molybdenum. Additional attenuation is expected after closure due to a reduced contribution from porewater and an accompanying decrease in groundwater pH around the RCPA, in combination with the treatment system. As a result, arsenic and molybdenum attenuation by soils is enhanced under circumneutral to moderately acidic conditions.

Based on these findings, arsenic and molybdenum appear to be viable candidates for MNA due to the aquifer response observed from closure and treatment activities and are, therefore, deemed to meet the criteria for Tier I MNA in accordance with USEPA guidance (USEPA 2007a, b; USEPA 2015).

9.0 TIER II EVALUATION

The purpose of the Tier II evaluation is to “Identify mechanisms and rates of the operative attenuation process.” Based on this definition, the following modeling results and observations support MNA as a viable corrective measure for the CCR Unit:

- **Attenuation Mechanisms:** PHREEQC modeling results (supported by results of SEP analysis) indicate that adsorption is attenuating arsenic and likely molybdenum downgradient of the CCR Unit. This is concluded based on an evaluation of site-specific groundwater compositions with the range of Hfo and Hao concentrations observed in SEP results of Site soils. The attenuation capacity of the Site is partially dependent on the concentrations of arsenic and molybdenum in groundwater. In addition to metal oxyhydroxides, clay minerals and/or particulate organics can also act as a substrate for attenuation (Goldberg et al. 1996). Although likely present, these mechanisms were not directly addressed in the current evaluation.

- **Estimated Site Attenuation Rates:** Concentrations of arsenic and molybdenum are decreasing at downgradient Detection and Assessment Monitoring Network wells, resulting in negative calculated point decay rates. Using the mean empirical decay rate, the maximum 2023 concentrations of arsenic and molybdenum observed in downgradient monitoring wells would take approximately 7 and 35 years, respectively, to attenuate to below GWPS based on the current sitewide trend. Notably, this calculation does not account for the treatment system, groundwater flow, nor increased attenuation due to pH correction of groundwater to circumneutral. Further reactive transport modeling, taking into geochemical changes from treatment, re-injection of cleaner groundwater, and groundwater flow direction and velocity, predict concentrations of both COC’s will be below their respective GWPS’s in approximately 14 years or less for each monitoring well onsite (See Section 7.3.3.2 for details).

Based on these findings, MNA appears to be an appropriate remedy for arsenic and molybdenum in combination with closure activities and are deemed to meet the criteria for Tier II MNA in accordance with USEPA guidance (USEPA 2007a, b; USEPA 2015).

10.0 TIER III EVALUATION

According to USEPA (USEPA 2007a), the purpose of the Tier III evaluation is to eliminate sites for an MNA remedy where (1) “Capacity of the aquifer is insufficient to attenuate the COC mass to regulatory standards” and/or (2) “Stability of the immobilized COC is insufficient to prevent remobilization due to future changes in groundwater chemistry”. Based on this definition, the following observations support MNA as a viable corrective measure for the CCR Unit:

- **Adsorption Capacity Modeling:** Modeling results indicate that the Site has the capacity to reduce concentrations of arsenic and molybdenum to below their respective GWPS’s after treatment (Figure 21). The 1-dimensional titration modeling demonstrates the soil’s capacity to attenuate arsenic and molybdenum if concentrations were to increase above current levels. The Detection and Assessment Monitoring Network (located immediately adjacent to the RCPA) shows reduced capacity for attenuation currently because levels of molybdenum currently exceed the GWPS. However, the Nature and Extent Network, which is more distant from the RCPA, demonstrates additional capacity for arsenic and molybdenum attenuation. As concentrations of arsenic and molybdenum decrease from closure and treatment, attenuation capacity is modeled to increase adjacent to the RCPA. The 95th percentiles of modeled trajectories show that most pH conditions at the Site are favorable for attenuating arsenic and molybdenum and will become more conducive to attenuation as the groundwater pH reverts to background levels post closure. Results of PHAST modeling further indicate that once treatment is complete, adequate adsorption capacity will exist downgradient of the Unit to maintain aqueous arsenic and molybdenum below their respective GWPS’s (Figures 22 and 23).
- **Stability Evaluation:** Geochemical modeling indicates that over the observed ranges of pH, Eh, and TDS of groundwater at the Site, aqueous concentrations of arsenic and molybdenum are relatively stable. Results of modeling further suggest that the remobilization could occur if conditions become sufficiently acidic (arsenic) or alkaline (arsenic and molybdenum; Figures 17-19). However, there is no indication or historical evidence that groundwater pH will shift enough to cause the remobilization of either constituent. The pH of background groundwater is ideal for long-term activity of these constituents and the treatment system will further aid in returning groundwater to circumneutral or background pH. Changes in redox conditions are modeled to have little to no impact on aqueous arsenic or molybdenum concentrations. Modeling results indicate that increasing TDS concentrations could result in a minor increase in aqueous arsenic and molybdenum. However, the active treatment system is currently decreasing TDS concentrations at the Site. Overall, once treatment is complete and aqueous concentrations fall below their respective GWPS’s, they are predicted to remain stable (Figures 22 and 23).

Based on these findings, arsenic and molybdenum are both candidates for MNA and deemed to meet the criteria for Tier III MNA in accordance with USEPA guidance (USEPA 2007a, b; USEPA 2015).

11.0 CONCLUSIONS

This evaluation has been completed in accordance with guidance and best practices promulgated by the USEPA (USEPA 2007a, b; USEPA 2015) and the ITRC (ITRC 2010). Based on the results of this evaluation, the following are concluded for arsenic and molybdenum at the Site:

- Overall, arsenic and molybdenum concentrations across the Site are decreasing based on a site-wide calculated first-order decay constant. Concentrations are predicted to further decrease based on the active treatment occurring at the Site which began in February 2022.
- Physical and chemical attenuation are also occurring, and concentrations of arsenic and molybdenum are predicted to decrease below their respective GWPS's in approximately 14 years or less in the Detection and Assessment and Corrective Action monitoring well networks.
- Modeling further indicates that arsenic and molybdenum attenuation will be stable long-term after treatment is complete.

Arsenic and molybdenum therefore meet the USEPA requirements (Tiers I, II, and III) for MNA based on the combination of closure and active groundwater treatment that is currently in place at the Site.

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TABLES

Table 4

Relevant Mineral Phases - Saturation Indices and Water Types

Monitored Natural Attenuation Evaluation

Rush Island Energy Center, Jefferson County, MO

MINERAL PHASES - Saturation Indices		R-MW-B1	R-MW-B2	R-P-29D	R-P-29S	R-P-05S	R-P-10S	R-P-16S	R-P-17D	R-P-17I	R-P-17S	R-P-19D	R-P-19I	R-P-19S	R-P-22D	R-P-22S	R-P-30S	R-P-31S
Water Type		Ca-HCO3	Ca-HCO3	Ca-HCO3	Ca-HCO3	Ca-HCO3	Ca-HCO3	Ca-HCO3	Na-SO4	Na-SO4	Na-HCO3	Na-HCO3	Na-HCO3	Ca-HCO3	Na-HCO3	Ca-HCO3	Ca-HCO3	Ca-HCO3
Charge Balance	%	**7.25**	3.58	0.22	4.98	0.12	0.83	1.68	0.63	-4.11	1.83	4.56	1.20	0.60	0.52	**5.16**	2.73	0.98
Ferrihydrite	$Fe(OH)_3$	**3.19**	**3.21**	**3.89**	**2.36**	**1.74**	**1.94**	**2.92**	**2.76**	**2.36**	**3.48**	**2.66**	**2.41**	**3.32**	**2.94**	**2.02**	**3.04**	**2.84**
Siderite	$FeCO_3$	**1.08**	**0.83**	**-0.40**	**0.88**	**0.79**	-1.00	-2.28	**0.38**	-6.60	-1.54	**0.44**	-3.88	**0.05**	**0.17**	**-0.03**	-1.95	**0.33**
Melanterite	$FeSO_4\ 7H_2O$	-5.55	-6.07	-6.65	-6.11	-5.56	-6.57	-8.29	-5.24	-13.91	-7.09	-5.35	-11.43	-5.87	-5.74	-5.43	-7.64	-5.94
Rhodochrosite	$MnCO_3$	**0.18**	**-0.30**	-0.73	**-0.07**	**-0.41**	**0.22**	-0.97	**0.03**	**-0.12**	**0.71**	**0.00**	**-0.44**	**-0.19**	-0.71	**-0.42**	-0.88	**0.28**
Birnessite	MnO_2	-15.59	-16.09	-12.71	-17.22	-19.02	-13.84	-10.99	-16.72	-6.74	-9.41	-16.80	-10.43	-13.92	-16.07	-16.23	-11.21	-15.61
Manganite	MnOOH	-6.57	-6.80	-5.27	-7.45	-8.36	-5.77	-4.74	-6.66	**-0.18**	-3.32	-6.74	-3.11	-5.84	-6.96	-7.32	-4.94	-6.26
Gypsum	$CaSO_4{:}2H_2O$	-2.26	-2.51	-2.06	-2.68	-2.32	-1.53	-1.66	-1.43	-2.11	-1.14	-1.60	-2.23	-1.97	-2.05	-1.22	-1.28	-2.26
Calcite	$CaCO_3$	**0.37**	**0.38**	**0.19**	**0.31**	**0.03**	**0.02**	**0.31**	**0.13**	**1.15**	**0.35**	**0.16**	**1.30**	**-0.07**	**-0.18**	**0.16**	**0.36**	**-0.04**
Magnesite	$MgCO_3$	-0.76	-1.00	-0.92	-1.06	-1.07	-1.48	-0.93	-1.22	-1.01	-0.99	-1.32	-0.99	-1.45	-1.68	-1.09	-1.08	-1.47
Barite	$BaSO_4$	**0.23**	**0.02**	**0.16**	**-0.30**	**0.15**	**0.64**	**0.35**	**0.91**	**0.21**	**0.92**	**0.89**	**0.38**	**0.27**	**0.43**	**0.72**	**0.49**	**0.07**
Witherite	$BaCO_3$	-2.48	-2.42	-2.93	-2.65	-2.84	-3.14	-3.00	-2.85	-1.85	-2.90	-2.68	-1.42	-3.16	-3.02	-3.23	-3.19	-3.03
Fluorite	CaF_2	-2.73	-2.78	-2.90	-2.69	-2.08	-2.74	-2.82	-2.37	-1.95	-2.95	-0.99	-2.43	-1.94	-1.00	-2.72	-2.72	-1.85
Carbon Dioxide	pCO2(g)	-1.29	-1.83	-1.87	-1.39	-1.76	-1.16	-1.62	-2.61	-5.68	-1.28	-2.44	-3.77	-1.50	-2.04	-1.12	-1.42	-2.02

Notes:

Charge balances greater than 5% shown in red

Saturation indices >=-0.5 shown in bold and gray

Dashed cells represent elements not measured in sample for SI evaluation

Most recent sampling data used to calculate saturation indicies

pCO2(g) values presented at 10^^{value} atm

Table 4
Relevant Mineral Phases - Saturation Indices and Water Types
Monitored Natural Attenuation Evaluation
Rush Island Energy Center, Jefferson County, MO

MINERAL PHASES - Saturation Indices		**R-MW-1**	**R-MW-2**	**R-MW-3**	**R-MW-4**	**R-MW-5**	**R-MW-6**	**R-MW-7[r]**	**R-P-21D**	**R-P-21I**	**R-P-21S**	**R-P-27S**	**R-P-28S**
Water Type		**Na-SO4**	**Na-SO4**	**Na-SO4**	**Ca-HCO3**	**Ca-HCO3**	**Ca-HCO3**	**Ca-HCO3**	**Na-Cl**	**Na-HCO3**	**Ca-HCO3**	**Na-OH**	**Na-OH**
Charge Balance	%	2.72	-0.11	-4.23	**19.17**	**-5.65**	2.14	4.37	-1.30	4.10	**9.23**	-0.42	-2.95
Ferrihydrite	$Fe(OH)_3$	**2.58**	**1.24**	**2.93**	**1.85**	**2.07**	**2.82**	**3.29**	**3.26**	**3.65**	**1.55**	-0.58	-0.59
Siderite	$FeCO_3$	-4.87	-10.52	-4.85	**0.65**	**0.91**	**-0.45**	**0.96**	**-0.08**	**-0.37**	**1.05**	-16.74	-17.09
Melanterite	$FeSO_4$ $7H_2O$	-11.03	-18.13	-11.74	-7.25	-5.70	-6.73	-5.50	-5.80	-6.85	-5.73	-22.81	-23.12
Rhodochrosite	$MnCO_3$	**-0.50**	**-0.12**	**0.12**	**-0.16**	**-0.08**	-0.88	**-0.29**	**-0.05**	**-0.14**	**0.13**	-3.29	-3.44
Birnessite	MnO_2	-7.48	-2.10	-7.12	-18.23	-18.27	-14.95	-16.09	-14.25	-13.81	-18.82	**-0.24**	**0.02**
Manganite	MnOOH	-2.15	**2.67**	-1.03	-7.79	-7.74	-6.43	-6.91	-5.62	-5.06	-8.19	**3.81**	**3.81**
Gypsum	$CaSO_4{:}2H_2O$	-1.57	-2.26	-1.82	-3.66	-2.10	-2.04	-2.33	-1.54	-1.93	-2.58	-1.65	-1.64
Calcite	$CaCO_3$	**0.53**	**1.32**	**1.05**	**0.24**	**0.52**	**0.26**	**0.11**	**0.17**	**0.53**	**0.21**	**0.36**	**0.29**
Magnesite	$MgCO_3$	-0.98		-0.66	-1.06	-0.96	-1.22	-1.08	-0.93	-1.02	-0.96		
Barite	$BaSO_4$	**0.34**	**-0.15**	**0.75**	-1.14	**0.35**	**0.02**	**0.19**	**0.50**	**0.37**	**-0.29**	**0.52**	**0.62**
Witherite	$BaCO_3$	-2.87	-1.89	-1.71	-2.58	-2.37	-3.03	-2.71	-3.12	-2.50	-2.85	-2.79	-2.76
Fluorite	CaF_2	-3.26	-2.75	-2.00	-1.46	-2.75	-1.76	-2.91	-1.20	-1.52	-1.90	-2.72	-1.18
Carbon Dioxide	pCO2(g)	-2.95	-6.69	-4.03	-1.79	-1.84	-1.92	-1.66	-2.12	-2.92	-1.28	-10.37	-10.48

Notes:
Charge balances greater than 5% shown in red
Saturation indices >=-0.5 shown in bold and gray
Dashed cells represent elements not measured in sample f
Most recent sampling data used to calculate saturation indi
pCO2(g) values presented at 10^^{value} atm

Table 5
Summary of Rietveld Quantitative Analysis X-Ray Diffraction Results
Monitored Natural Attenuation
Rush Island Energy Center, Jefferson County, MO

Group	Mineral	Mineral Formula	Sample Location									
			BH-01			BH-02				BH-03		
			Sample Interval (ft bgs)									
			28.5-31	75-80	130-135	41-45	70-72	72-75	125-130	30-32	70-75	110-115
Silicates	Quartz	SiO_2	61.2	77.8	75.0	72.5	61.3	70.6	74.0	67.4	76.8	71.4
	Plagioclase	$(Ca,Na)(Al,Si)_4O_8$	22.8	17.4	17.8	20.9	26.0	20.7	18.4	21.7	14.5	17.6
	Potassium Feldspar	$KAlSi_3O_8$	15.4	4.2	5.8	4.5	8.8	8.1	7.1	10.6	8.7	8.4
	Muscovite	$KAl_2(AlSi_3O_{10})(FOH)_2$	0.0	0.1	0.8	0.8	1.6	0.6	0.5	0.2	0.0	0.0
	Chlorite	$(Mg,Fe)_3(Si,Al)_4O_{10}(OH)_2$	0.0	-	0.0	0.0	1.1	0.0	0.0	-	-	0.0
	Amphibole	$(Ca,Na)_{2-3}(Mg,Fe,Al)_5(Al,Si)_8O_{22}(OH,F)_2$	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-	0.0
	Vermiculite	$(Mg,Fe)_3(Al,Si)_4O_{10}(OH)_2 \cdot 4H_2O$	-	-	-	-	0.4	-	-	-	-	-
Carbonates	Calcite	$CaCO_3$	0.0	0.0	0.0	0.1	0.4	0.0	-	0.0	-	2.3
	Dolomite	$CaMg(CO_3)_2$	0.7	0.5	0.6	1.2	0.6	-	-	0.1	-	0.3

Notes:

Results provided in wt% - percent by weight of each mineral.

ft bgs - feet below ground surface.

Non-detect minerals within a sample are represented by "-".

Zero values indicate that the mineral was included in the refinement, but the calculated concentration is below a measurable value.

Samples were collected by Golder Associates in 2018

Table 6

Summary of Sequential Analysis of Metals in Soils from Borings

Monitored Natural Attenuation Evaluation

Rush Island Energy Center, Jefferson County, MO

Analyte	SEP Step	Sample Location									
		BH-01			BH-02				BH-03		
		Sample Interval (ft bgs)									
		28.5-31	75-80	130-135	41-45	70-72	72-75	125-130	30-32	70-75	110-115
Aluminum	SEP Step 1	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U
Aluminum	SEP Step 2	0 U	0 U	8.7 J	0 U	14 J	18 J	6.1 J	9.3 J	0 U	6 J
Aluminum	SEP Step 3	26	15	42	28	63	170	54	22	22	28
Aluminum	SEP Step 4	410	310	480	440	550	2200	640	290 J	490	330
Aluminum	SEP Step 5	50 J	36 J	40 J	39 J	33 J	34 J	27 J	42 J	29 J	38 J
Aluminum	SEP Step 6	830	610	910	900	1200	4100	990	1000	690	470
Aluminum	SEP Step 7	24000	32000	36000	27000	30000	26000	40000	33000 J	29000	29000
Environmentally Available		486	361	571	507	660	2,422	727	363	541	402
SEP SUM		25,316	32,971	37,481	28,407	31,860	32,522	41,717	34,363	30,231	29,872
Iron	SEP Step 1	0 U	0 U	0 U	0 U	0 U	24 J	0 U	0 U	0 U	0 U
Iron	SEP Step 2	87	11 J	290	86	290	720	180	83	34	60
Iron	SEP Step 3	610	230	1100	640	970	1500	650	440 J	1400	460
Iron	SEP Step 4	2100	1200	1700	2000	1900	4500	1700	1300 J	2000	1100
Iron	SEP Step 5	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U
Iron	SEP Step 6	3600	1800	2700	3100	2600	6100	2300	3400	2700	1500
Iron	SEP Step 7	3500 B	2200 B	2700 B	3200 B	2600 B	6200 B	3000 B	4900 J	3800 B	1600 B
Environmentally Available		2,797	1,441	3,090	2,726	3,160	6,744	2,530	1,823	3,434	1,620
SEP SUM		9,897	5,441	8,490	9,026	8,360	19,044	7,830	10,123	9,934	4,720
Arsenic	SEP Step 1	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U
Arsenic	SEP Step 2	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U
Arsenic	SEP Step 3	0.19 J	0.62	0.44 J	0.2 J	0.84	0.57 J	0.32 J	0.36 J	2.4	0.34 J
Arsenic	SEP Step 4	0.7 J	0.98 J	0.64 J	0.76 J	1.2 J	1.4 J	0.8 J	0.66 J	1.9 J	0.65 J
Arsenic	SEP Step 5	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U
Arsenic	SEP Step 6	0.6 J	0.63	0.92	0.41 J	1	1.6	0.94	0.65	1.1	0.65
Arsenic	SEP Step 7	1.3	1.1	1.4	1.2	1.8	1.5	1.4	1.2	2.1	0.88
Environmentally Available		0.89	1.6	1.08	0.96	2.04	1.97	1.12	1.02	4.3	0.99
SEP SUM		2.79	3.33	3.4	2.57	4.84	5.07	3.46	2.87	7.5	2.52
Molybdenum	SEP Step 1	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U
Molybdenum	SEP Step 2	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U
Molybdenum	SEP Step 3	0 U	0 U	0 U	0.22 J	0 U	0.12 J	0 U	0.67 J	0 U	0 U
Molybdenum	SEP Step 4	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0.41 J	0 U	0 U
Molybdenum	SEP Step 5	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U
Molybdenum	SEP Step 6	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U
Molybdenum	SEP Step 7	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0.19 J	0.2 J	0 U
Environmentally Available		0	0	0	0	0	0	0	1	0	0
SEP SUM		0	0	0	0.22	0	0.12	0	1.27	0.2	0

Notes:

All Results displayed in milligram per kilogram mg/kg.

ft bgs - feet below ground surface.

1 = result using SEP_Tot_Prep method

2 = result using 3050B method

U= The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J= The analyte was positively identified. The associated numerical value is the approximate concentration.

B= Compound was found in the blank and sample.

SEP: Sequential Extraction Procedure.

Step 1 - Exchangeable Phase: This extraction includes trace elements that are reversibly adsorbed to soil minerals, amorphous solids, and organic material by

Step 2 - Carbonate Phase: This extraction targets trace elements that are adsorbed or otherwise bound to carbonate minerals.

Step 3 - Non-Crystalline Materials Phase: This extraction targets trace elements that are complexed by amorphous minerals (e.g. iron).

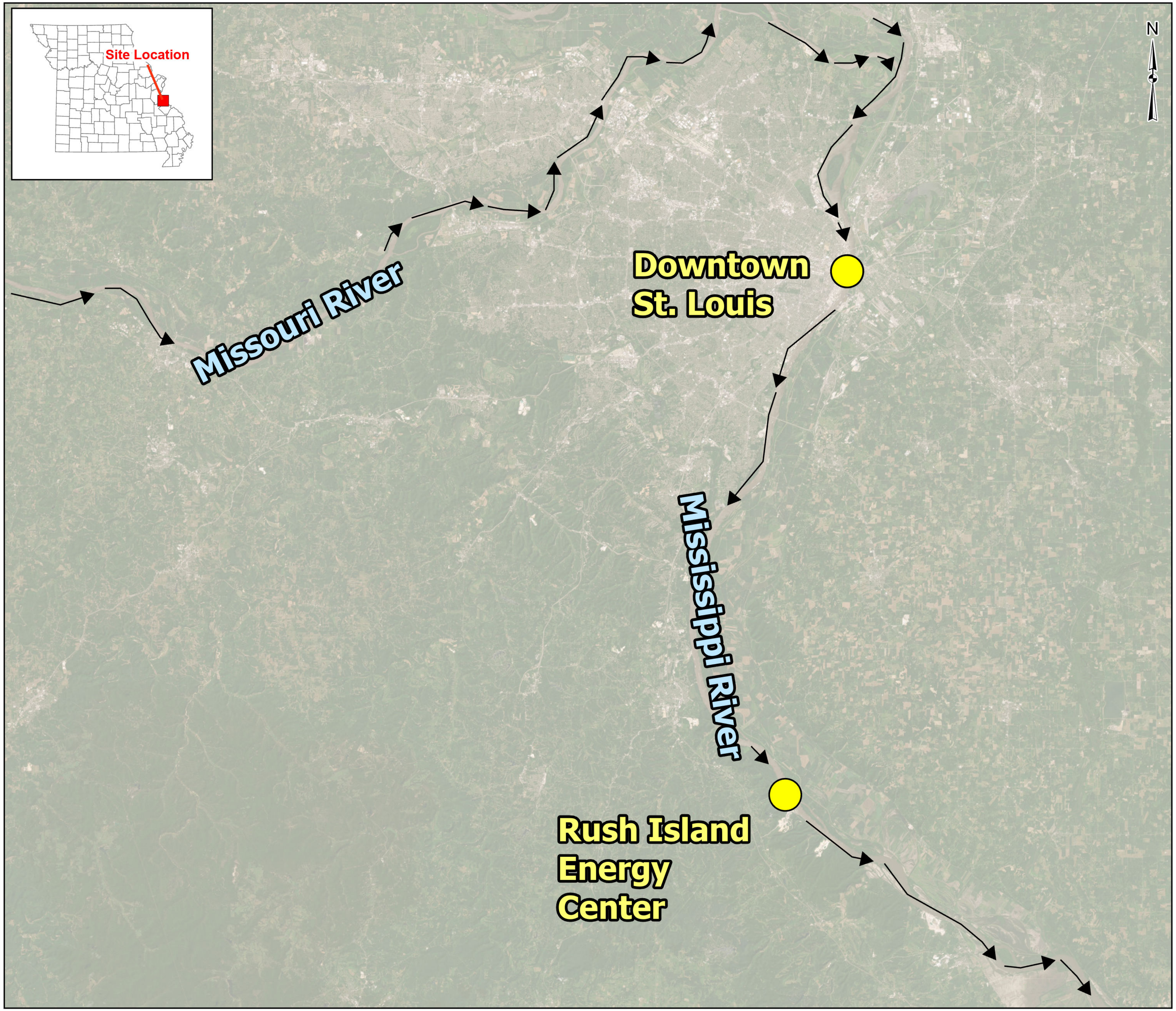
Step 4 - Metal Hydroxide Phase: This extraction targets trace elements bound to hydroxides of iron, manganese, and/or aluminum.

Step 5 - Organic Phase: This extraction targets trace elements strongly bound via chemisorption to organic material.

Step 6 - Acid/Sulfide Fraction: The extraction is used to identify trace elements precipitated as sulfide minerals

Step 7- Residual Fraction: Trace elements remaining in the soil after the previous extractions will be distributed between silicates, phosphates, and refractory oxides.

FIGURES



TITLE

SITE LOCATION MAP

→ River Flow Direction

NOTES

1. All boundaries and locations are approximate.

REFERENCES

1. Ameren Missouri Rush Island Energy Center Property Control Map January, 2012

0 2.5 5 10
Miles

PROJECT
CCR RULE GROUNDWATER MONITORING PROGRAM

CLIENT
AMEREN MISSOURI
RUSH ISLAND ENERGY CENTER

DESIGN	JSI	YYYY-MM-DD	2024-10-09
PREPARED	JDQ	PROJECT No.	23008-34 MNA
REVIEW	JSI		
APPROVED	MNH		

FIGURE 1

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:

0
1 in

TITLE

Rush Island Energy Center Monitoring Programs and Sample Location Map

LEGEND

- 🟥 Rush Island Energy Center Property Boundary
- ▭ RCPA Surface Impoundment

Treatment System Wells

- ● Injection Well
- ○ Extraction Well

Monitoring Well Networks

- ⬟ Monitored Natural Attenuation Borehole Location
- ⊕ Background Monitoring Well
- ⊕ RCPA Corrective Action (Performance) Monitoring Well
- ⊕ RCPA Compliance Monitoring Well (Detection and Assessment Monitoring)
- ⊕ RCPA Nature and Extent Monitoring Well
- ⊕ CCR Unit Porewater Piezometer

NOTES

1. All boundaries and locations are approximate.
2. Injection and extraction wells are not labeled for clarity.
3. Corrective Action monitoring wells except R-P-16S are included in both the RCPA and Corrective Action and Nature and Extent Networks.

REFERENCES

1. Ameren Missouri Rush Island Energy Center Property Control Map January, 2012

0 1,000 2,000
Feet

PROJECT
CCR RULE GROUNDWATER MONITORING PROGRAM

CLIENT
AMEREN MISSOURI
RUSH ISLAND ENERGY CENTER

Ameren

ROCKSMITH
GEOENGINEERING

DESIGN	JSI	YYYY-MM-DD	2024-10-09
PREPARED	JDQ	PROJECT No.	23008-34 MNA
REVIEW	JSI	FIGURE 2	
APPROVED	MNH		

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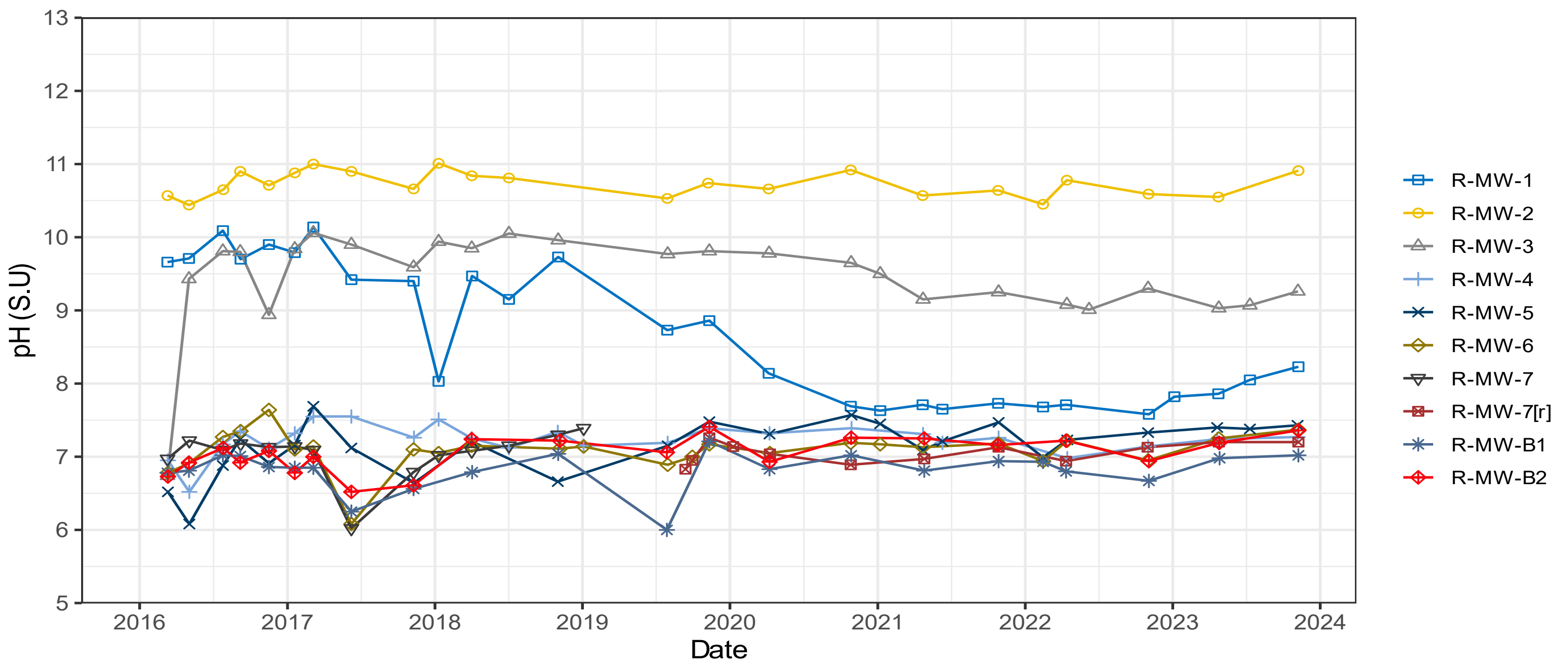
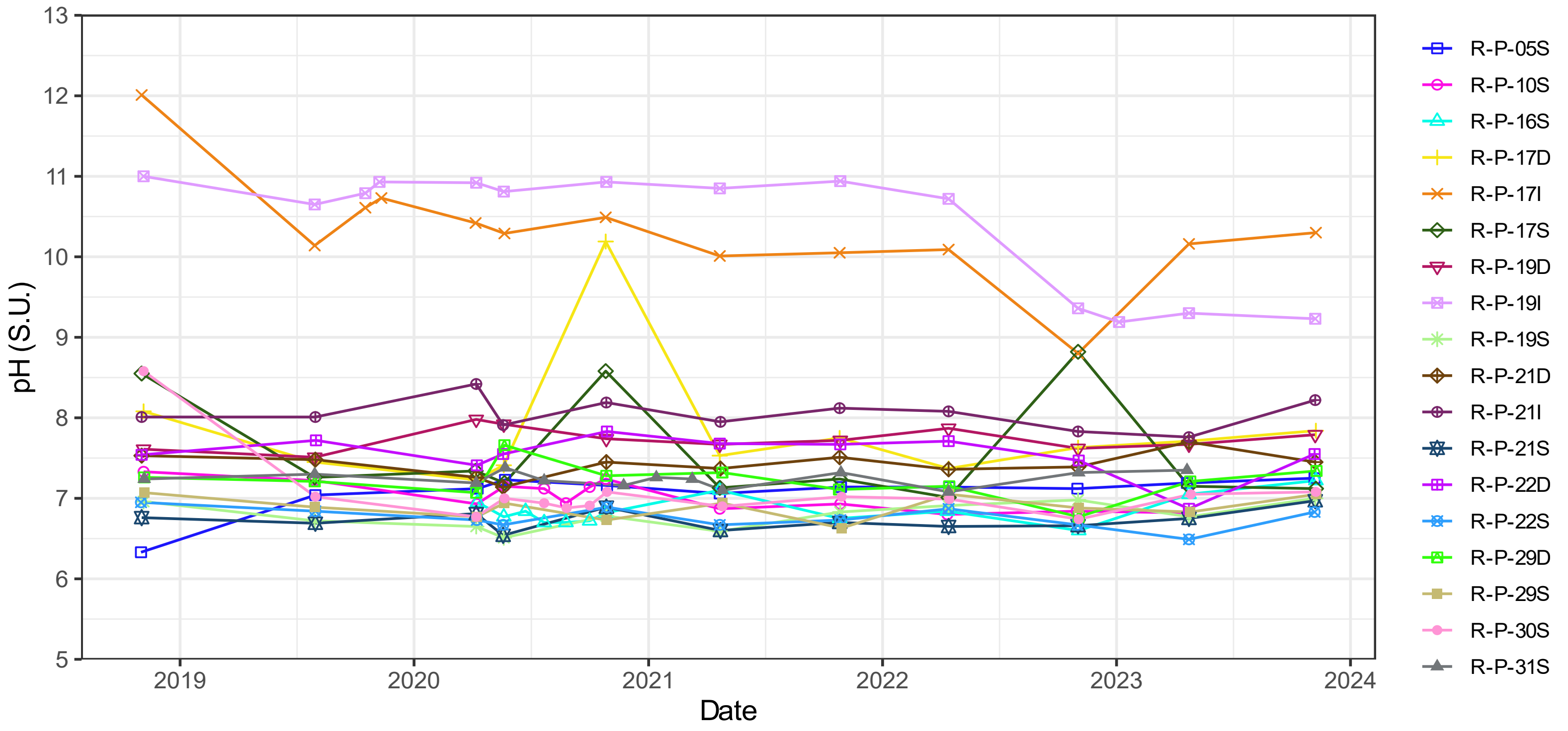


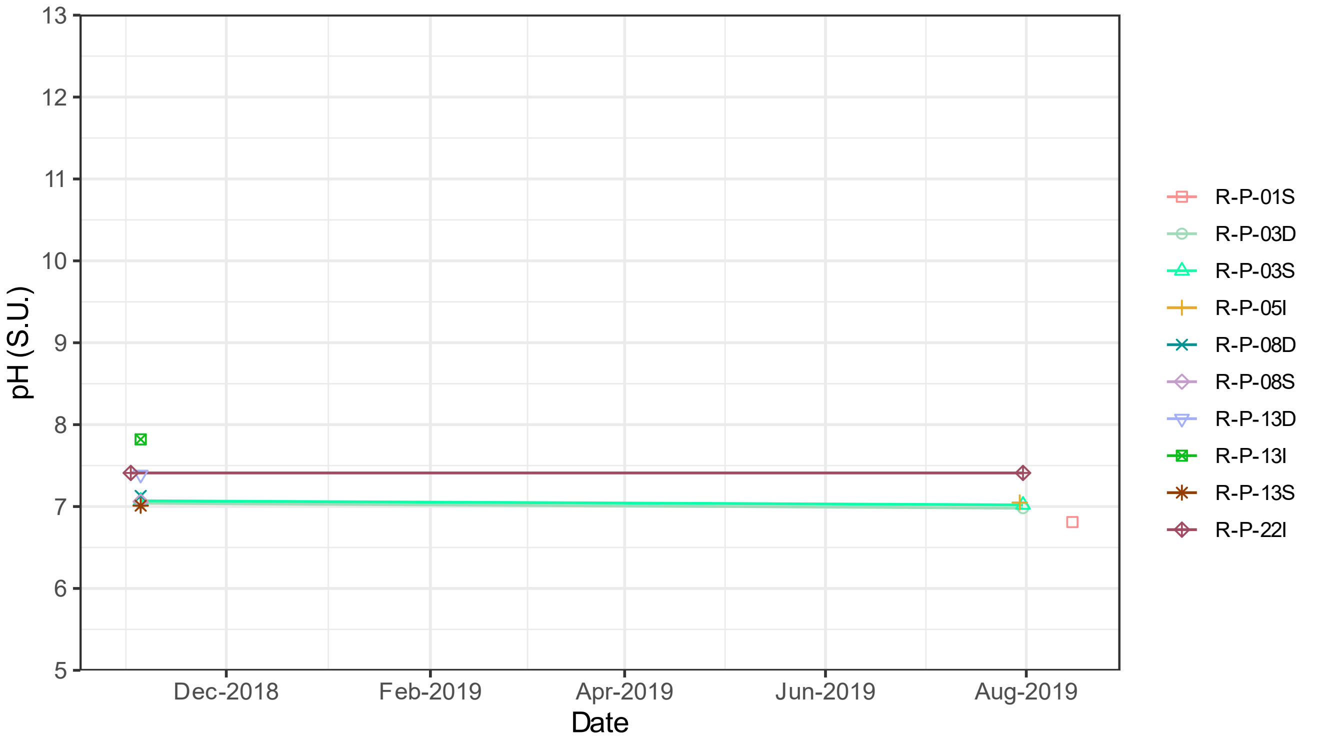
a) RCPA Detection and Assessment Wells and Background Groundwater Monitoring Wells



b) RCPA Corrective Action Groundwater Monitoring Wells

Notes:

R-MW-2 pH of 12.59 S.U. on 11/5/18 identified as an outlier and was removed from the dataset



c) Nature and Extent Groundwater Monitoring Wells

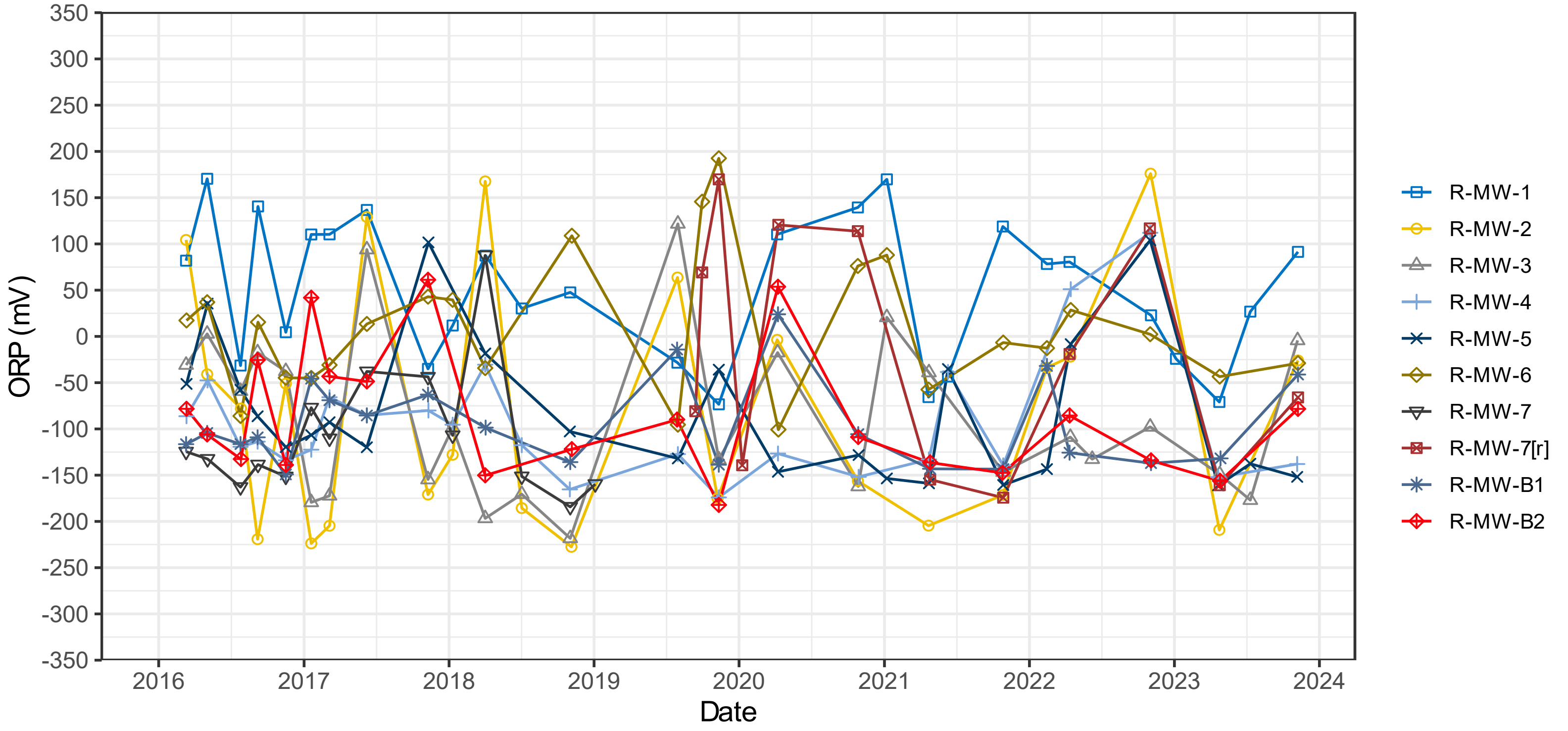
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

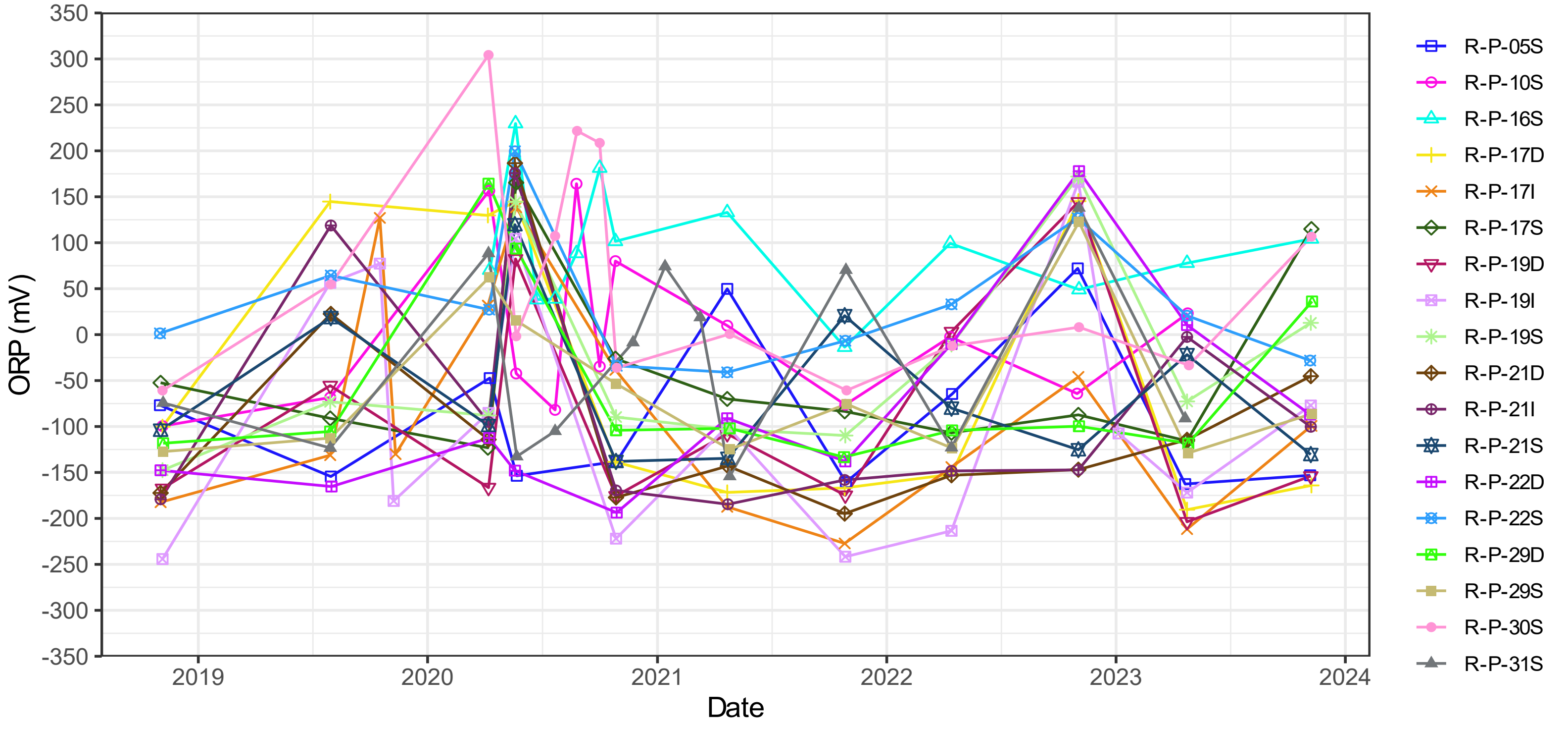
CONSULTANT

TITLE
pH of Groundwater at (a) Detection and Assessment and Background wells, (b) Corrective Action Network Wells, and (c) Nature and Extent Wells

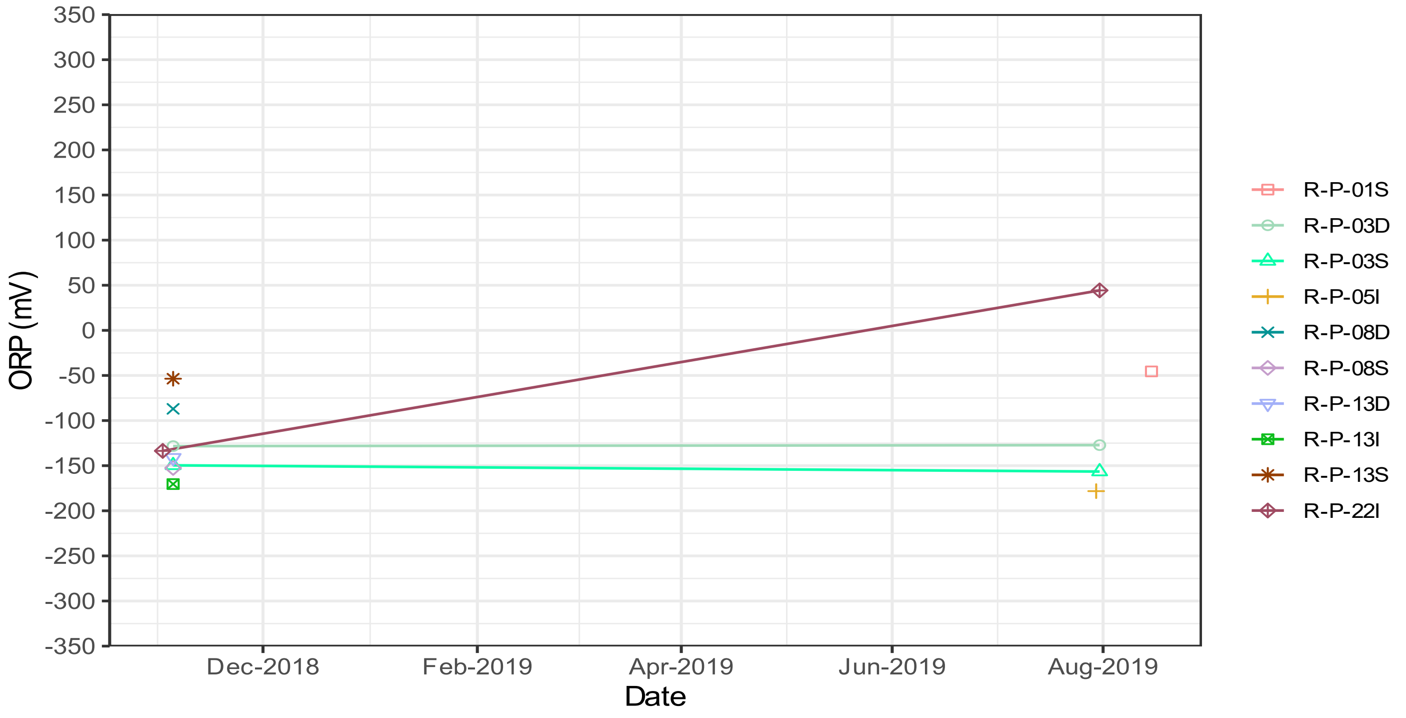
PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	3



a) RCPA Detection and Assessment Wells and Background Groundwater Monitoring Wells



b) RCPA Corrective Action Groundwater Monitoring Wells



c) Nature and Extent Groundwater Monitoring Wells

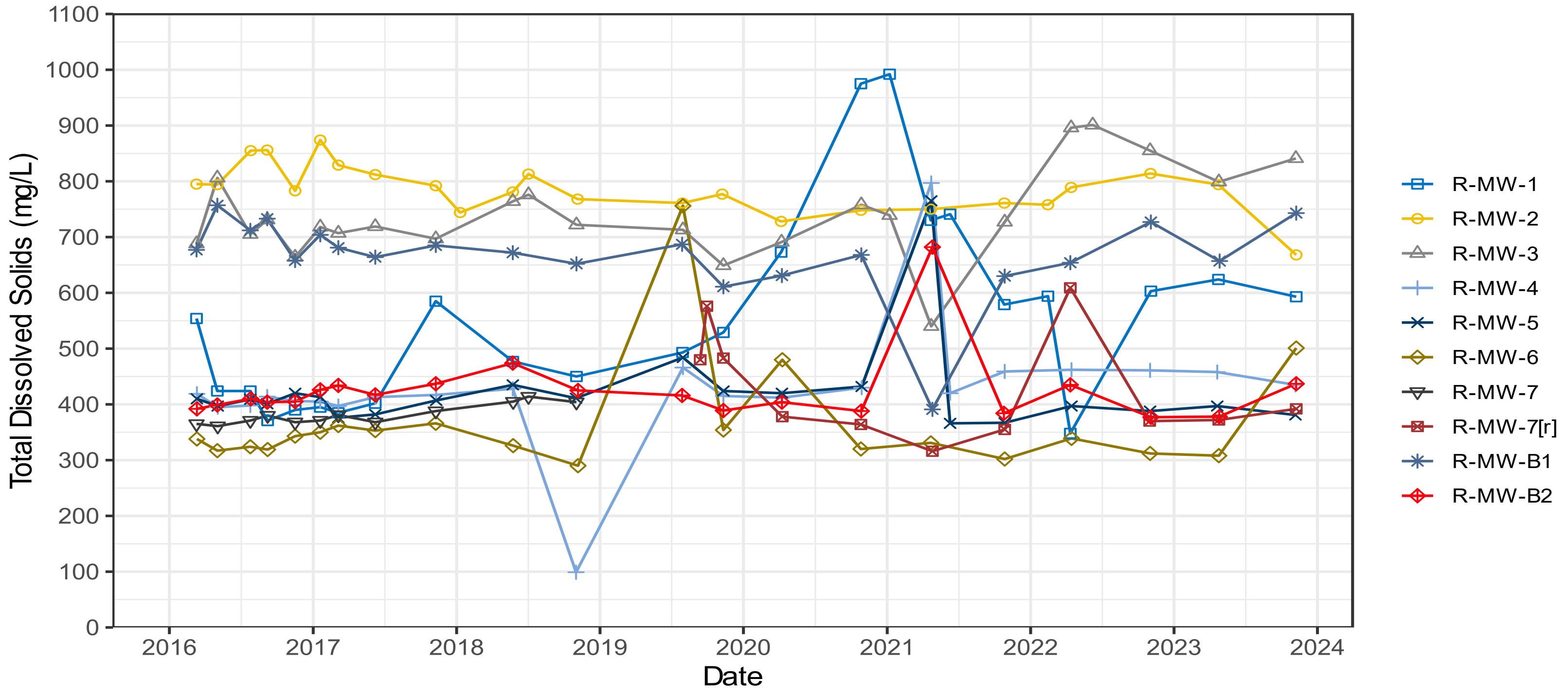
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

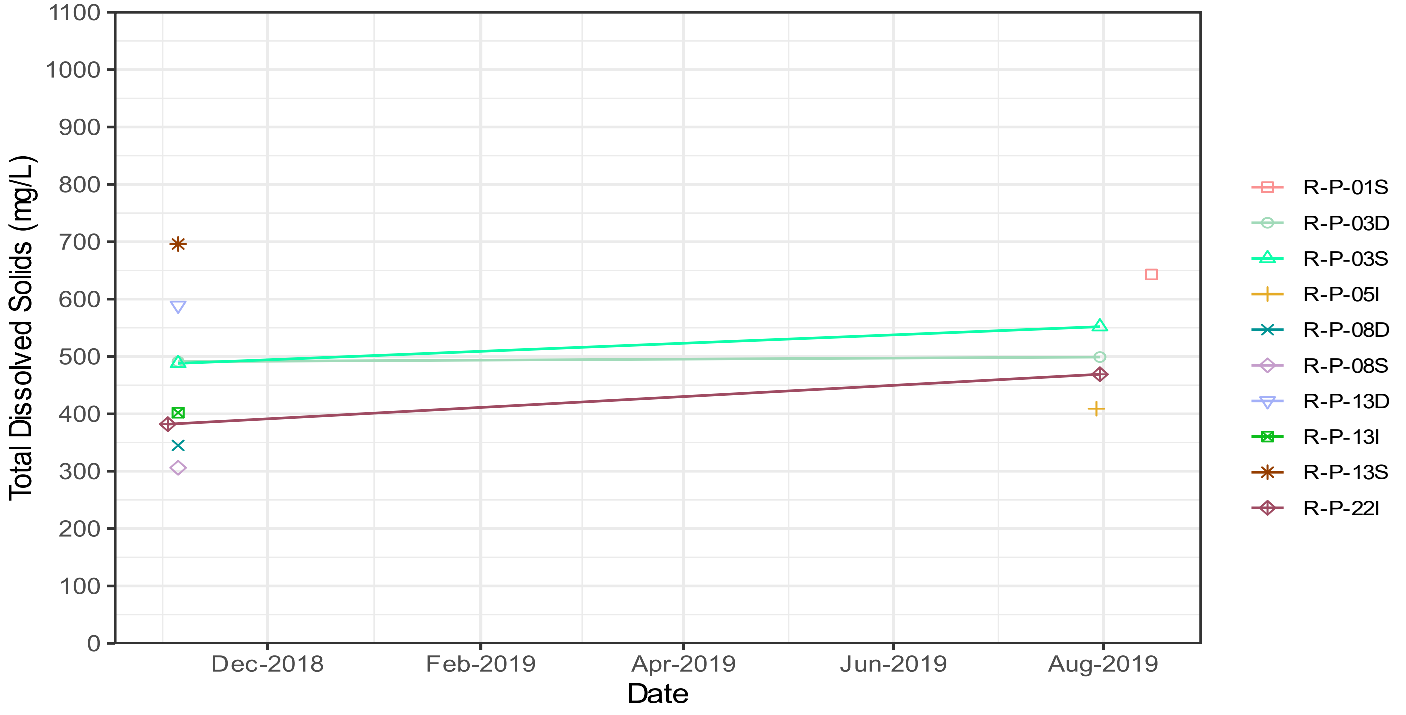
CONSULTANT

TITLE
ORP of Groundwater at (a) Detection and Assessment and Background Wells, (b) Corrective Action Network Wells, and (c) Nature and Extent Wells

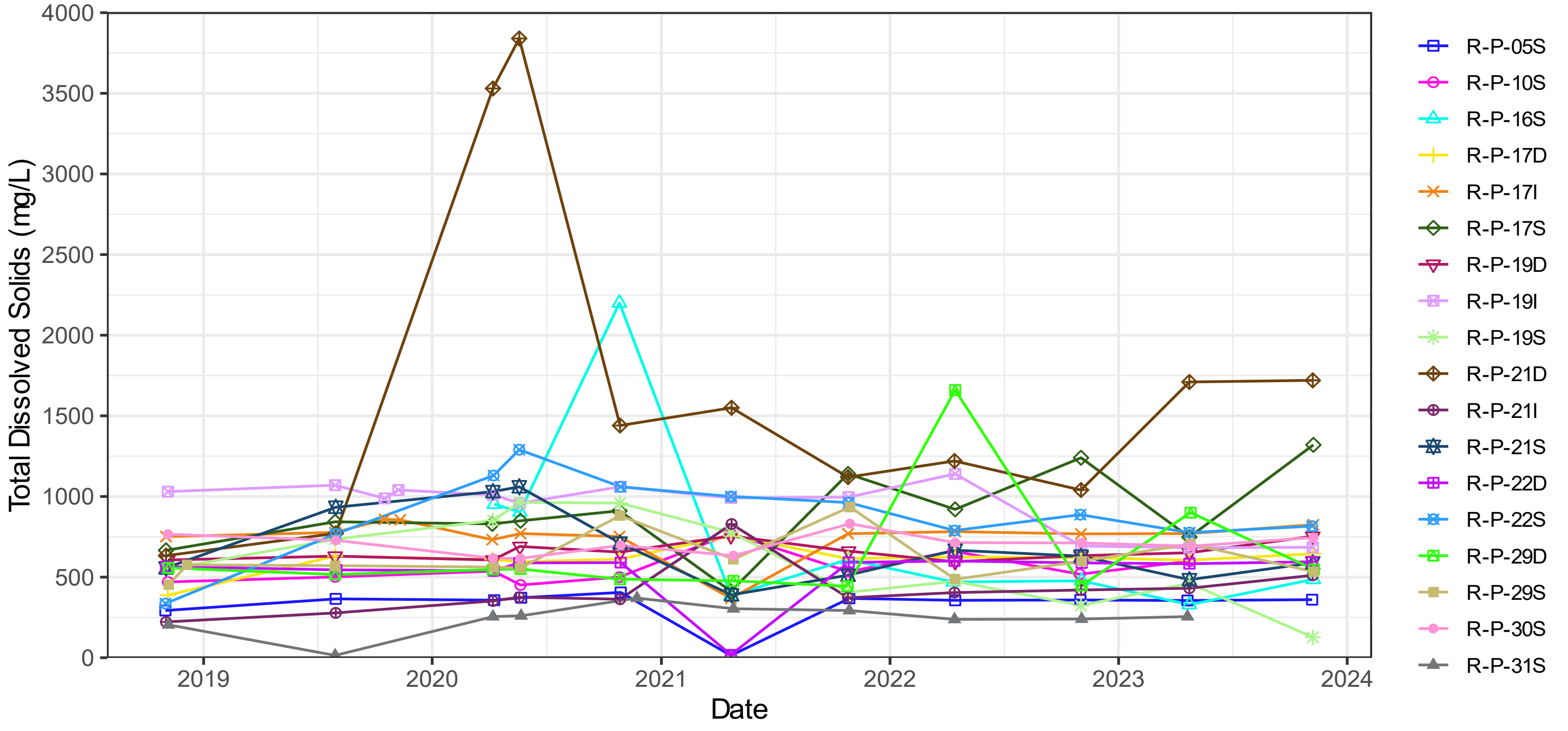
PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	4



a) RCPA Detection and Assessment Wells and Background Groundwater Monitoring Wells



c) Nature and Extent Groundwater Monitoring Wells



b) RCPA Corrective Action Groundwater Monitoring Wells

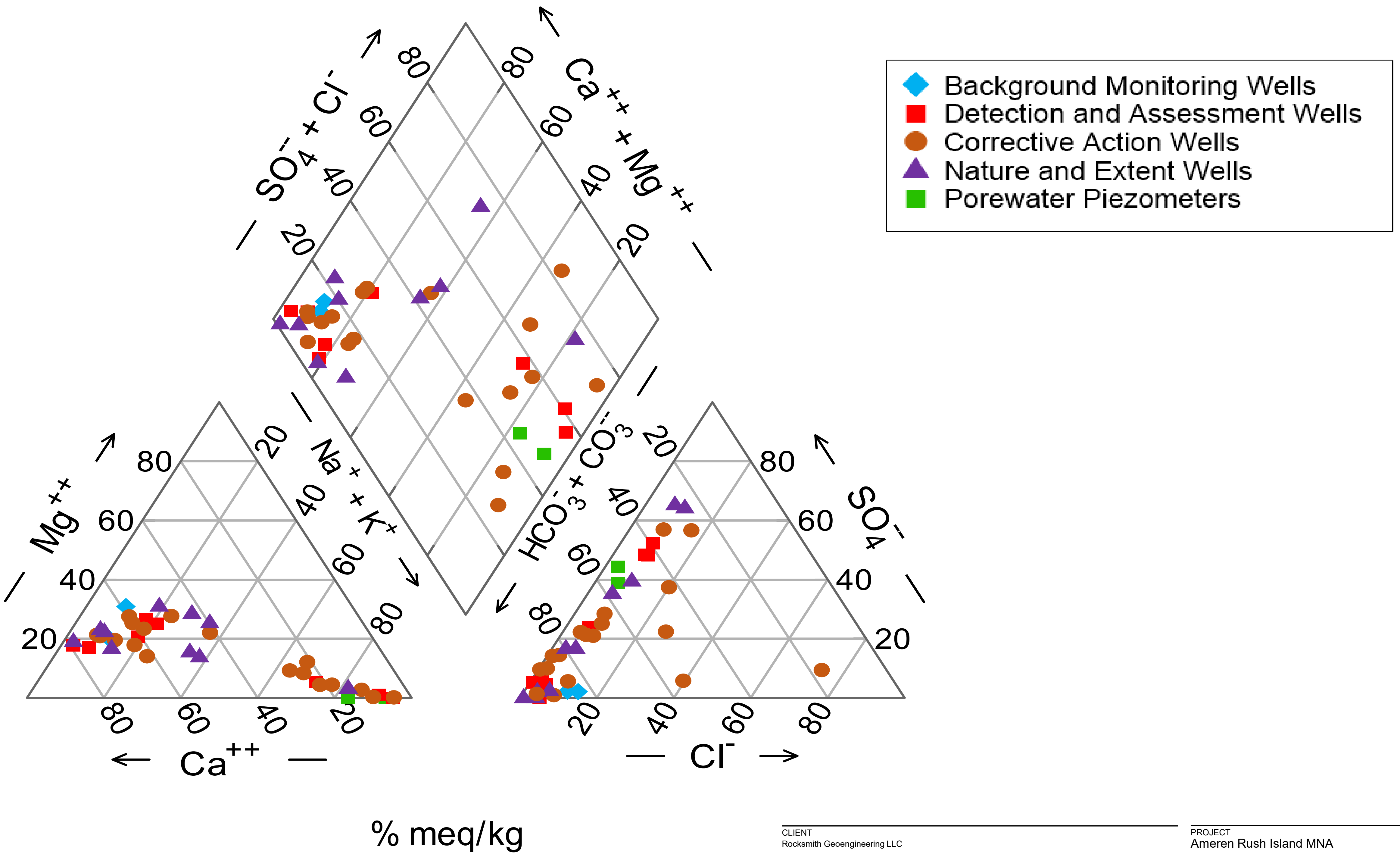
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
Total Dissolved Solids in Groundwater at (a) Detection and Assessment and Background Wells, (b) Corrective Action Network Wells, and (c) Nature and Extent Wells

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	5



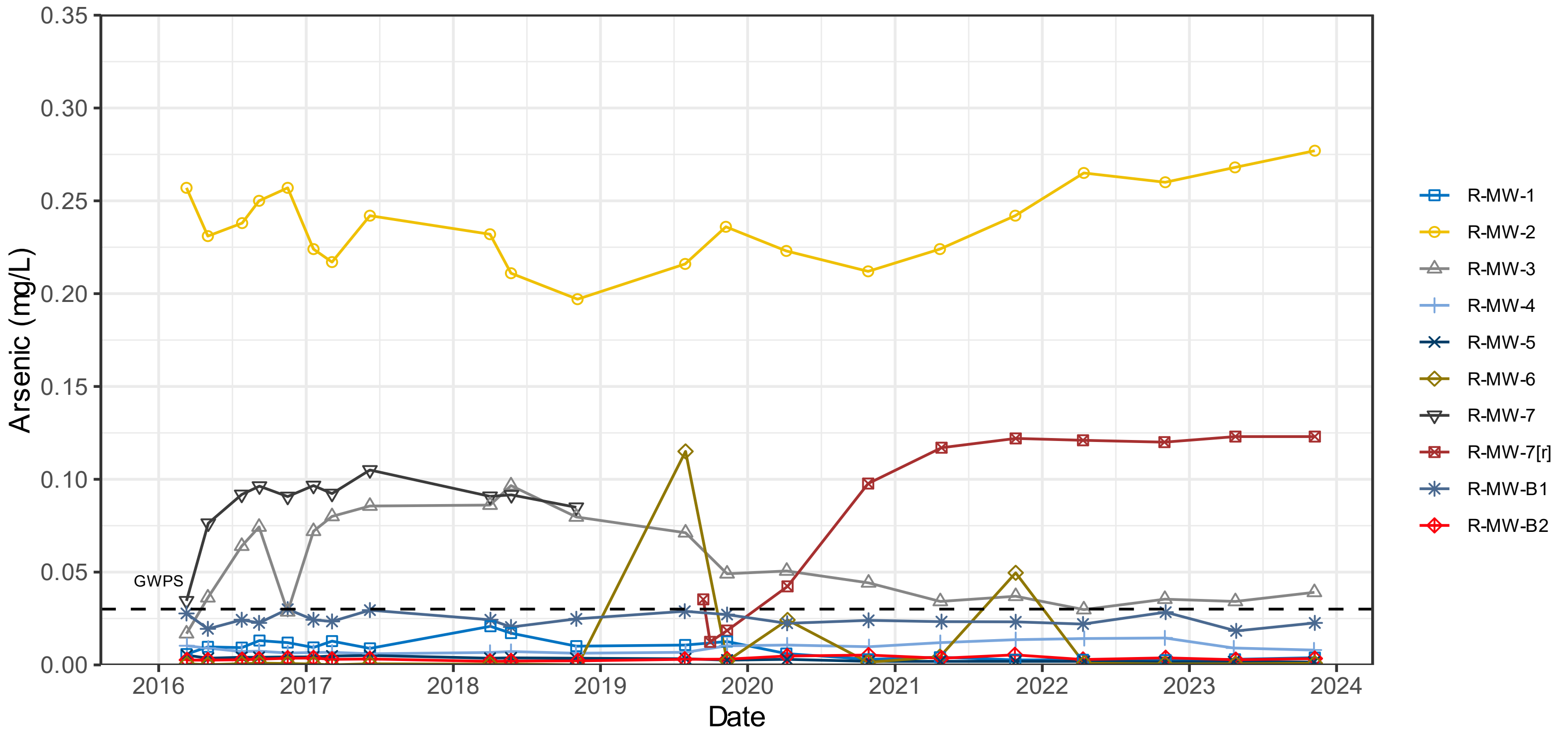
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

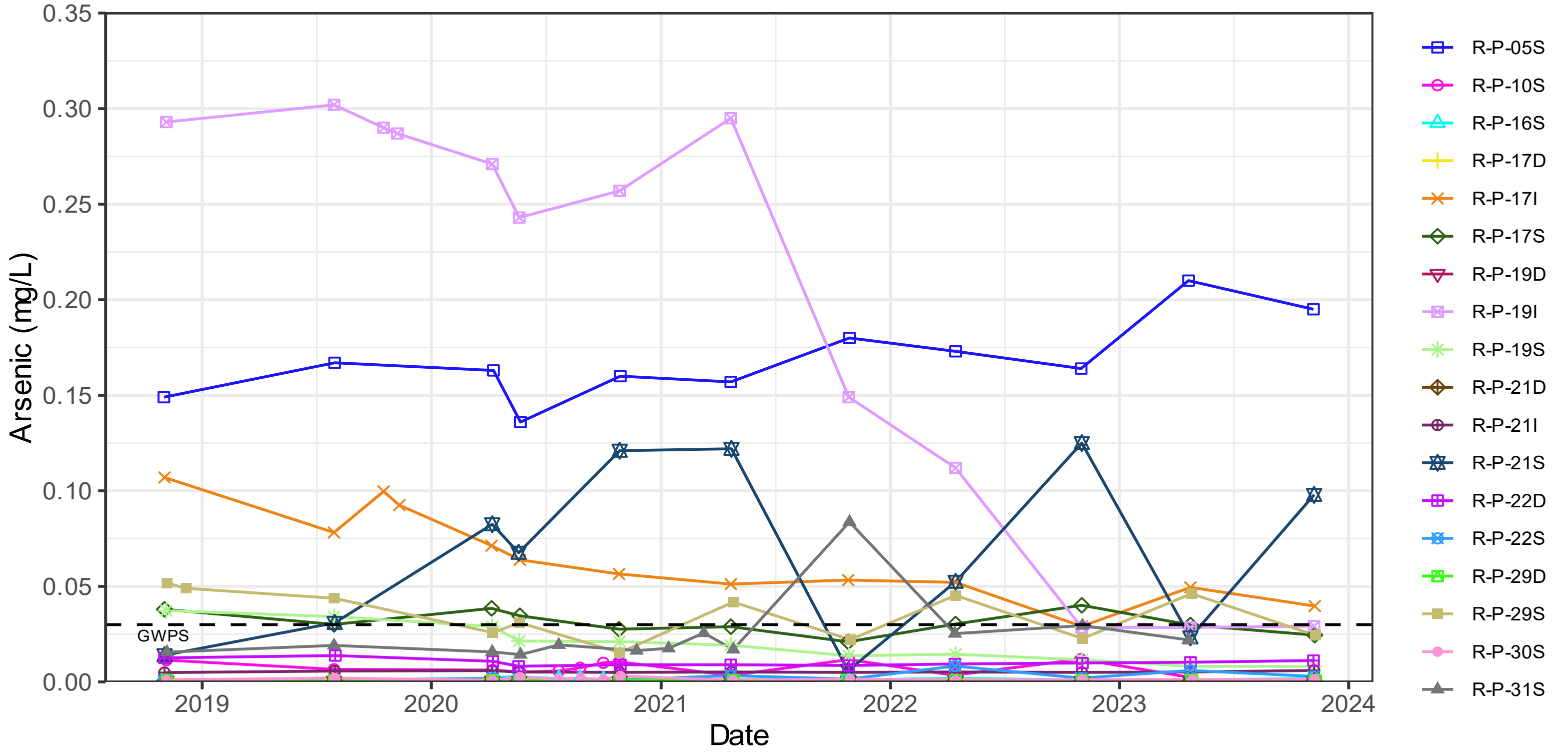
CONSULTANT

TITLE
Trilinear Diagram - Groundwater Characterization of Compliance, Corrective Action, and Nature and Extent Monitoring Network Wells

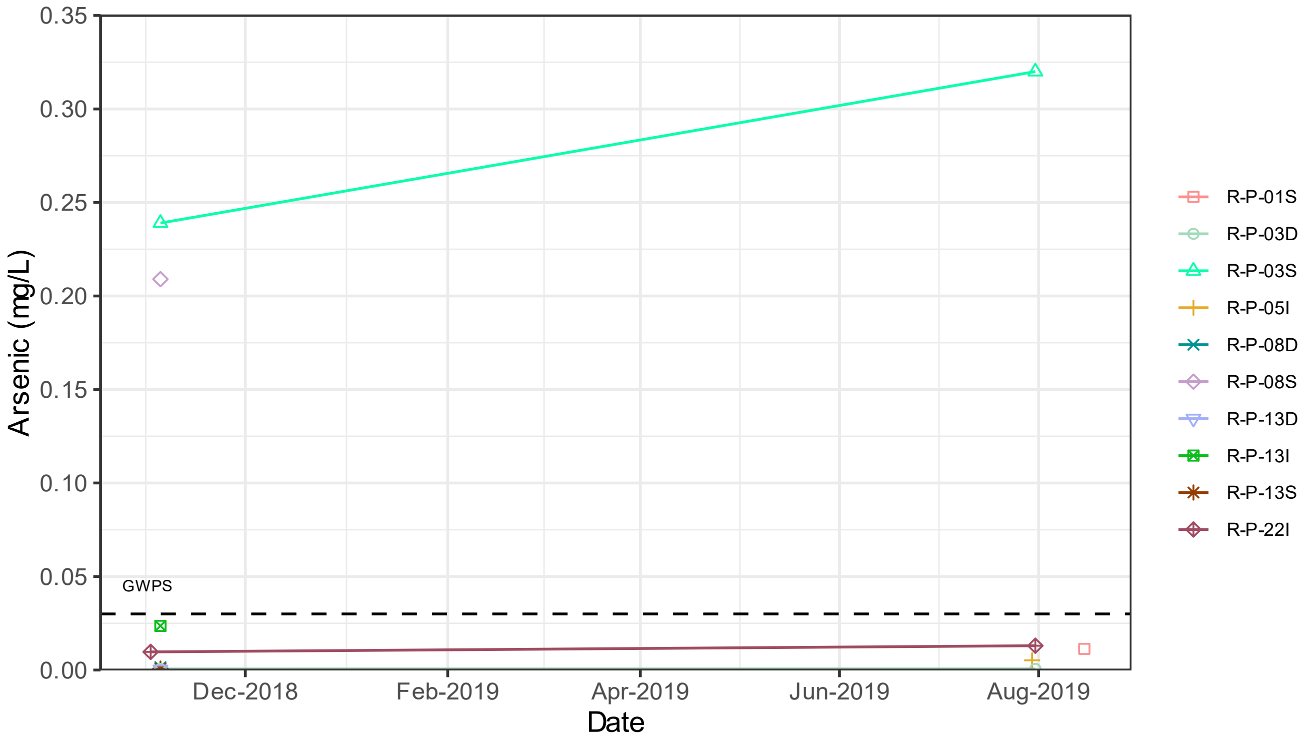
PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	6



A) RCPA Detection and Assessment Wells and Background Groundwater Monitoring Wells



B) RCPA Corrective Action Groundwater Monitoring Wells



C) Nature and Extent Groundwater Monitoring Wells

CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
Arsenic in Groundwater at (a) Detection and Assessment and Background Wells, (b) Corrective Action Network Wells, and (c) Nature and Extent Wells

PROJECT NO.	PHASE	REV.	FIGURE
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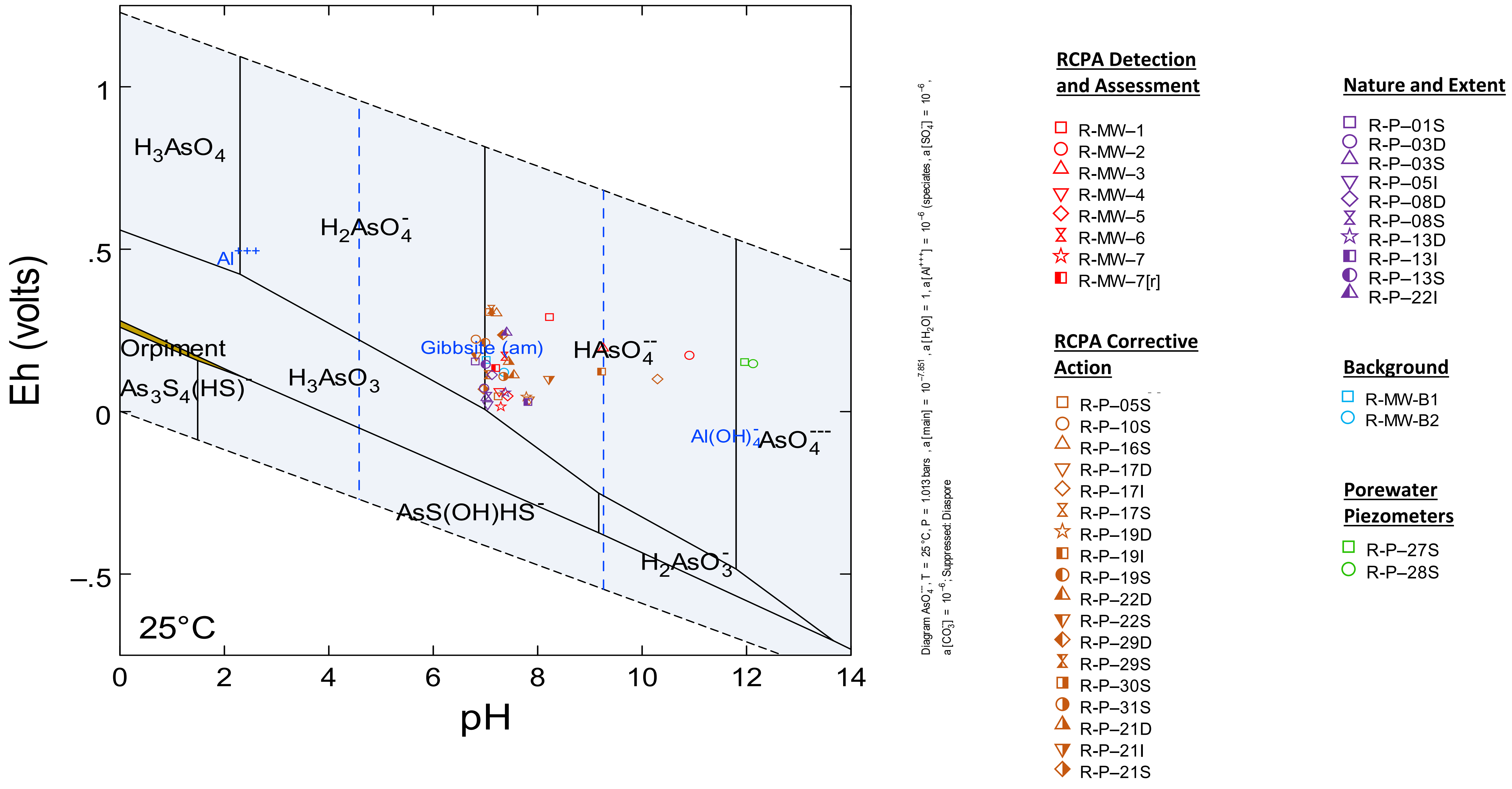


CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
Arsenic Poubaix Diagram - (with Aluminum Stability Overlaid)

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	8

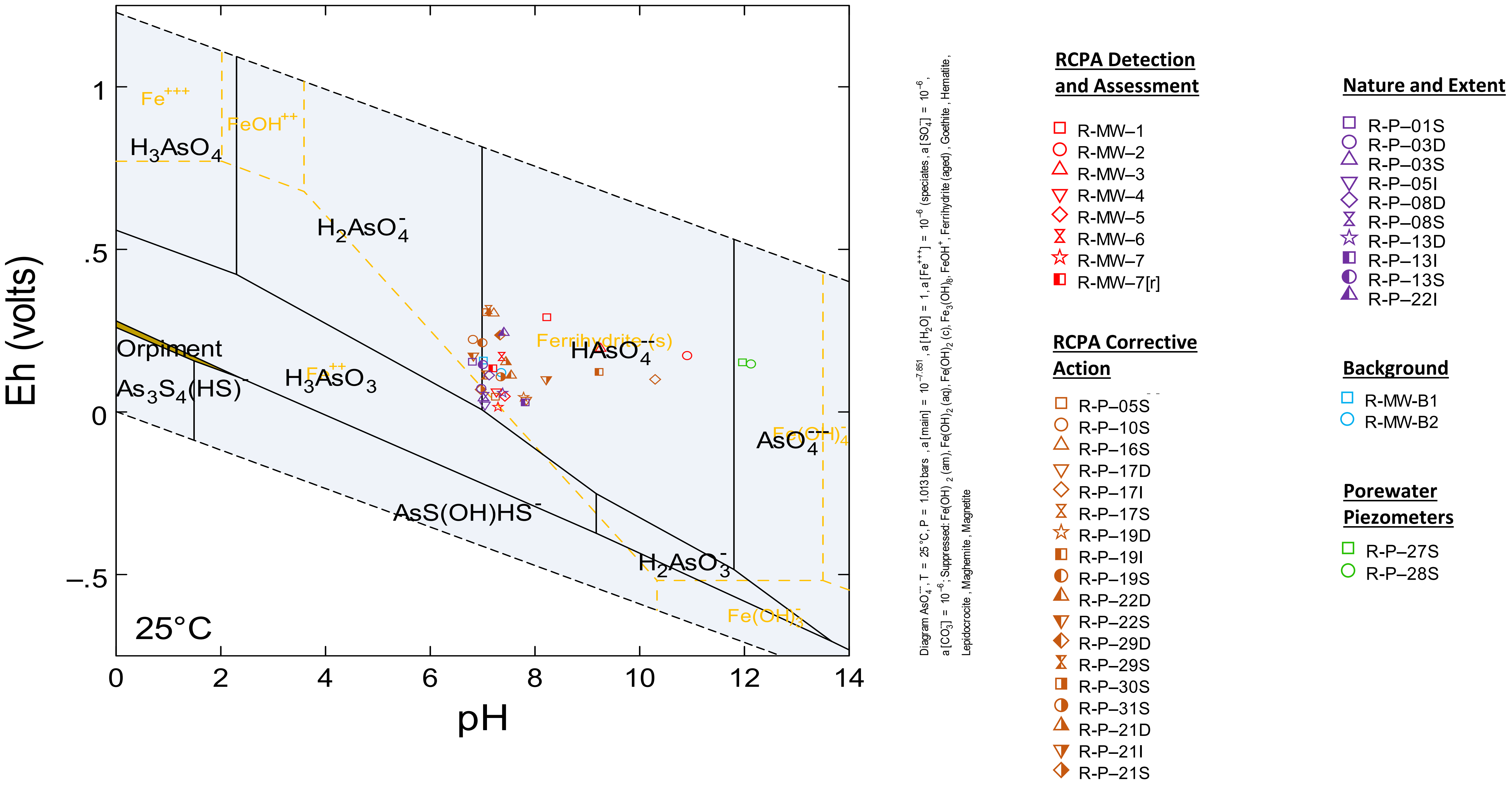


Diagram AsO_4^{---}, T = 25 °C, P = 1.013 bars, a [main] = $10^{-7.851}$, a [H_2O] = 1, a [Fe^{+++}] = 10^{-6} (speciates, a [SO_4^{--}] = 10^{-6}, a [CO_3^{--}] = 10^{-6}; Suppressed: $Fe(OH)_2$ (am), $Fe(OH)_2$ (aq), $Fe(OH)_2$ (c), $Fe_3(OH)_8$, $FeOH^+$, Ferrihydrite (aged), Goethite, Hematite, Lepidocrocite, Maghemite, Magnetite

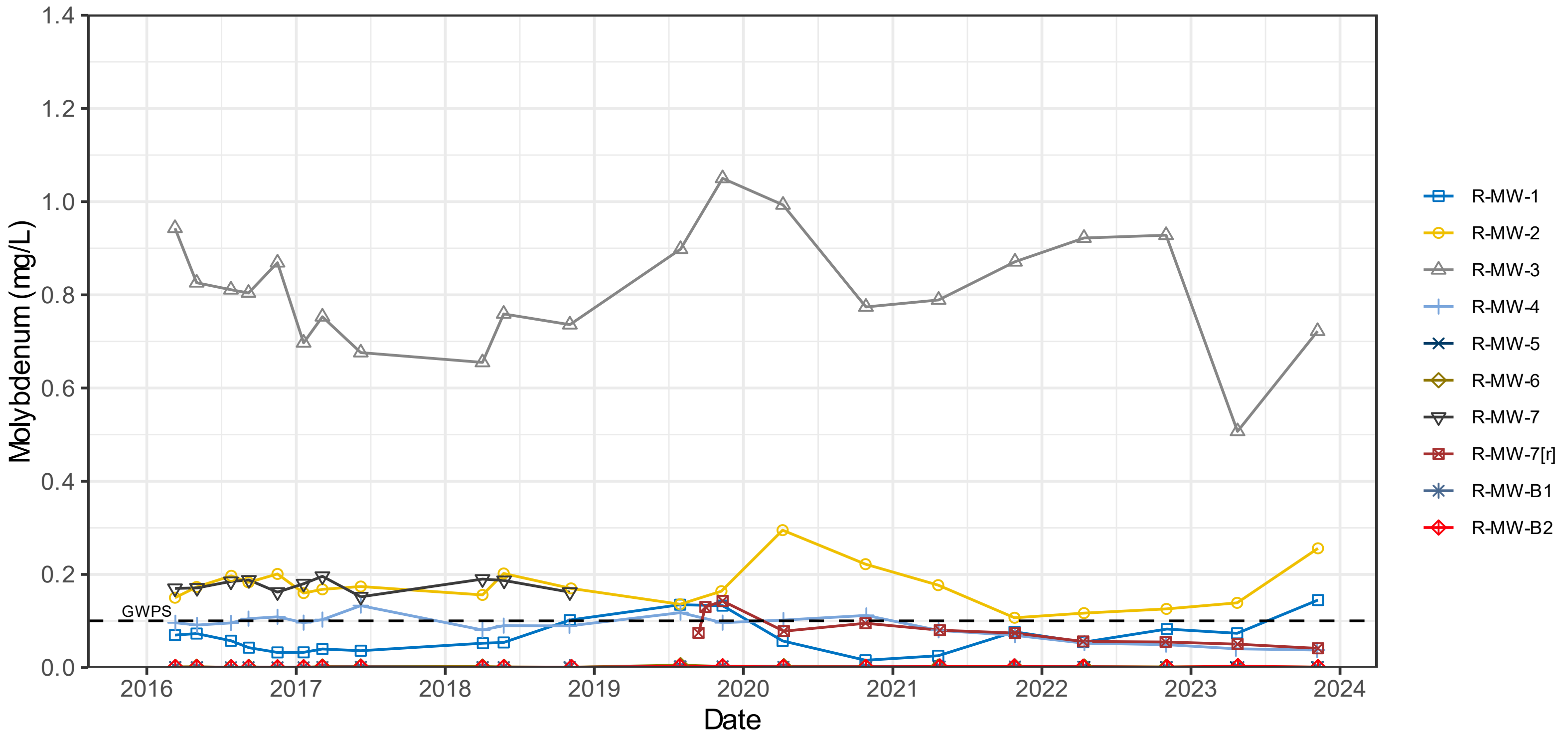
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

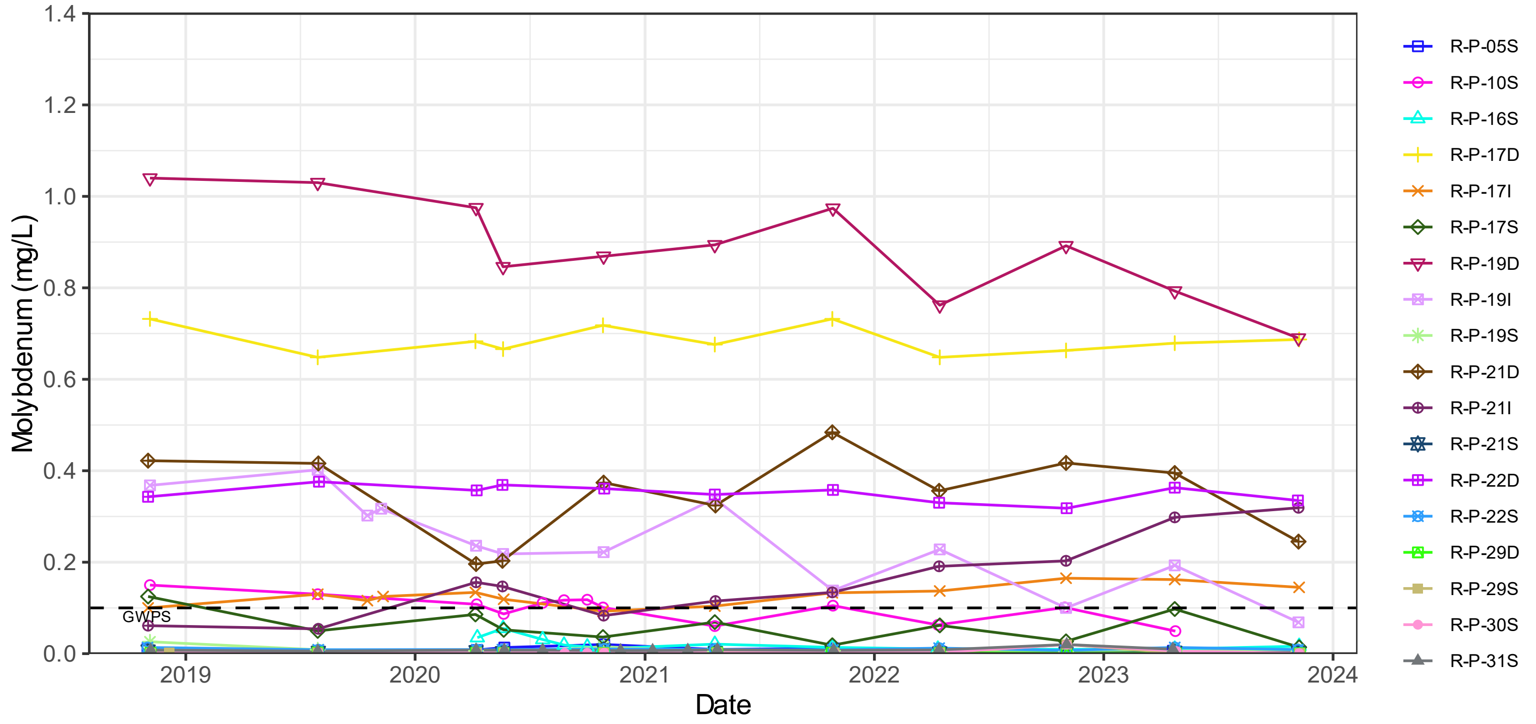
CONSULTANT

TITLE
Arsenic Poubaix Diagram - (with Iron Stability Overlaid)

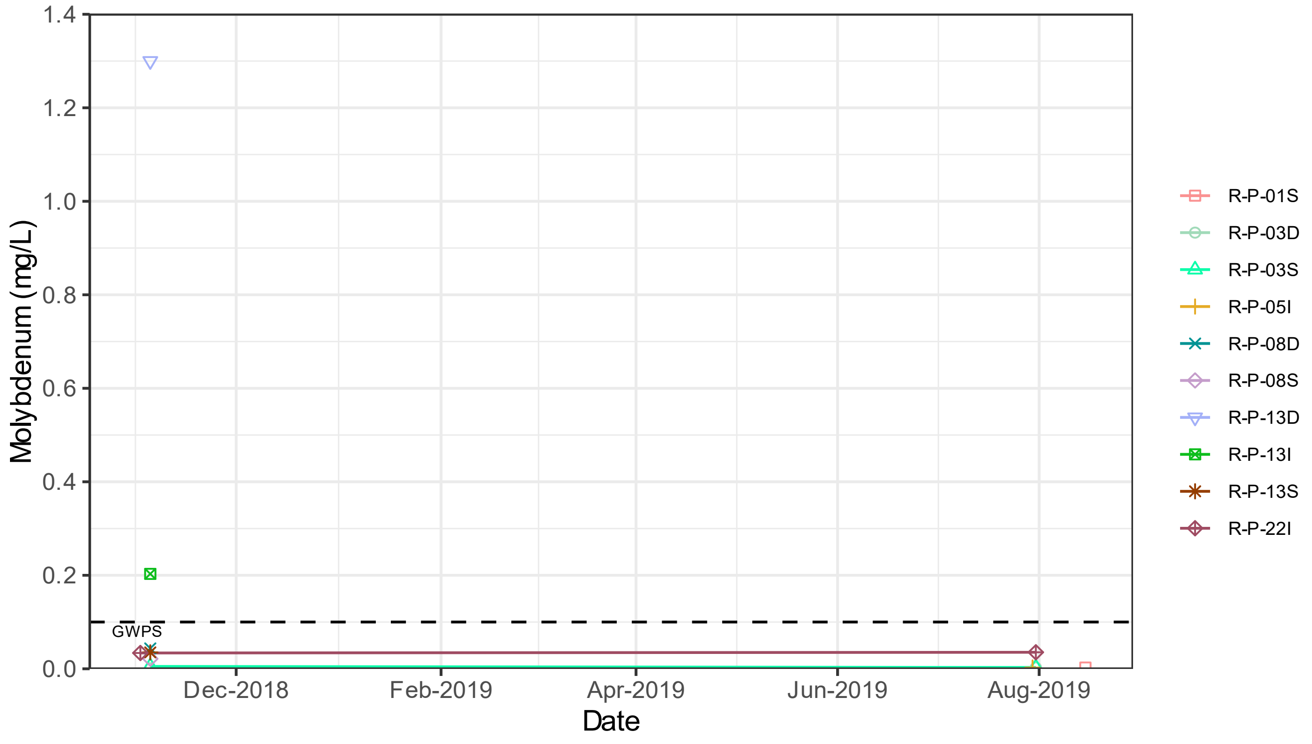
PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	9



A) RCPA Detection and Assessment Wells and Background Groundwater Monitoring Wells



B) RCPA Corrective Action Groundwater Monitoring Wells



C) Nature and Extent Groundwater Monitoring Wells

CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
Molybdenum in Groundwater at (a) Detection and Assessment and Background Wells, (b) Corrective Action Network Wells, and (c) Nature and Extent Wells

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	10

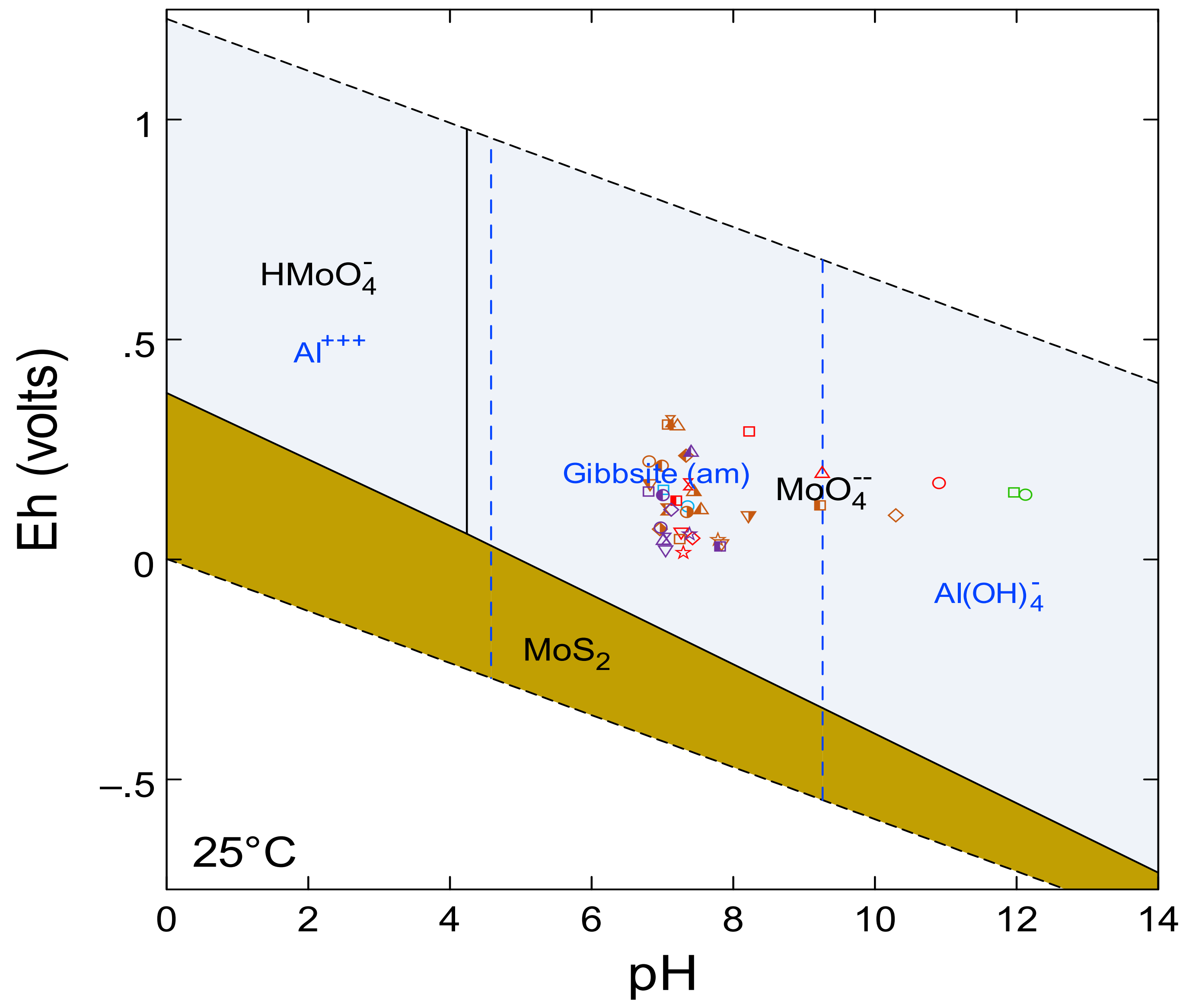


Diagram MoO_4^{--}, T = 25 °C, P = 1.013 bars, a [main] = $10^{-6.126}$, a [H_2O] = 1, a [Al^{+++}] = 10^{-6} (speciates, a [SO_4^{--}] = 10^{-6},
a [CO_3^{--}] = 10^{-6}; Suppressed: Diaspore, H_2MoO_4, $MoO_3(H_2O)_3$(aq)

RCPA Detection and Assessment

□ R-MW–1
○ R-MW–2
△ R-MW–3
▽ R-MW–4
◇ R-MW–5
⧗ R-MW–6
☆ R-MW–7
◧ R-MW–7[r]

RCPA Corrective Action

□ R-P–05S
○ R-P–10S
△ R-P–16S
▽ R-P–17D
◇ R-P–17I
⧗ R-P–17S
☆ R-P–19D
◧ R-P–19I
◐ R-P–19S
▲ R-P–22D
▼ R-P–22S
◆ R-P–29D
⧗ R-P–29S
◧ R-P–30S
◐ R-P–31S
▲ R-P–21D
▼ R-P–21I
◆ R-P–21S

Nature and Extent

□ R-P–01S
○ R-P–03D
△ R-P–03S
▽ R-P–05I
◇ R-P–08D
⧗ R-P–08S
☆ R-P–13D
◧ R-P–13I
◐ R-P–13S
▲ R-P–22I

Background

□ R-MW-B1
○ R-MW-B2

Porewater Piezometers

□ R-P–27S
○ R-P–28S

CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
Molybdenum Poubaix Diagram - (with Aluminum Stability Overlaid)

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	11

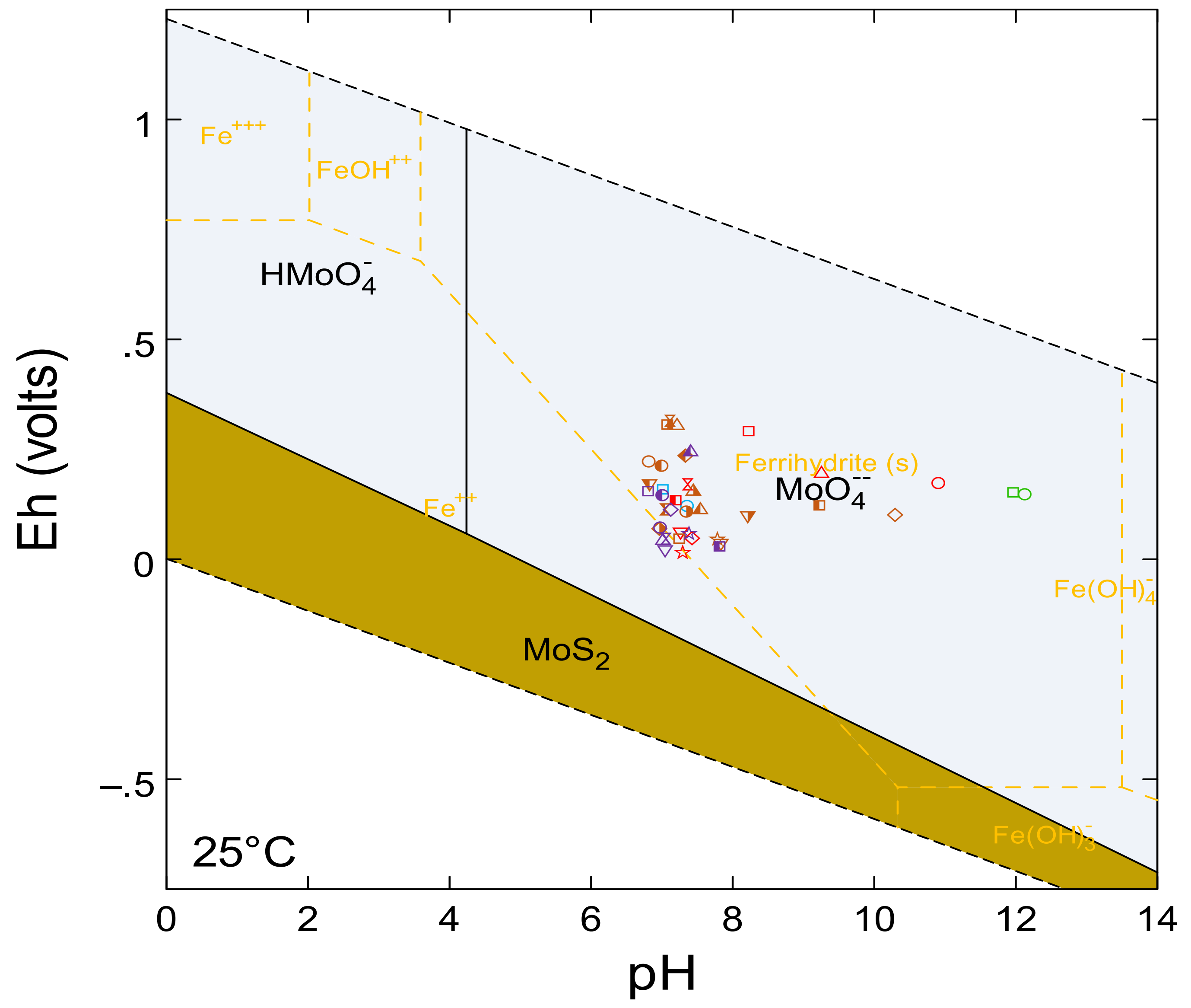


Diagram MoO_4^{--}, T = 25 °C, P = 1.013 bars, a [main] = $10^{-6.126}$, a [H_2O] = 1, a [Fe^{+++}] = 10^{-6} (speciates, a [SO_4^{--}] = 10^{-6}, a [CO_3^{--}] = 10^{-6}; Suppressed: $Fe(OH)_2$ (am), $Fe(OH)_2$ (aq), $Fe(OH)_2$ (c), $Fe_3(OH)_8$, $FeOH^+$, Ferrihydrite (aged), Goethite, H_2MoO_4, Hematite, Lepidocrocite, Maghemite, Magnetite, $MoO_3(H_2O)_3$(aq)

RCPA Detection and Assessment

- □ R-MW–1
- ○ R-MW–2
- △ R-MW–3
- ▽ R-MW–4
- ◇ R-MW–5
- ⧖ R-MW–6
- ☆ R-MW–7
- ◧ R-MW–7[r]

RCPA Corrective Action

- □ R-P–05S
- ○ R-P–10S
- △ R-P–16S
- ▽ R-P–17D
- ◇ R-P–17I
- ⧖ R-P–17S
- ☆ R-P–19D
- ◧ R-P–19I
- ◐ R-P–19S
- ◭ R-P–22D
- ▼ R-P–22S
- ⬖ R-P–29D
- ⧗ R-P–29S
- ⬓ R-P–30S
- ◒ R-P–31S
- ◭ R-P–21D
- ▼ R-P–21I
- ⬖ R-P–21S

Nature and Extent

- □ R-P–01S
- ○ R-P–03D
- △ R-P–03S
- ▽ R-P–05I
- ◇ R-P–08D
- ⧖ R-P–08S
- ☆ R-P–13D
- ◧ R-P–13I
- ◐ R-P–13S
- ◭ R-P–22I

Background

- □ R-MW-B1
- ○ R-MW-B2

Porewater Piezometers

- □ R-P–27S
- ○ R-P–28S

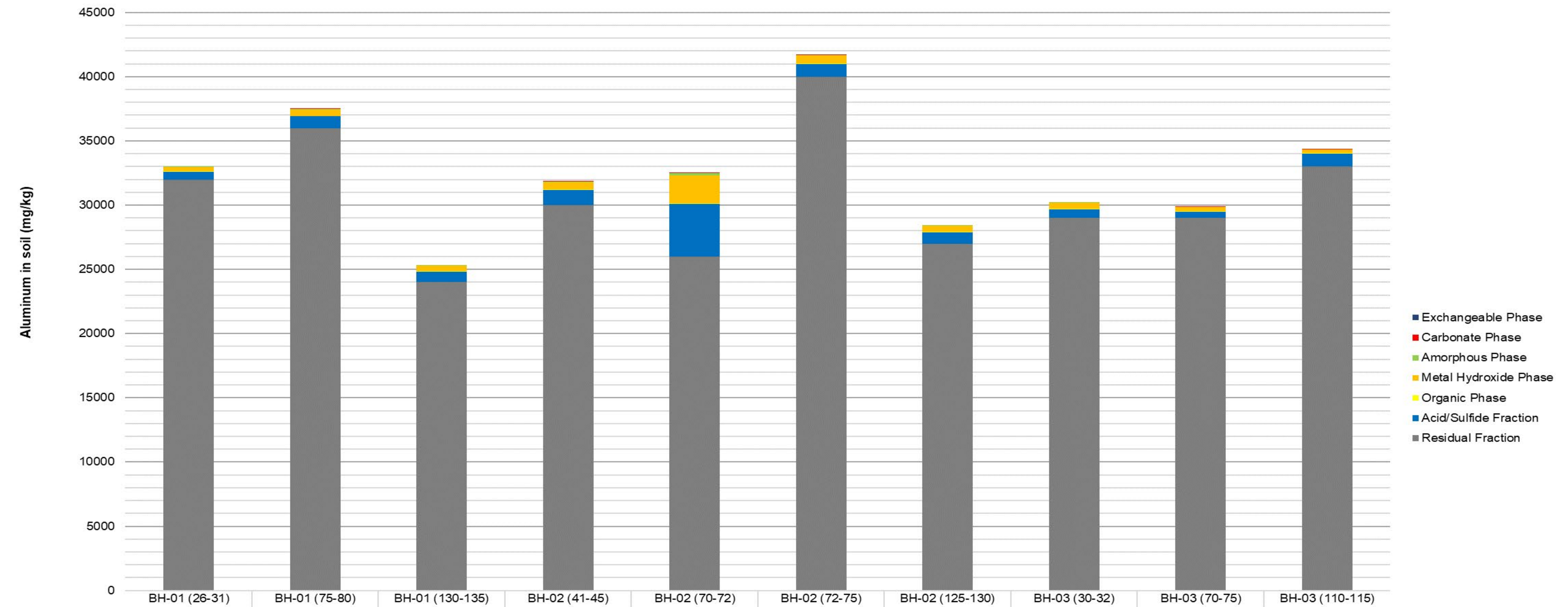
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

CONSULTANT

PROJECT
Ameren Rush Island MNA

TITLE
Molybdenum Poubaix Diagram - (with Iron Stability Overlaid)

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	12



	BH-01 (26-31)	BH-01 (75-80)	BH-01 (130-135)	BH-02 (41-45)	BH-02 (70-72)	BH-02 (72-75)	BH-02 (125-130)	BH-03 (30-32)	BH-03 (70-75)	BH-03 (110-115)
Exchangeable Phase	0	0	0	0	0	0	0	0	0	0
Carbonate Phase	0	8.7	0	14	18	6.1	0	0	6	9.3
Amorphous Phase	15	42	26	63	170	54	28	22	28	22
Metal Hydroxide Phase	310	480	410	550	2200	640	440	490	330	290
Organic Phase	36	40	50	33	34	27	39	29	38	42
Acid/Sulfide Fraction	610	910	830	1200	4100	990	900	690	470	1000
Residual Fraction	32000	36000	24000	30000	26000	40000	27000	29000	29000	33000

Borehole and depth below ground surface

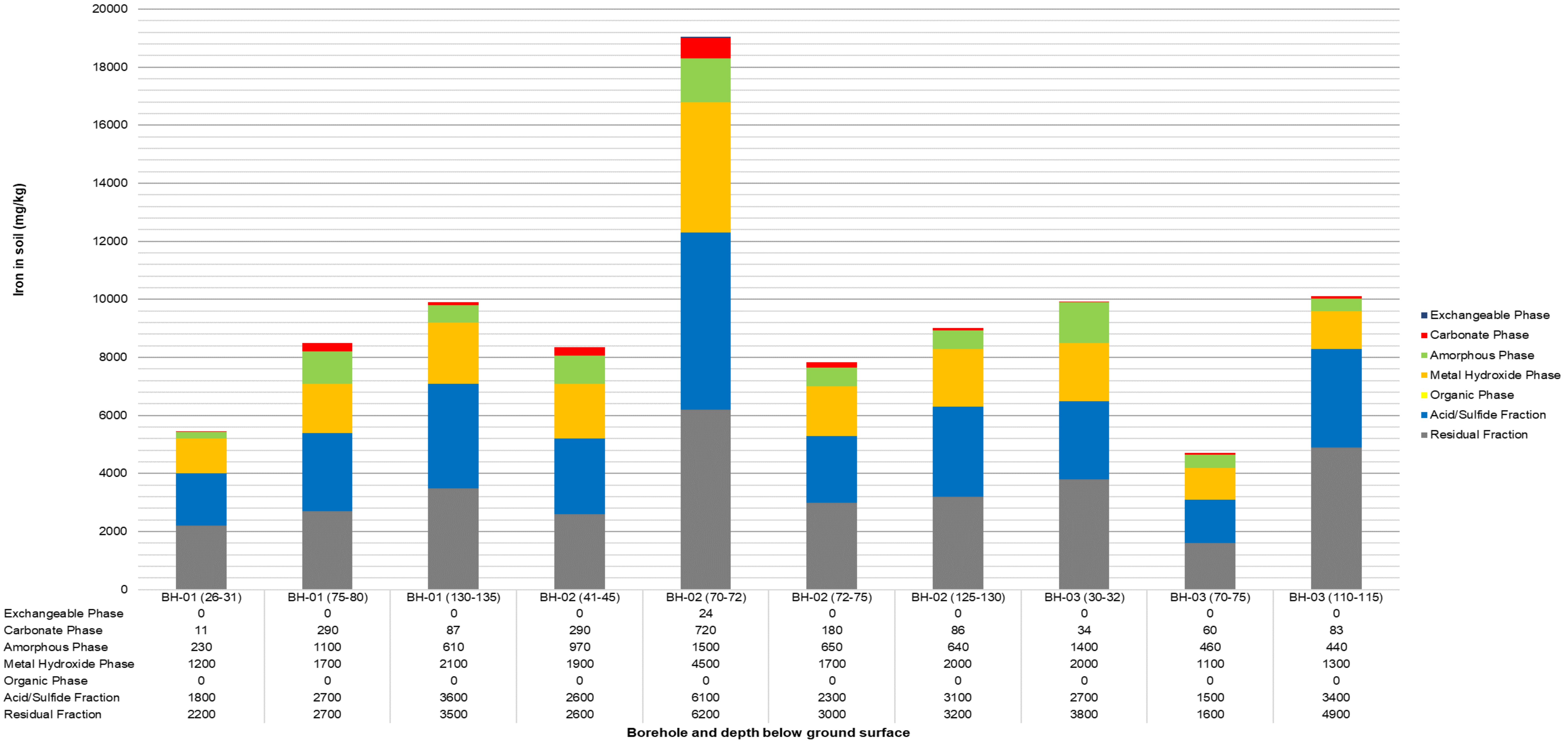
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
Sequential Extraction of Aluminum from Soil in Select Borings

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	13



	BH-01 (26-31)	BH-01 (75-80)	BH-01 (130-135)	BH-02 (41-45)	BH-02 (70-72)	BH-02 (72-75)	BH-02 (125-130)	BH-03 (30-32)	BH-03 (70-75)	BH-03 (110-115)
Exchangeable Phase	0	0	0	0	24	0	0	0	0	0
Carbonate Phase	11	290	87	290	720	180	86	34	60	83
Amorphous Phase	230	1100	610	970	1500	650	640	1400	460	440
Metal Hydroxide Phase	1200	1700	2100	1900	4500	1700	2000	2000	1100	1300
Organic Phase	0	0	0	0	0	0	0	0	0	0
Acid/Sulfide Fraction	1800	2700	3600	2600	6100	2300	3100	2700	1500	3400
Residual Fraction	2200	2700	3500	2600	6200	3000	3200	3800	1600	4900

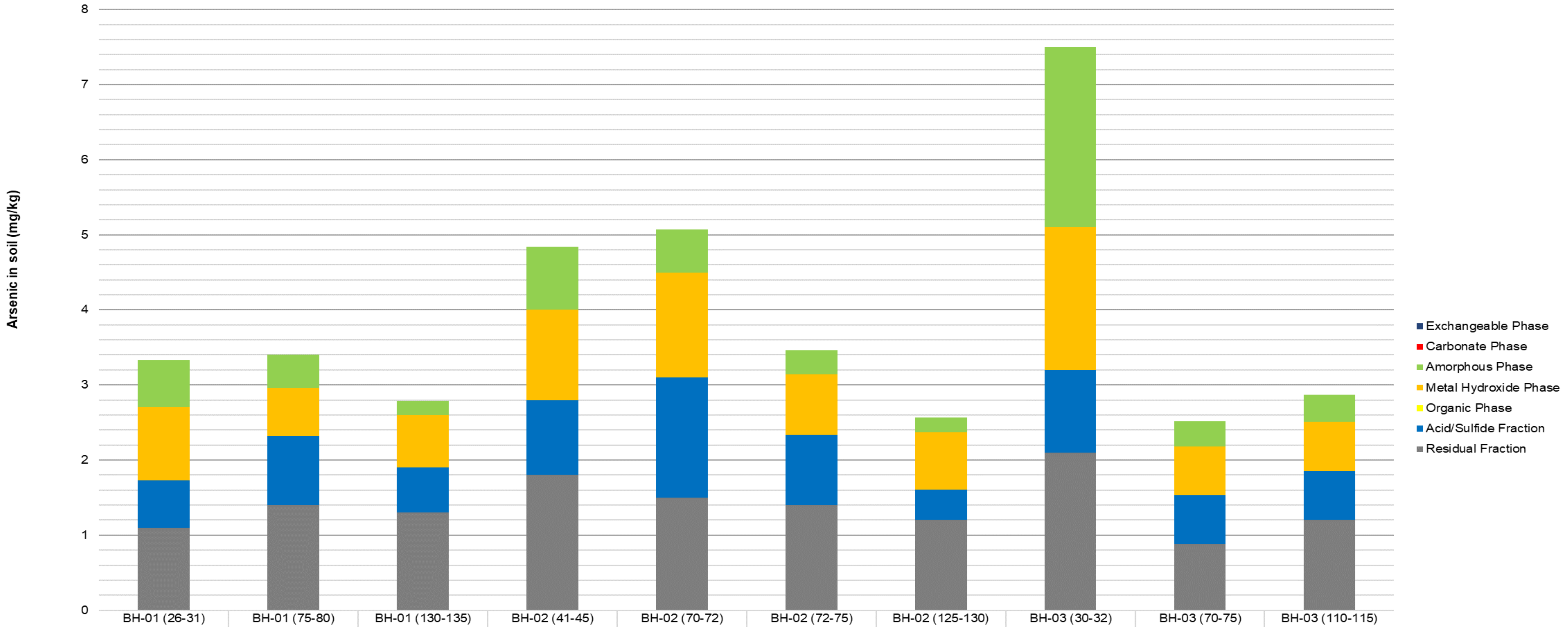
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
Sequential Extraction of Iron from Soil in Select Borings

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	14



	BH-01 (26-31)	BH-01 (75-80)	BH-01 (130-135)	BH-02 (41-45)	BH-02 (70-72)	BH-02 (72-75)	BH-02 (125-130)	BH-03 (30-32)	BH-03 (70-75)	BH-03 (110-115)
Exchangeable Phase	0	0	0	0	0	0	0	0	0	0
Carbonate Phase	0	0	0	0	0	0	0	0	0	0
Amorphous Phase	0.62	0.44	0.19	0.84	0.57	0.32	0.2	2.4	0.34	0.36
Metal Hydroxide Phase	0.98	0.64	0.7	1.2	1.4	0.8	0.76	1.9	0.65	0.66
Organic Phase	0	0	0	0	0	0	0	0	0	0
Acid/Sulfide Fraction	0.63	0.92	0.6	1	1.6	0.94	0.41	1.1	0.65	0.65
Residual Fraction	1.1	1.4	1.3	1.8	1.5	1.4	1.2	2.1	0.88	1.2

Borehole and depth below ground surface

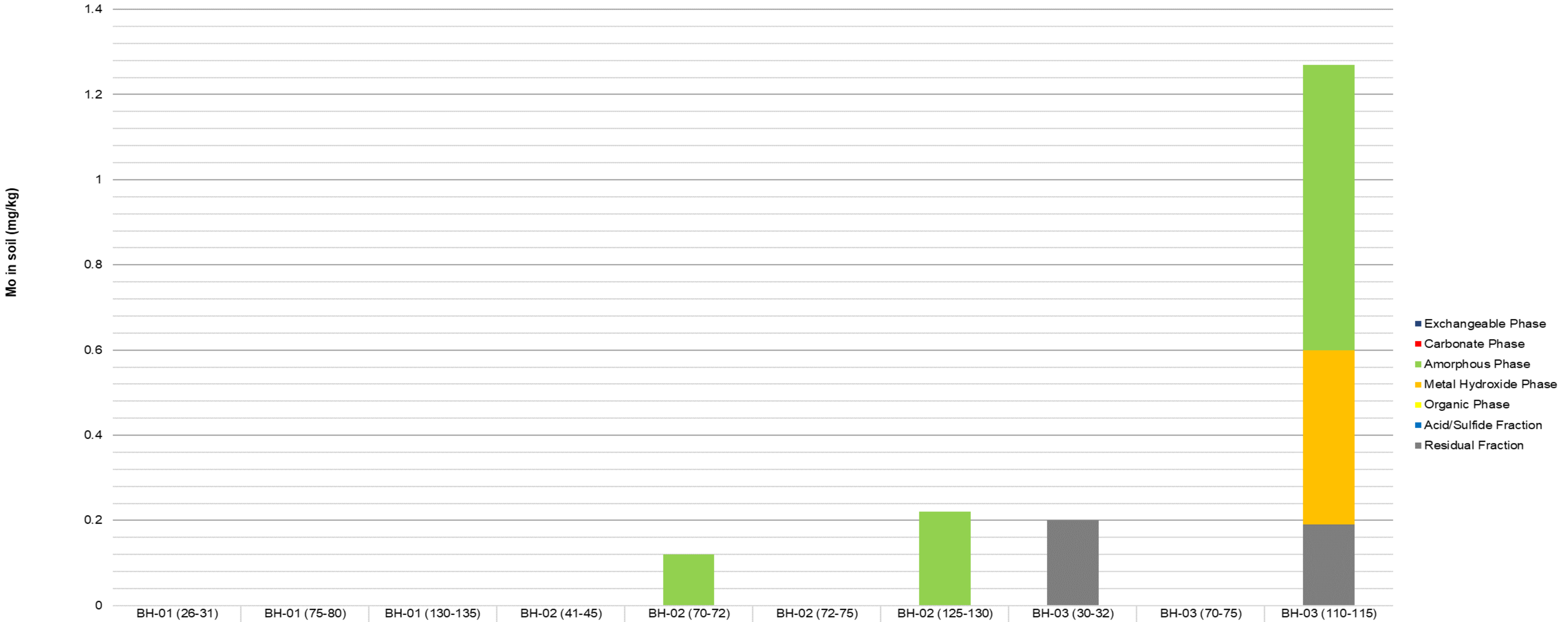
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
Sequential Extraction of Arsenic from Soil in Select Borings

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	15



	BH-01 (26-31)	BH-01 (75-80)	BH-01 (130-135)	BH-02 (41-45)	BH-02 (70-72)	BH-02 (72-75)	BH-02 (125-130)	BH-03 (30-32)	BH-03 (70-75)	BH-03 (110-115)
Exchangeable Phase	0	0	0	0	0	0	0	0	0	0
Carbonate Phase	0	0	0	0	0	0	0	0	0	0
Amorphous Phase	0	0	0	0	0.12	0	0.22	0	0	0.67
Metal Hydroxide Phase	0	0	0	0	0	0	0	0	0	0.41
Organic Phase	0	0	0	0	0	0	0	0	0	0
Acid/Sulfide Fraction	0	0	0	0	0	0	0	0	0	0
Residual Fraction	0	0	0	0	0	0	0	0.2	0	0.19

Borehole and depth below ground surface

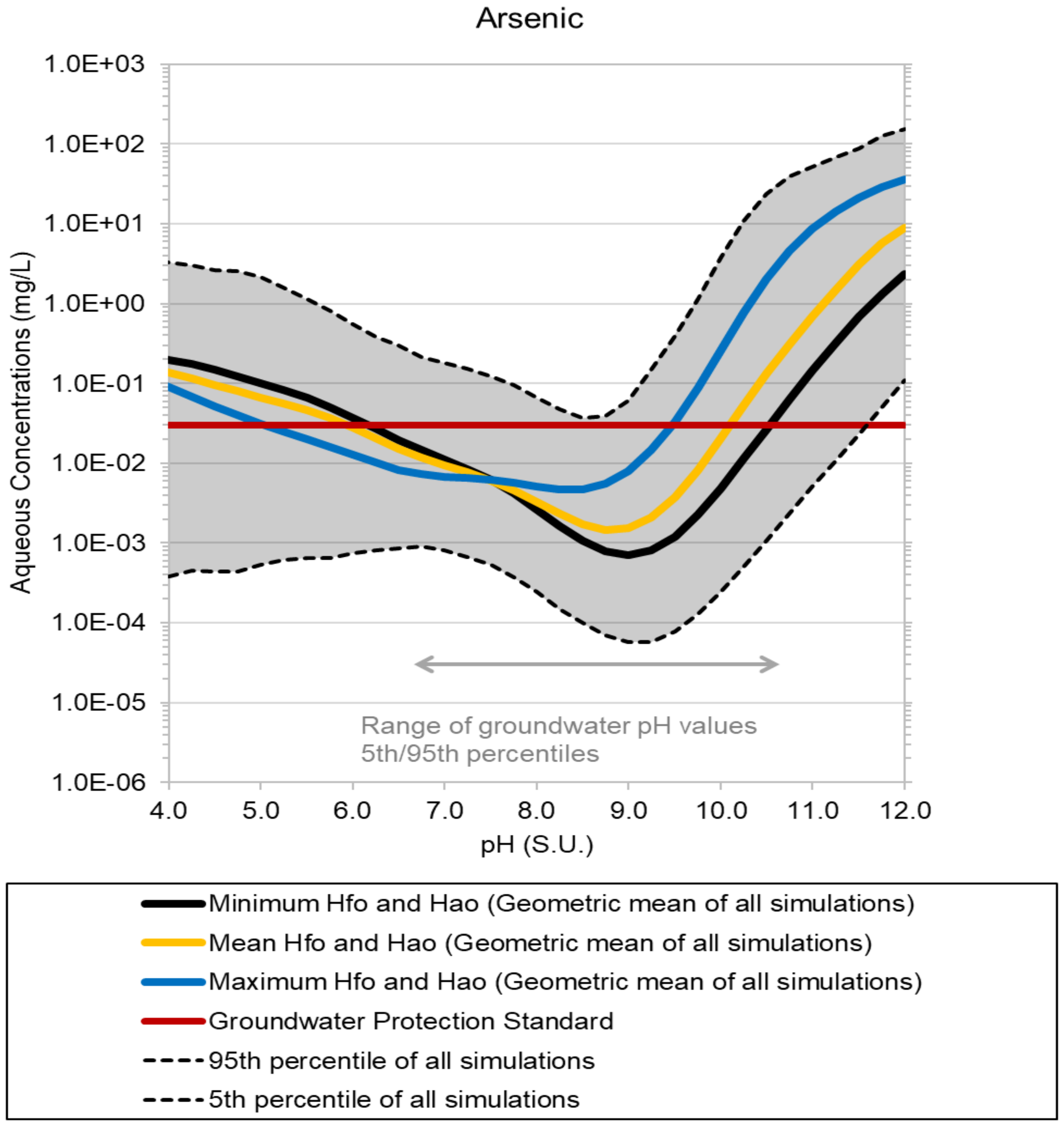
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

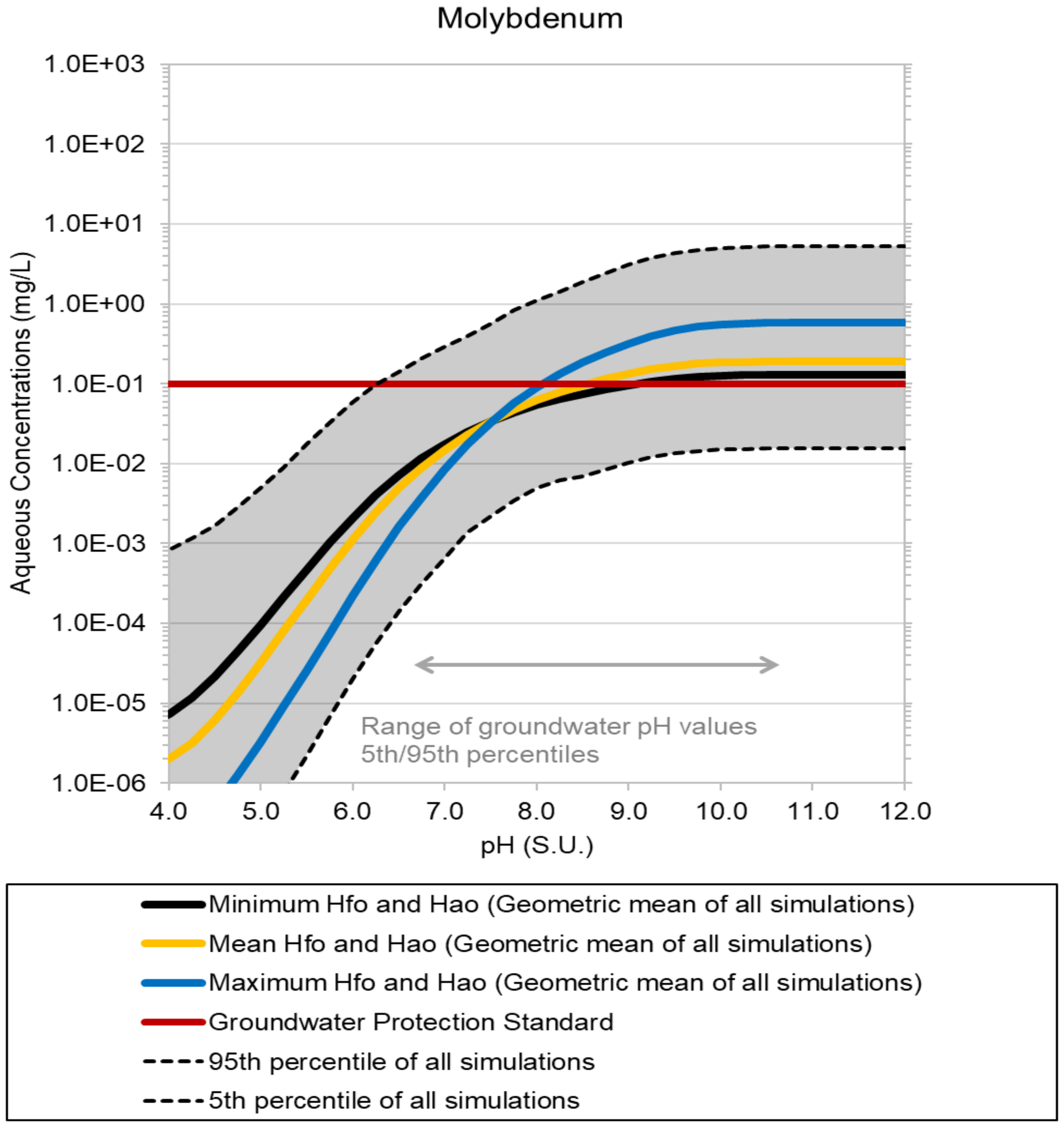
PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
Sequential Extraction of Molybdenum from Soil in Select Borings

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	16





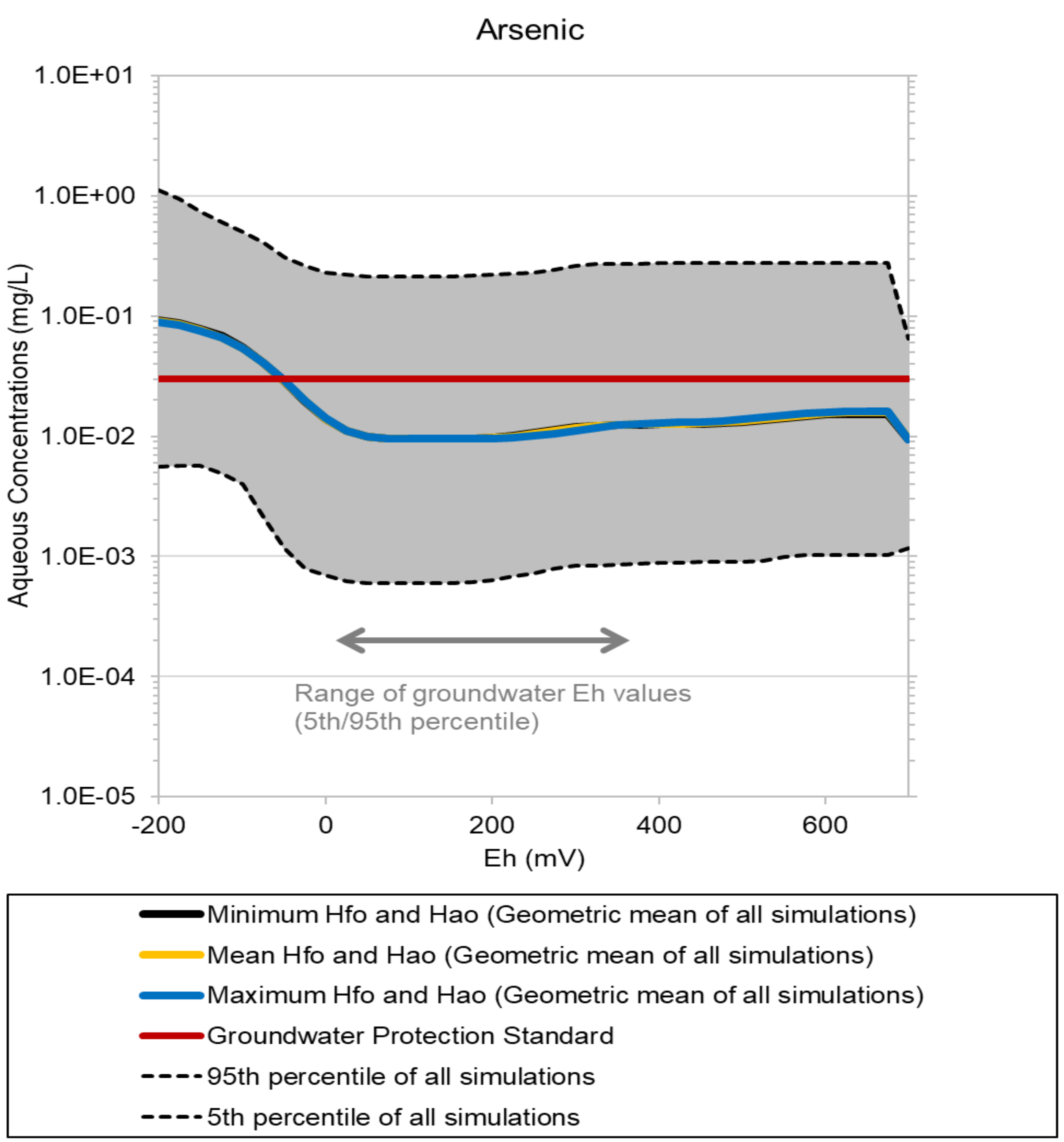
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

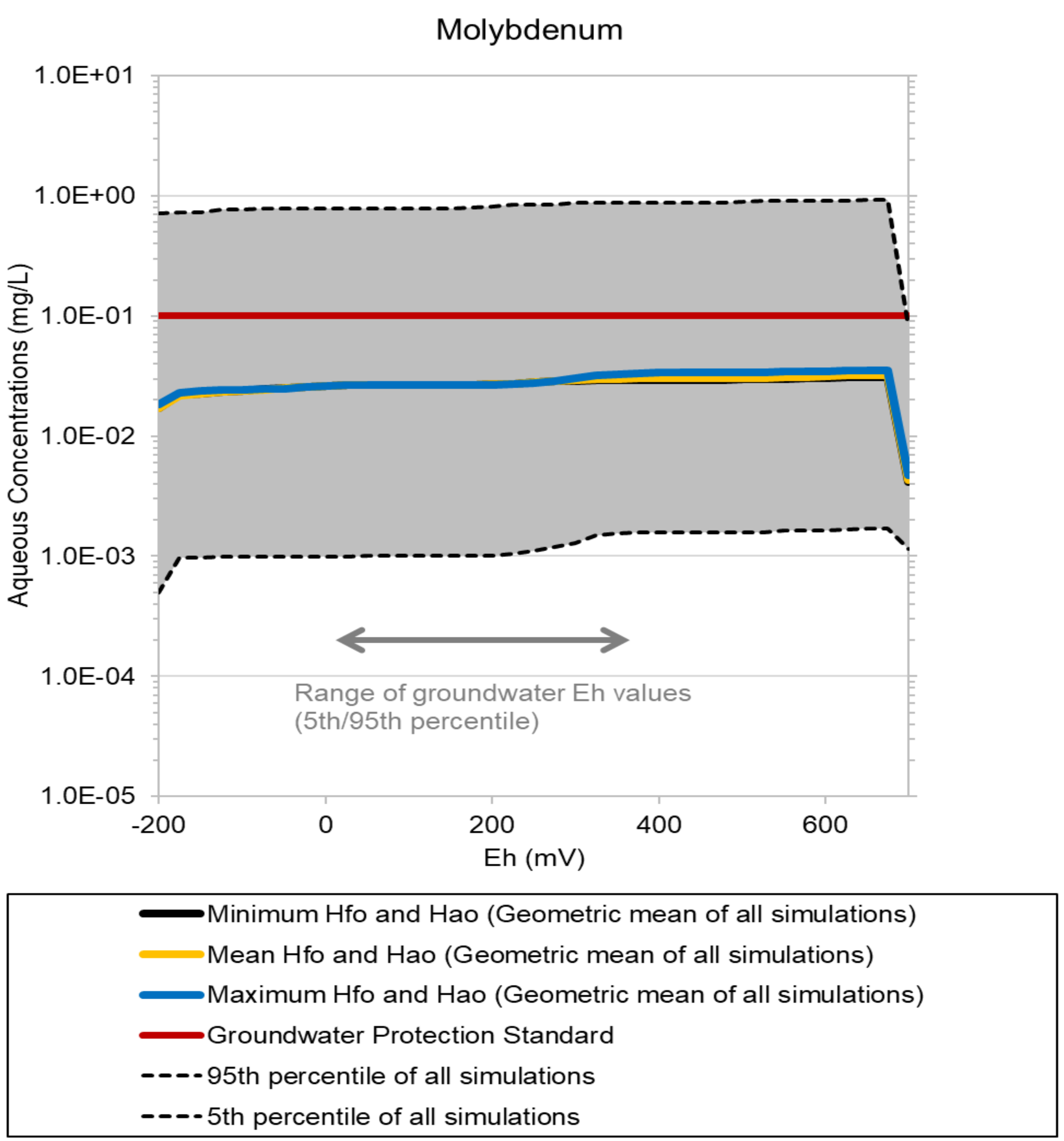
PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
pH MNA Stability Evaluation

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	17





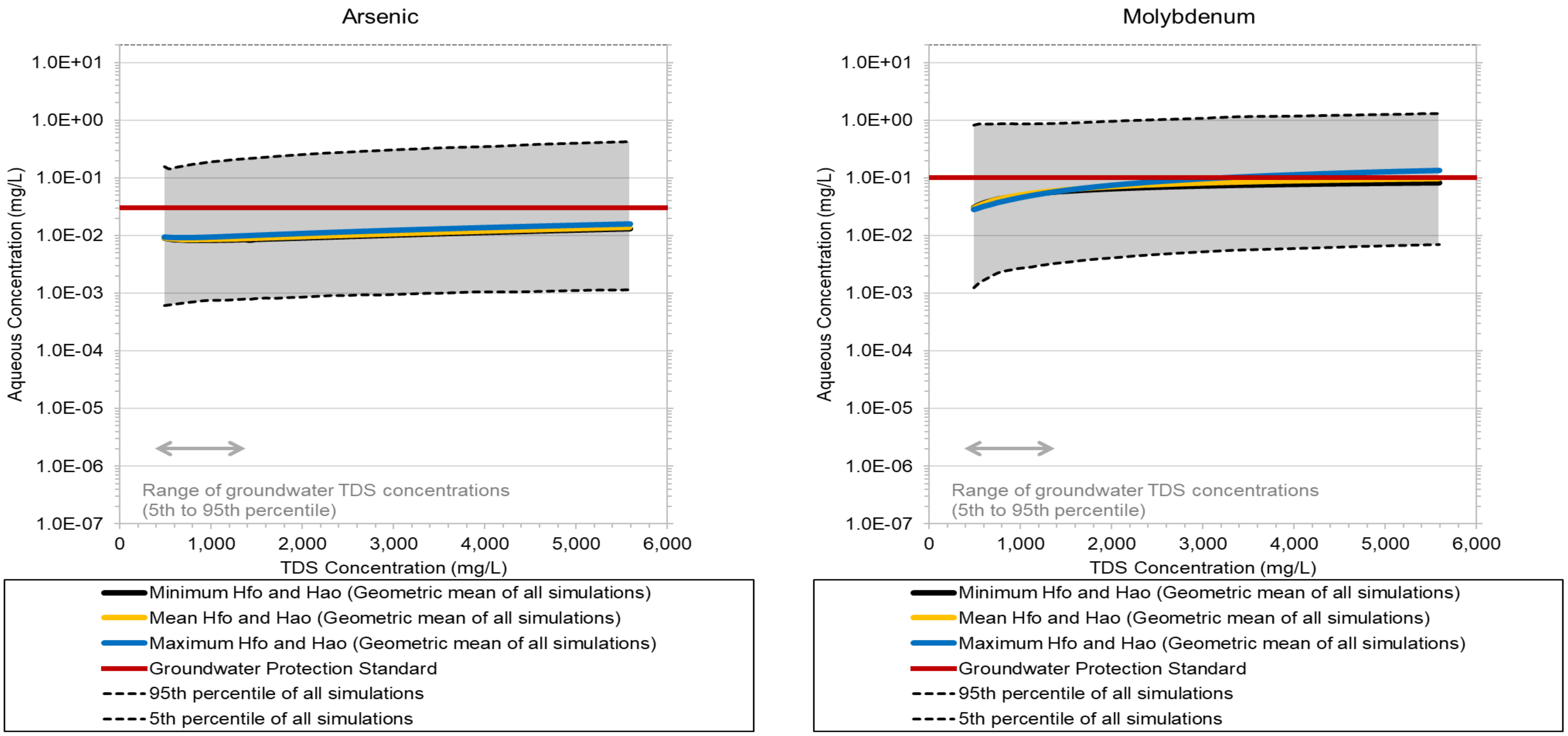
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
Redox MNA Stability Evaluation

PROJECT NO. US0023766.1895
PHASE XX
REV. 0
FIGURE 18



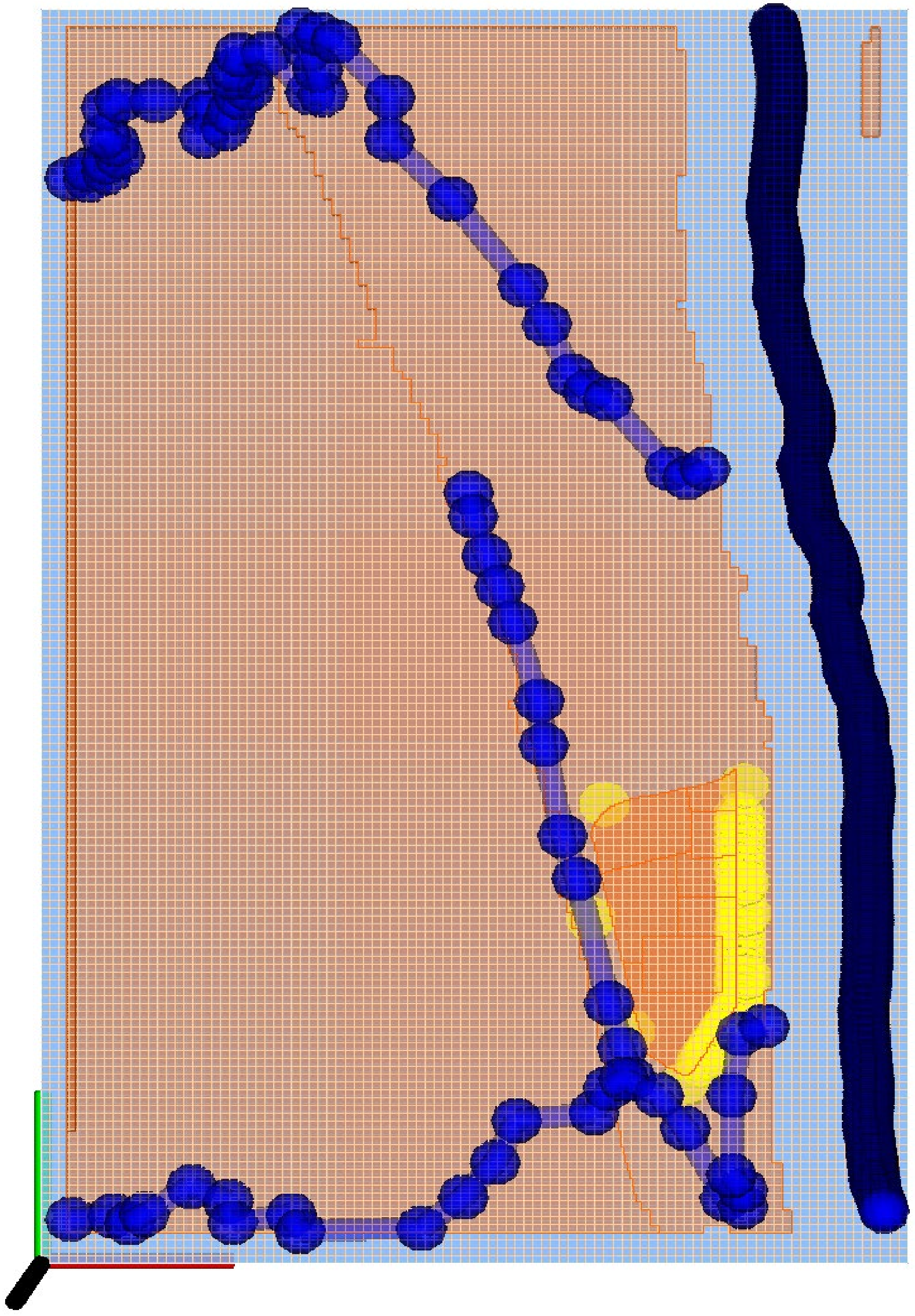
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

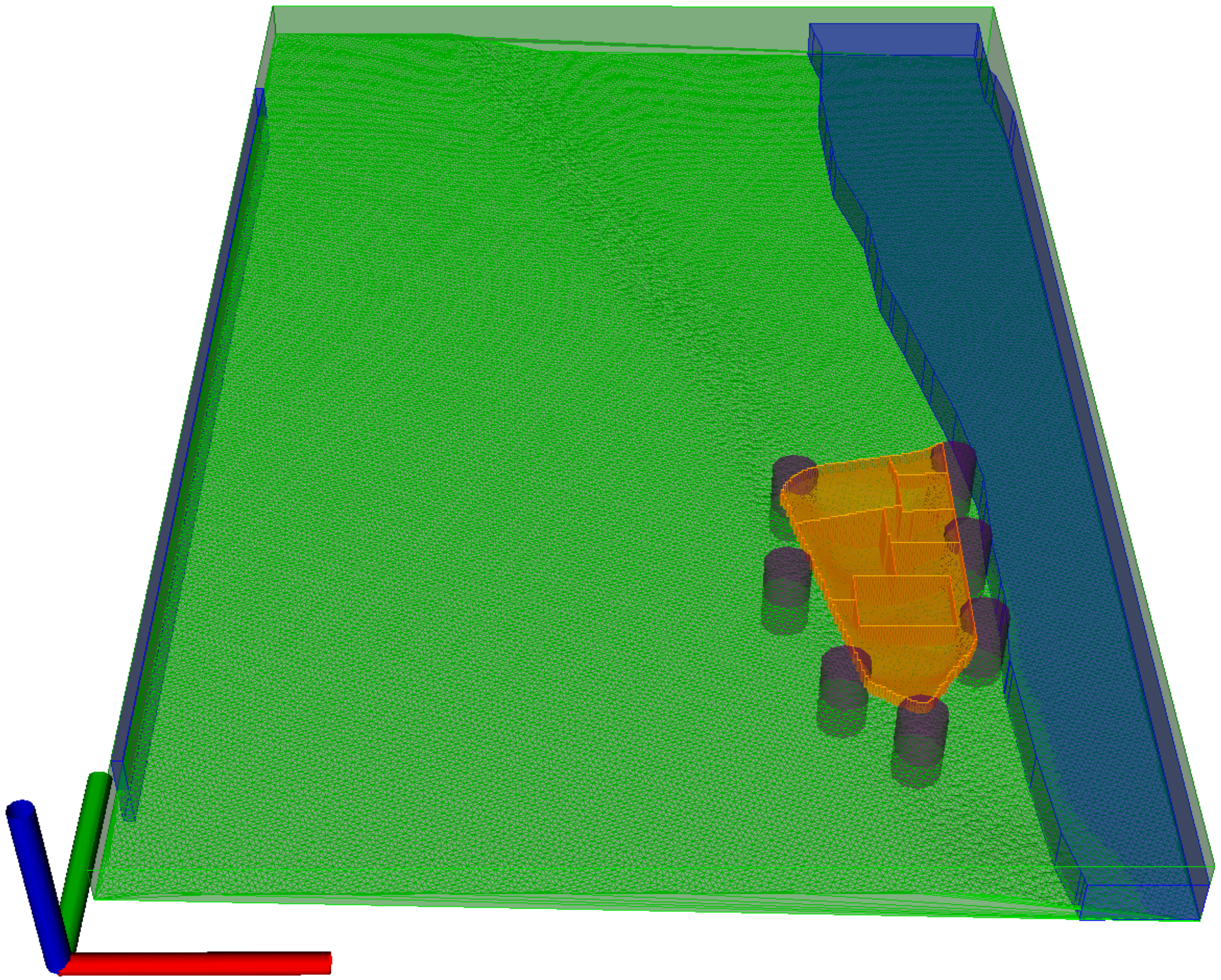
PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
TDS MNA Stability Evaluation

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	19





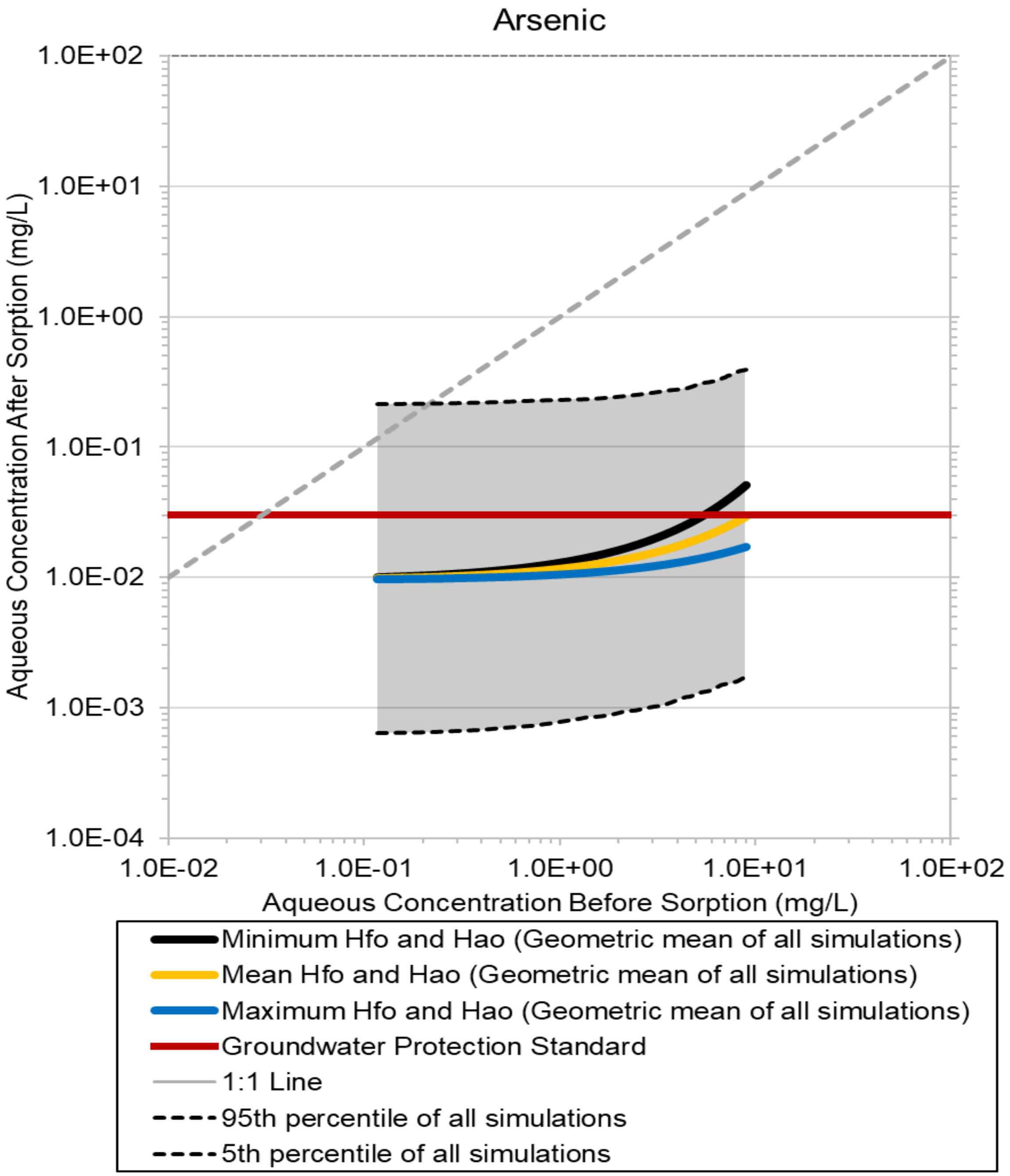
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

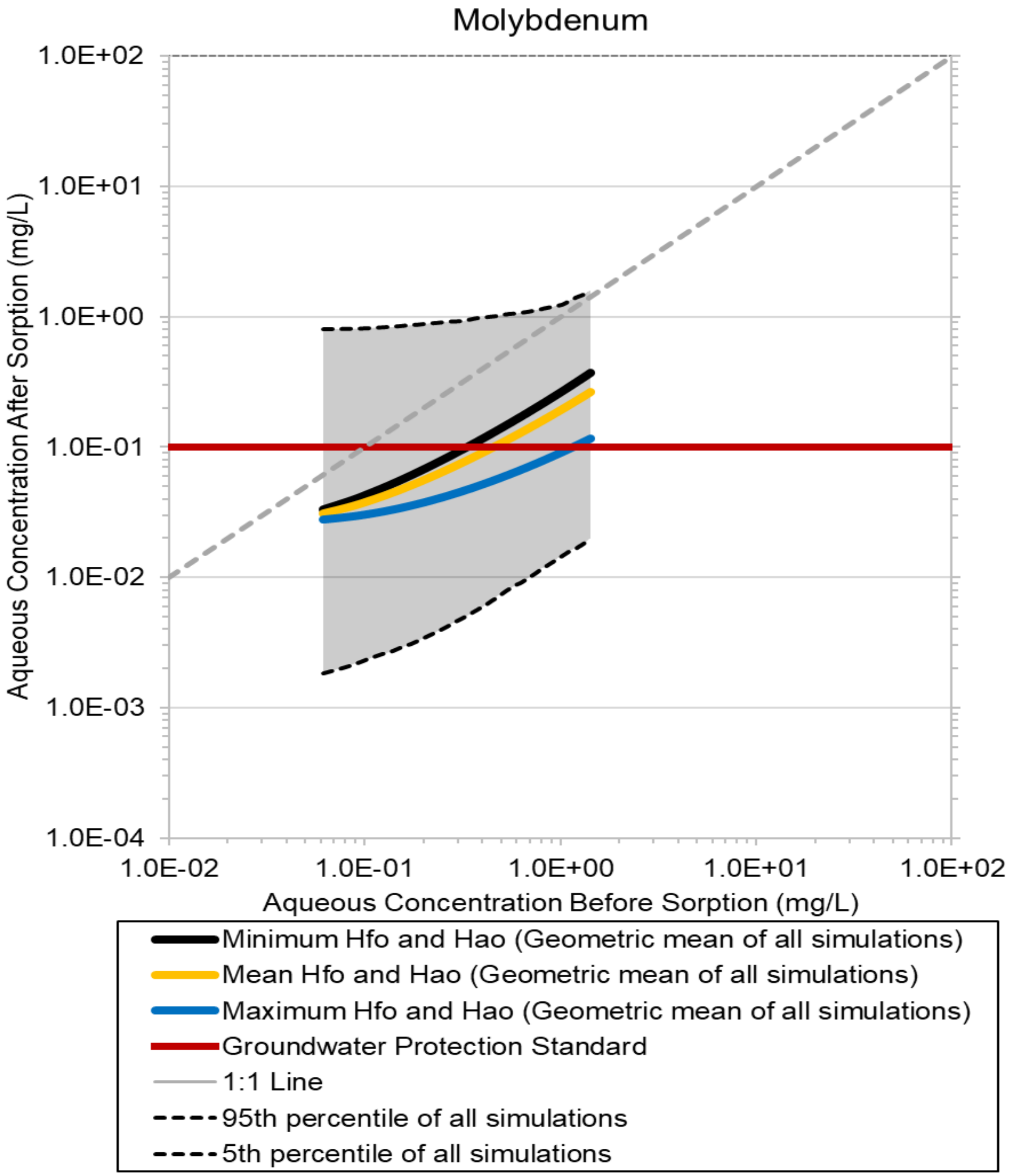
PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
PHAST Model Domain Architecture and Media

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	20





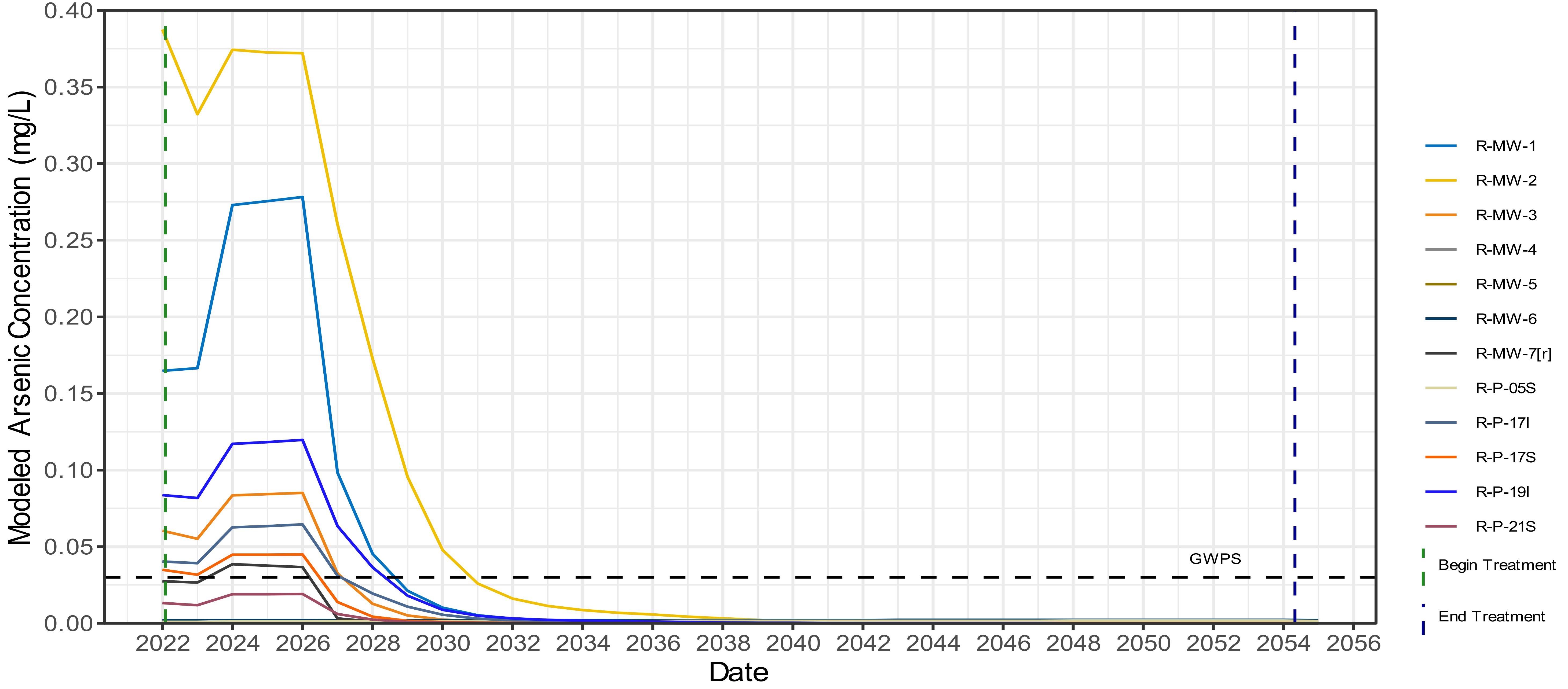
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
Modeled Attenuation Capacity of the Compliance and Nature and Extent Well Network for Arsenic and Molybdenum at the RCPA

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	21



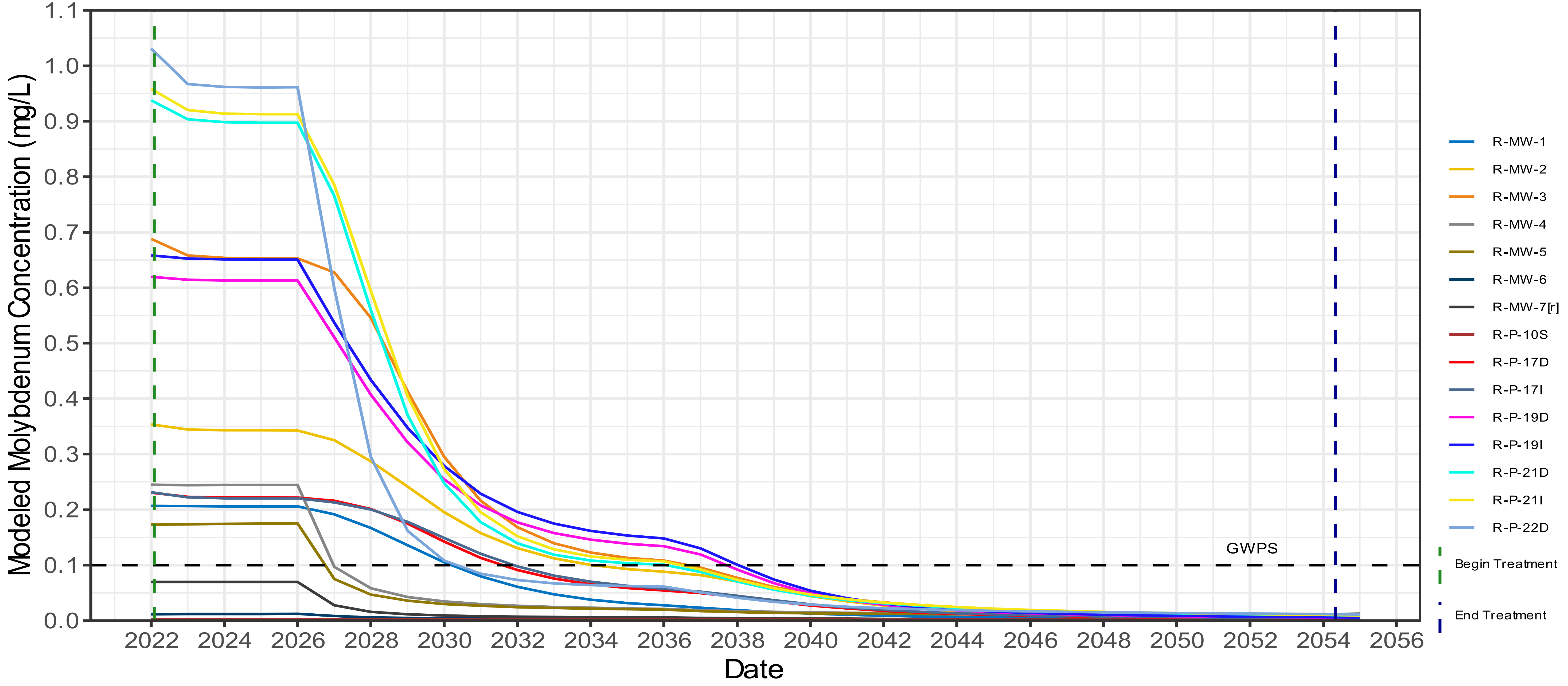
CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
Predicted Concentration of Arsenic at Select wells
Based on Reactive Transport (PHAST) Modelling

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	22



CLIENT
Rocksmith Geoengineering LLC
Ameren Rush Island

PROJECT
Ameren Rush Island MNA

CONSULTANT

TITLE
Predicted Concentration of Molybdenum at Select wells Based on Reactive Transport (PHAST) Modelling

PROJECT NO.	PHASE	REV.	FIGURE
US0023766.1895	XX	0	23

APPENDIX A

Mineralogical Composition Laboratory Report

Quantitative X-Ray Diffraction by Rietveld Refinement

Report Prepared for:	*Golder Associates*
Project Number/ LIMS No.	*CA20I-00000-211-17012-01 / MI7012-NOV18*
Sample Receipt:	*November 6, 2018*
Sample Analysis:	*November 28, 2018*
Reporting Date:	*November 30, 2018*

Instrument:	Panalytical X'pert Pro Diffractometer
Test Conditions:	Co radiation, 40 kV, 45 mA Regular Scanning: Step: 0.033°, Step time:0.15s, 2θ range: 6-70°
Interpretations :	HighScore Plus software using Crystallography Open Database (COD) and Joint Committee on Powder Diffraction Standards -International Center for Diffraction Data (JCPDS-ICDD).
Detection Limit :	0.5-2%. Strongly dependent on crystallinity.

Contents:

1) Method Summary
2) Summary of Mineral Assemblages
3) Quantitative XRD Results
4) XRD Pattern(s)

Sarah Prout

Lain Glossop H.B.Sc
Senior Mineralogist

Sarah Prout, Ph.D.
Senior Mineralogist

Method Summary

Mineral Identification and Interpretation:

Mineral identification and interpretation involve matching the diffraction pattern of a test sample material to patterns of single-phase reference materials. The reference patterns from the Crystallography Open Database (COD) and the Joint Committee on Powder Diffraction Standards - International Center for Diffraction Data (JCPDS-ICDD).

Interpretations do not reflect the presence of non-crystalline and/or amorphous compounds, except when internal standards have been added by request. Mineral proportions may be strongly influenced by crystallinity, crystal structure and preferred orientations. Mineral or compound identification and quantitative analysis results should be accompanied by supporting chemical assay data or other additional tests.

Quantitative Rietveld Analysis:

Panalytical Highscore Plus software was used to perform the quantitative Rietveld Analysis. This software uses a graphics based profile analysis program built around a non-linear least squares fitting system, to quantitatively determine the amount of different phases present in a multicomponent sample. Whole pattern analyses are predicated by the fact that the X-ray diffraction pattern is a total sum of both instrumental and specimen factors. Unlike other peak intensity-based methods, the Rietveld method uses a least squares approach to refine a theoretical line profile (shown as a blue pattern in the analyses plots) until it matches the obtained experimental patterns (shown as the coloured pattern in the analyses plots).

Rietveld refinement is completed with a set of minerals specifically identified for the sample. Zero values indicate that the mineral was included in the refinement calculations, but the calculated concentration was less than 0.5 wt%. Minerals not identified by the analyst are not included in refinement calculations for specific samples and are indicated with a dash.

Summary of Rietveld Quantitative Analysis X-ray Diffraction Results

Quantitative X-ray Diffraction Results

Mineral/Compound	Sample ID 01	Sample ID 02	Sample ID 03	Sample ID 04	Sample ID 05	Sample ID 06
	DUP-1	**BH-01 (28.5-31)**	**BH-01 (75-80)**	**BH-01 (130-35)**	**BH-02 (41-45)**	**BH-02 (70-72)**
	(wt %)	(wt %)	(wt %)	(wt %)	(wt %)	(wt %)
Quartz	74.3	61.2	77.8	75.0	72.5	61.3
Plagioclase	19.4	22.8	17.4	17.8	20.9	26.0
K-Feldspar	3.7	15.4	4.2	5.8	4.5	8.8
Chlorite	0.0	0.0	-	0.0	0.0	1.1
Amphibole	0.0	0.0	0.0	0.0	0.0	-
Calcite	1.4	0.0	0.0	0.0	0.1	0.4
Dolomite	0.3	0.7	0.5	0.6	1.2	0.6
Muscovite	0.9	0.0	0.1	0.8	0.8	1.6
Vermiculite	-	-	-	-	-	0.4
TOTAL	100	100	100	100	100	100

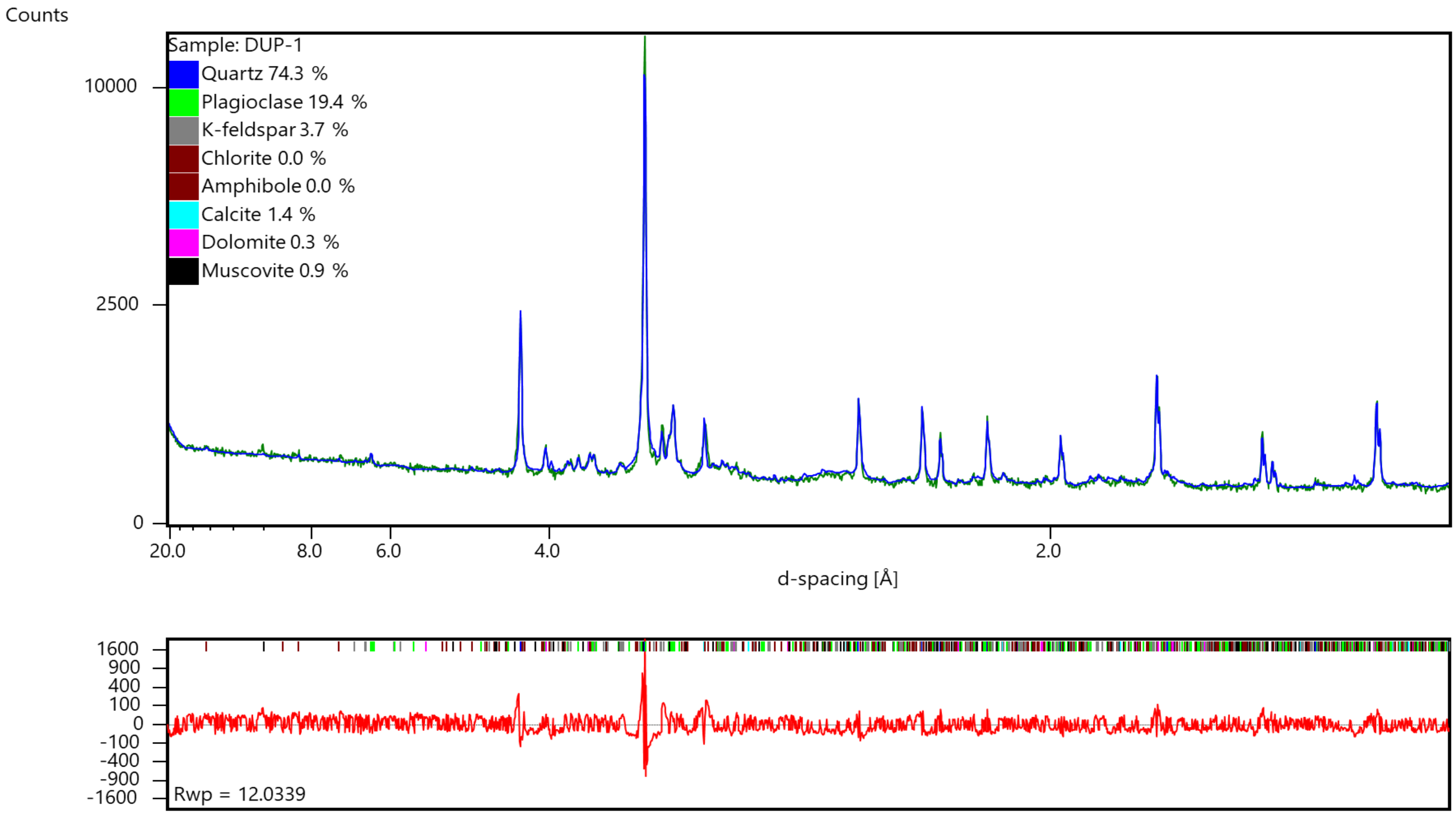
Mineral/Compound	Sample ID 07	Sample ID 08	Sample ID 09	Sample ID 10	Sample ID 11
	BH-02 (72-75)	**BH-02 (125-130)**	**BH-03 (30-32)**	**BH-03 (70-75)**	**BH-03 (110-115)**
	(wt %)	(wt %)	(wt %)	(wt %)	(wt %)
Quartz	70.6	74.0	67.4	76.8	71.4
Plagioclase	20.7	18.4	21.7	14.5	17.6
K-Feldspar	8.1	7.1	10.6	8.7	8.4
Chlorite	0.0	0.0	-	-	0.0
Amphibole	0.0	-	0.0	-	0.0
Calcite	0.0	-	0.0	-	2.3
Dolomite	-	-	0.1	-	0.3
Muscovite	0.6	0.5	0.2	0.0	0.0
Vermiculite	-	-	-	-	-
TOTAL	100	100	100	100	100

Zero values indicate that the mineral was included in the refinement, but the calculated concentration is below a measurable value.

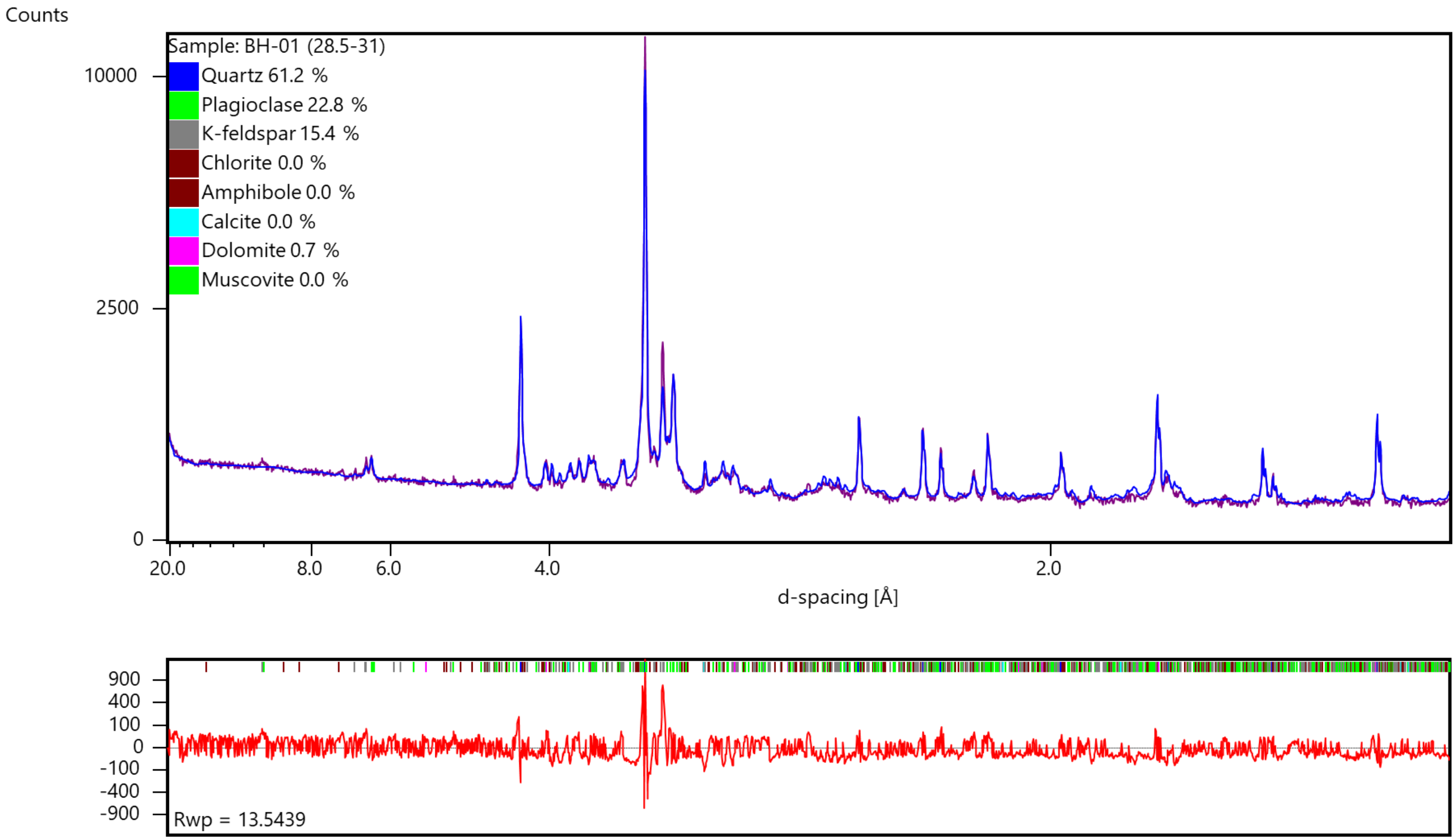
Dashes indicate that the mineral was not identified by the analyst and not included in the refinement calculation for the sample.

The weight percent quantities indicated have been normalized to a sum of 100%. The quantity of amorphous material has not been determined.

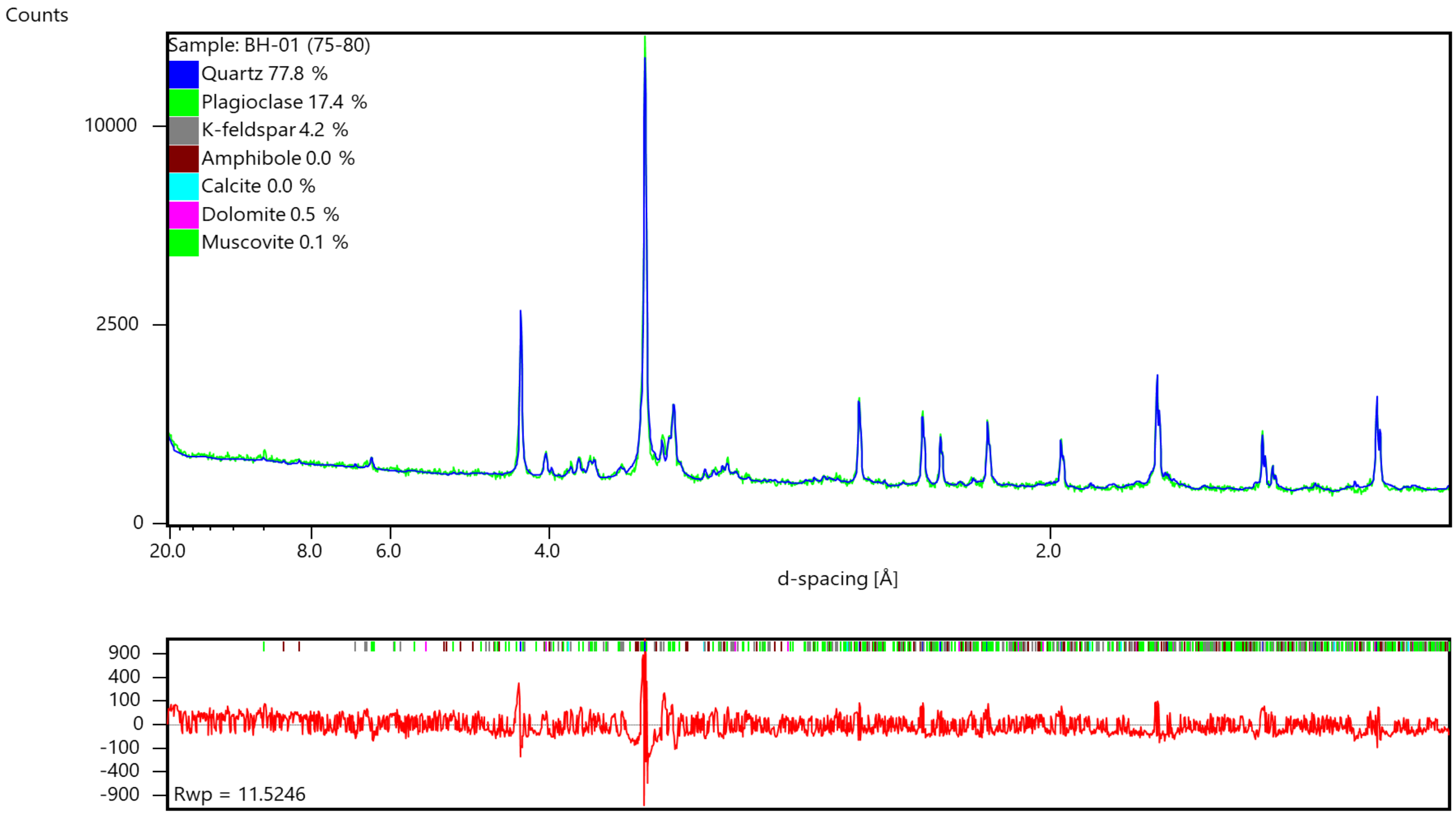
Mineral/Compound	Approximate Formula
Quartz	SiO_2
Plagioclase	$(Ca,Na)(Al,Si)_4O_8$
K-Feldspar	$KAlSi_3O_8$
Chlorite	$(Mg,Fe^{2+})_5Al_2Si_3O_{10}(OH)_8$
Amphibole	$(Ca,Na)_{2–3}(Mg,Fe,Al)_5(Al,Si)_8O_{22}(OH,F)_2$
Calcite	$CaCO_3$
Dolomite	$CaMg(CO_3)_2$
Muscovite	$KAl_2(AlSi_3O_{10})(FOH)_2$
Vermiculite	$(Mg,Fe)_3(OH)_2{\cdot}4H_2O$



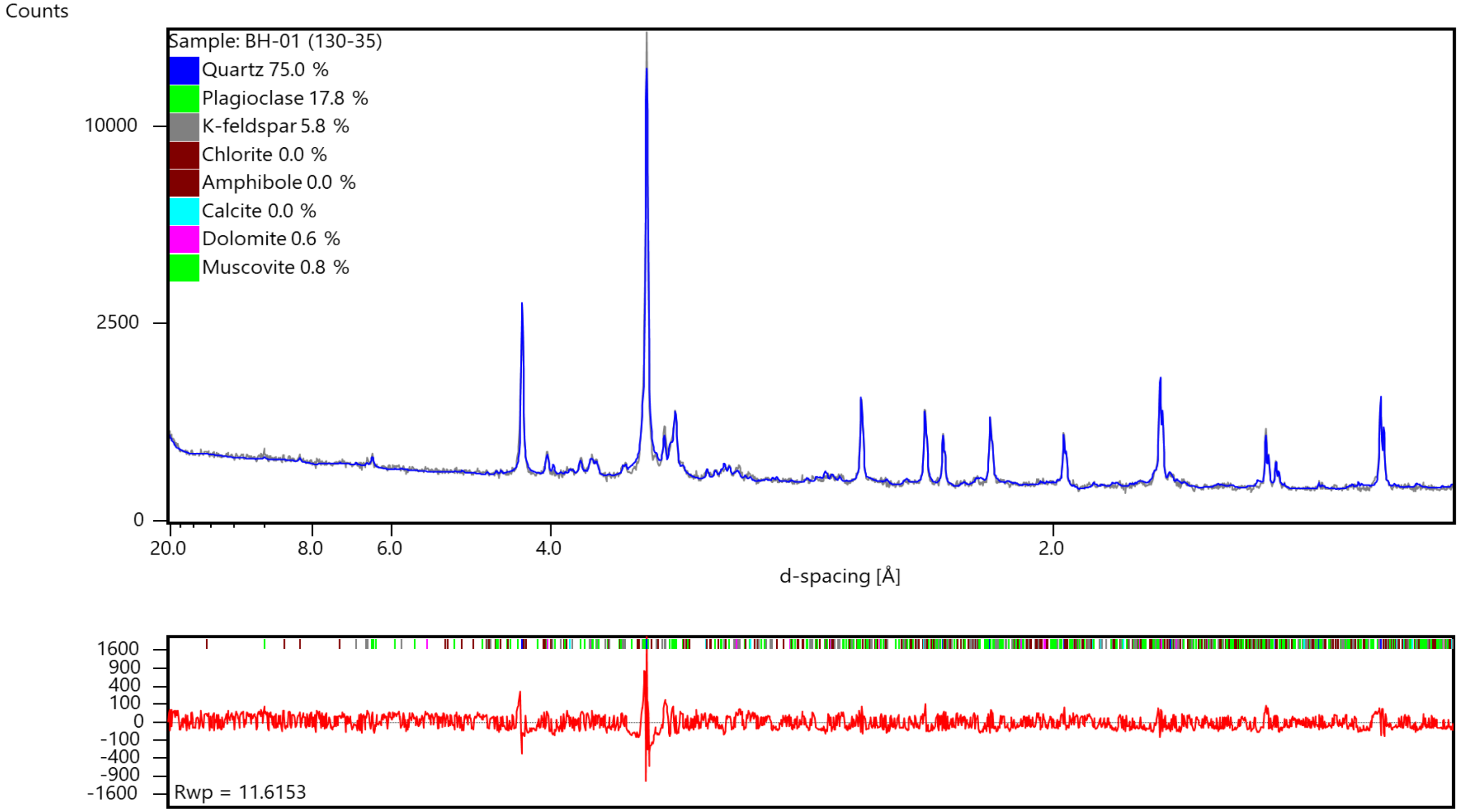
X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement. The lower red curve is the difference plot with the weighted R profile value (Rwp).



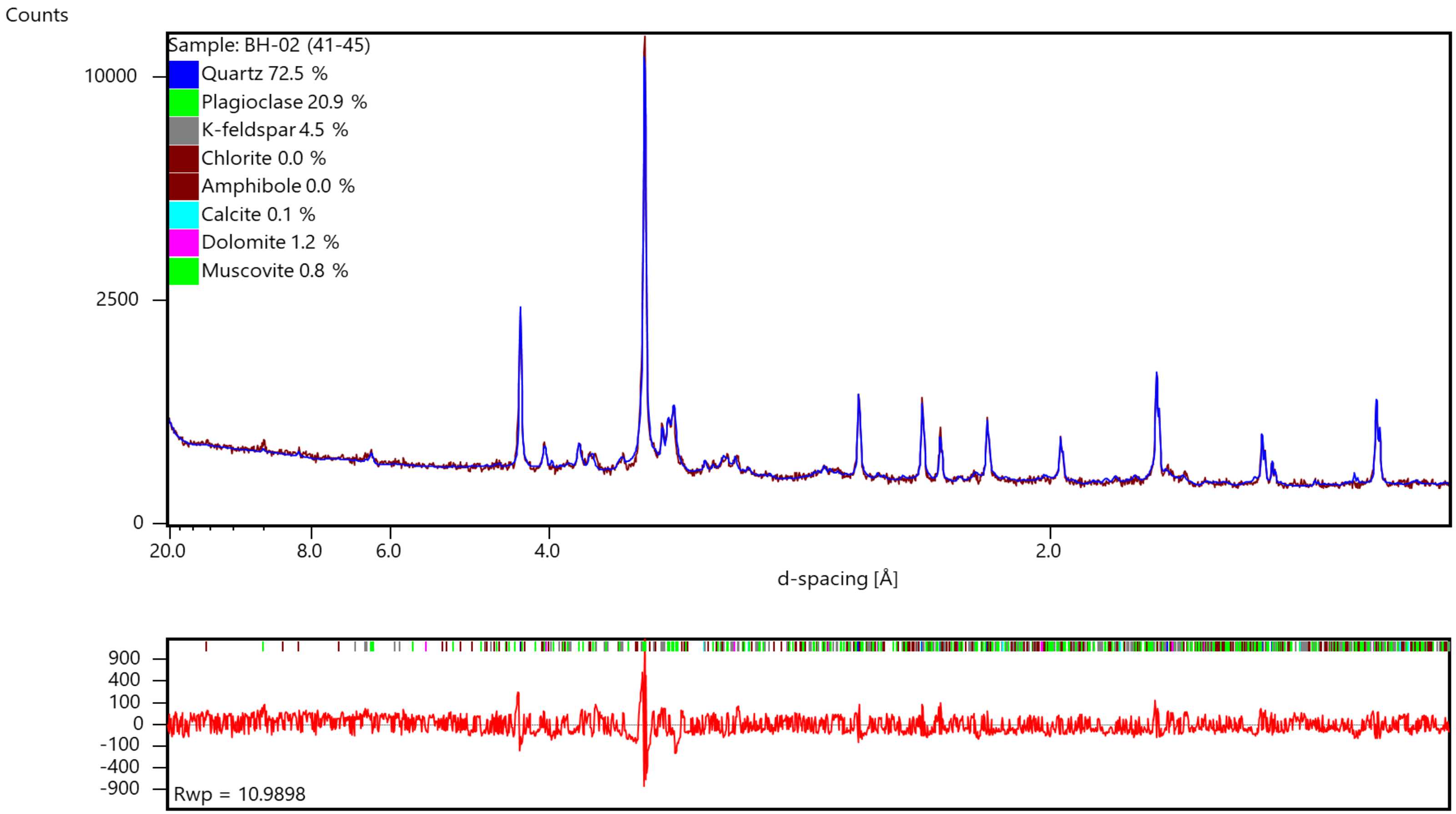
X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement. The lower red curve is the difference plot with the weighted R profile value (Rwp).



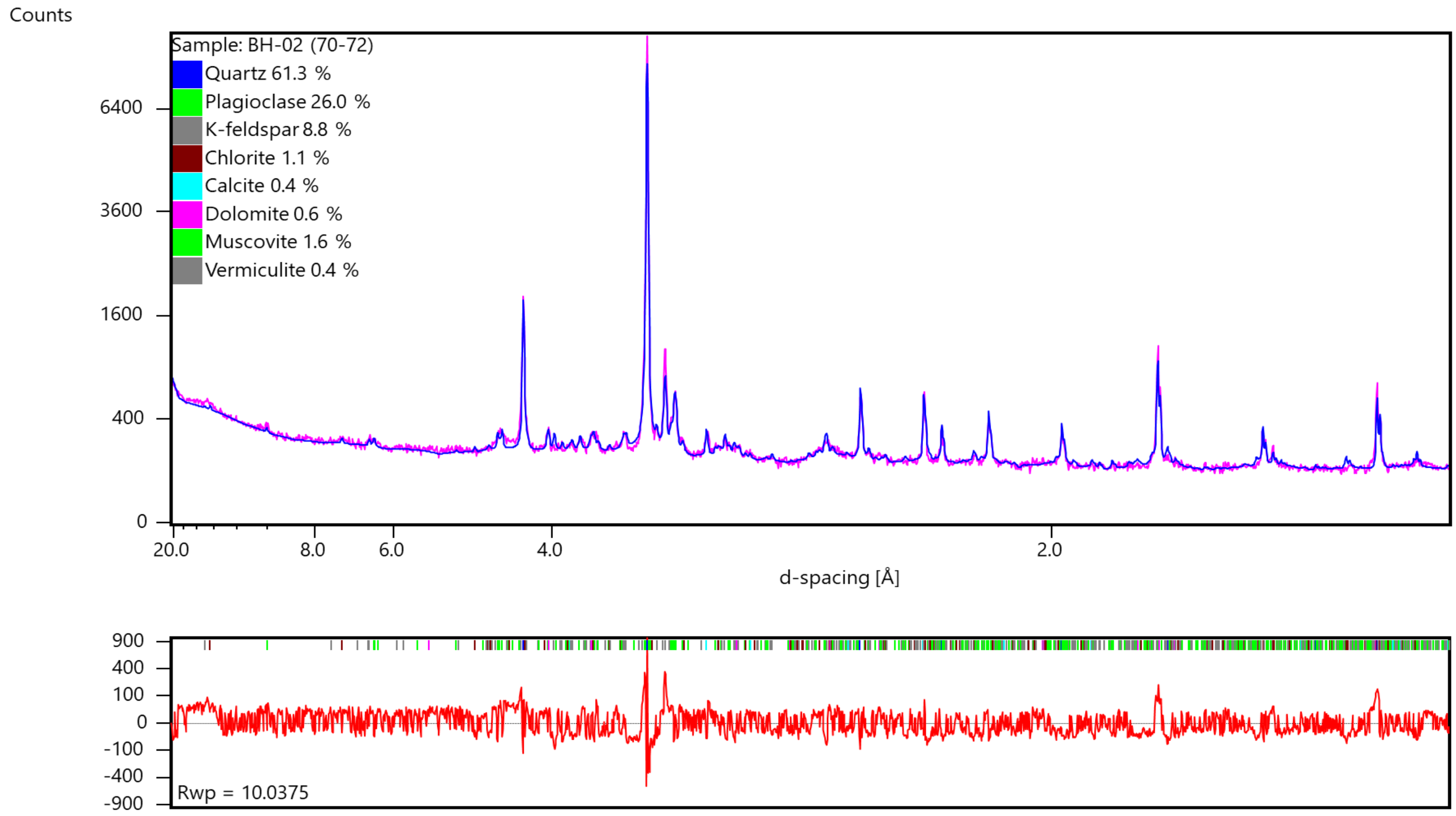
X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement. The lower red curve is the difference plot with the weighted R profile value (Rwp).



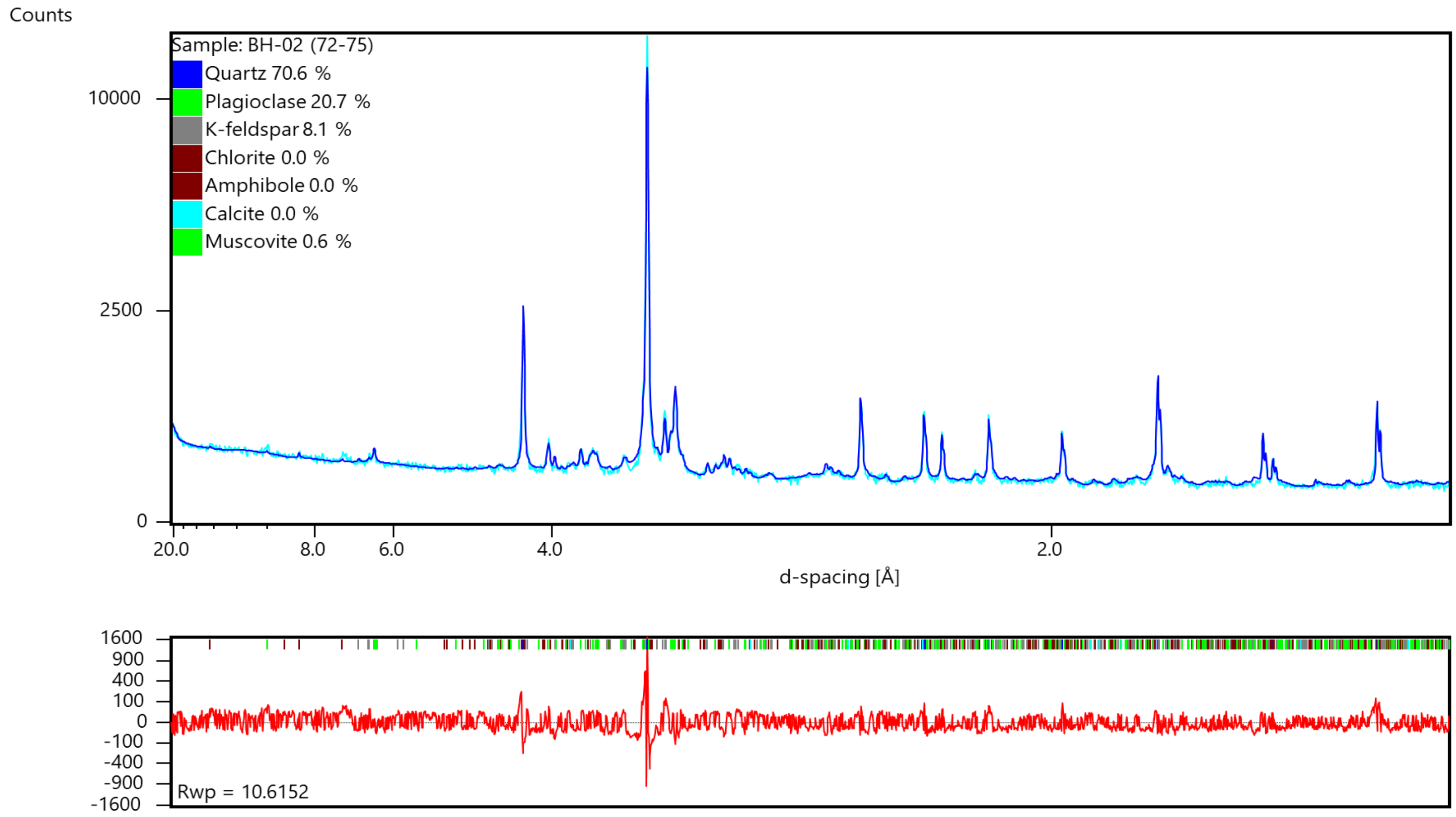
X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement. The lower red curve is the difference plot with the weighted R profile value (Rwp).



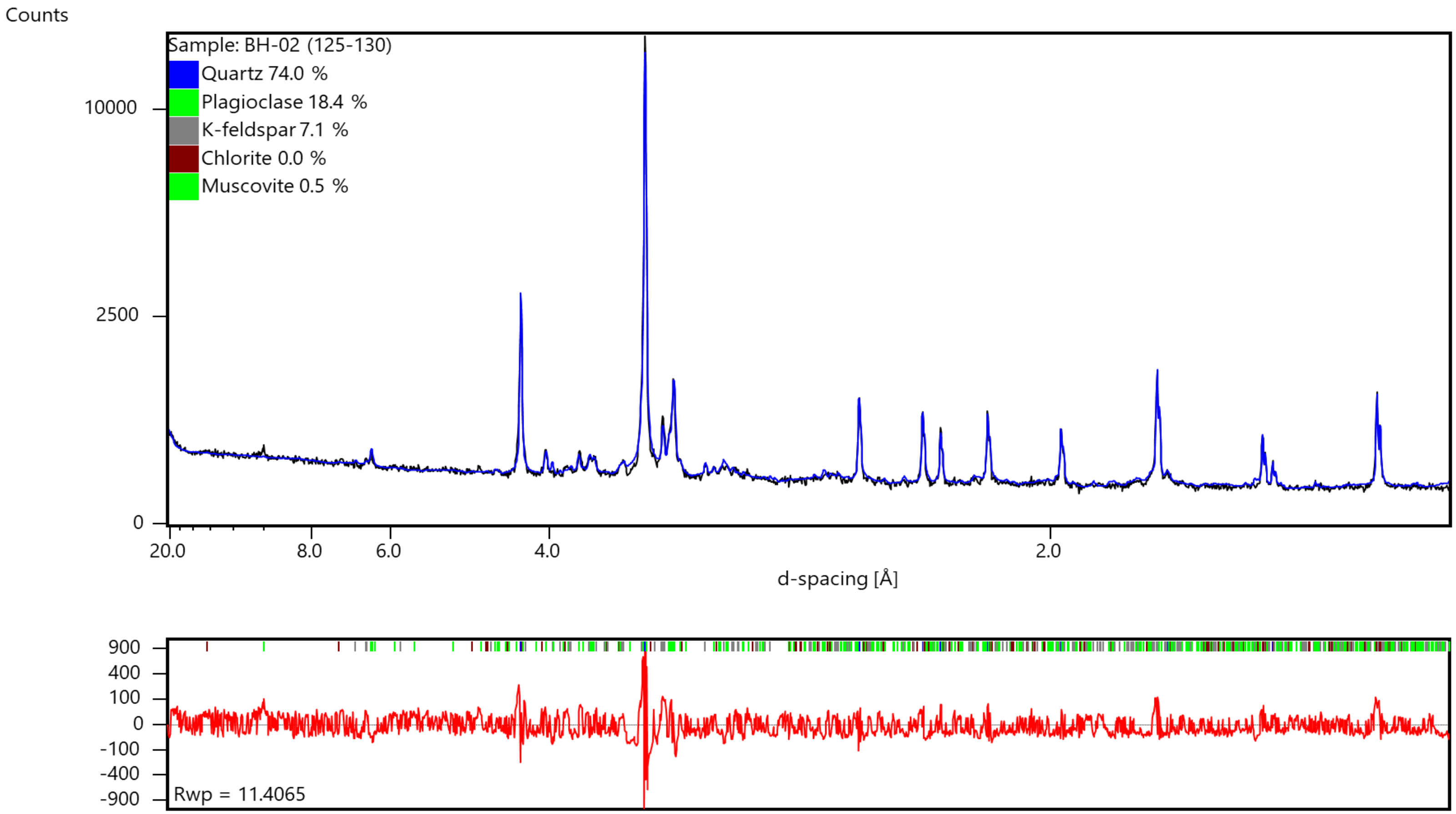
X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement. The lower red curve is the difference plot with the weighted R profile value (Rwp).



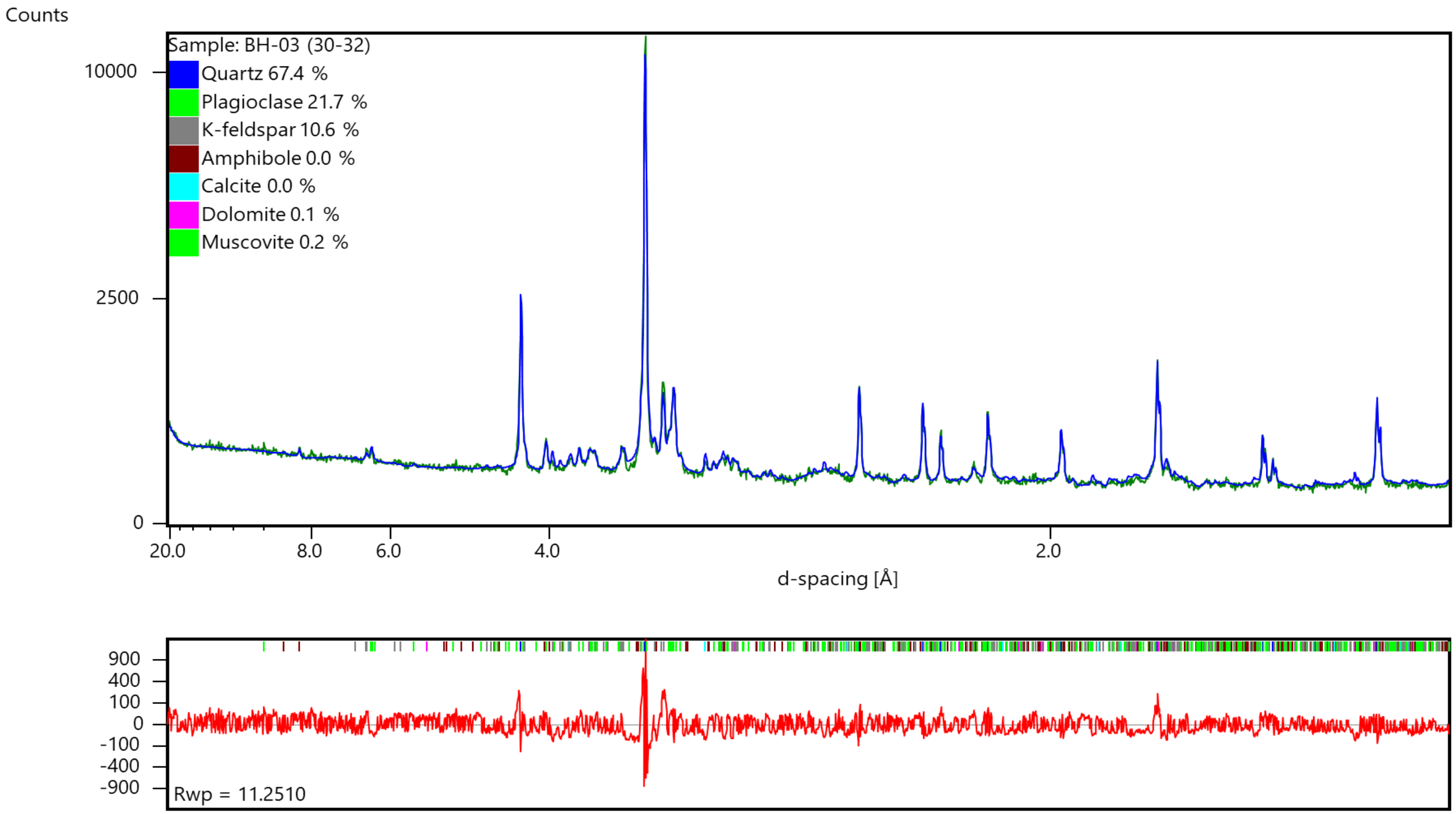
X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement. The lower red curve is the difference plot with the weighted R profile value (Rwp).



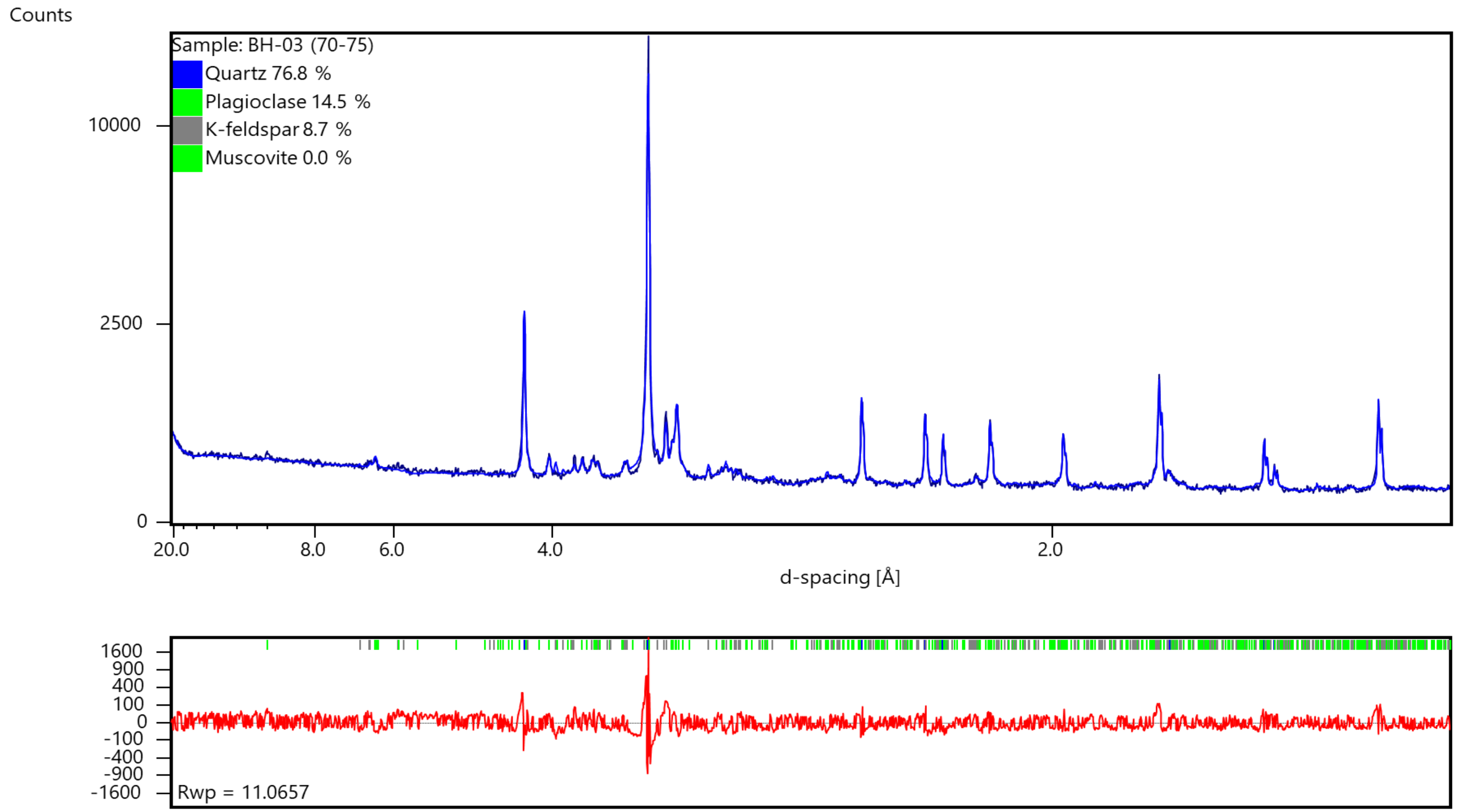
X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement. The lower red curve is the difference plot with the weighted R profile value (Rwp).



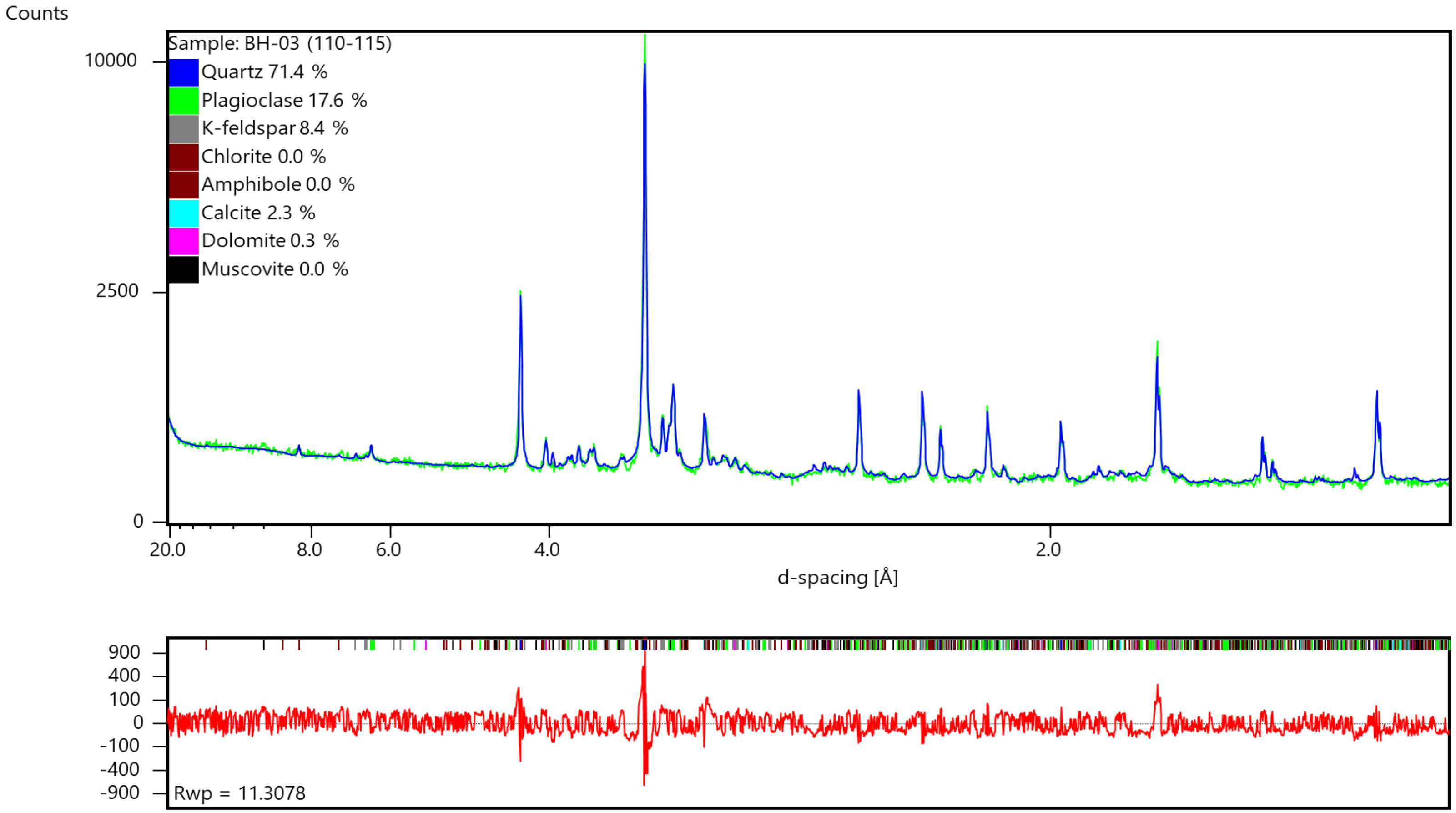
X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement. The lower red curve is the difference plot with the weighted R profile value (Rwp).



X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement. The lower red curve is the difference plot with the weighted R profile value (Rwp).



X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement. The lower red curve is the difference plot with the weighted R profile value (Rwp).



X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement. The lower red curve is the difference plot with the weighted R profile value (Rwp).

APPENDIX B

Sequential Extraction Laboratory Report

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TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921
Tel: (865)291-3000

TestAmerica Job ID: 140-13229-1
Client Project/Site: Rush Island Energy Center - Soil & Speci

For:
Golder Associates Inc.
13515 Barrett Parkway Drive
Suite 260
Ballwin, Missouri 63021

Attn: Jeffrey Ingram

Terry Walker Wasmund

Authorized for release by:
11/30/2018 12:27:22 PM

Terry Walker Wasmund, Project Manager II
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LINKS

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Have a Question? Ask The Expert

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Table of Contents

Definitions/Glossary

Client: Golder Associates Inc.
Project/Site: Rush Island Energy Center - Soil & Speci

Qualifiers

Metals

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
*	RPD of the LCS and LCSD exceeds the control limits
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Job ID: 140-13229-1

Laboratory: TestAmerica Knoxville

Narrative

Job Narrative
140-13229-1

Receipt

The samples were received on 11/1/2018 at 12:00 PM. The samples arrived in good condition, properly preserved, and on ice. The temperature of the cooler at receipt was 0.3º C.

Receipt Exceptions

The container label for sample BH-01 (130-135) (140-13229-11) did not match the information listed on the Chain-of-Custody (COC). The container labeled BH-01 (130-135), while the COC listed BH-01 (130-35). The client was contacted and confirmed the correct ID is BH-01 (130-135).

Metals - Method 6010B
7 Step Sequential Extraction Procedure

These soil samples were prepared and analyzed using TestAmerica Knoxville standard operating procedure KNOX-MT-0008, “7 Step Sequential Extraction Procedure”. SW-846 Method 6010B as incorporated in TestAmerica Knoxville standard operating procedure KNOX-MT-0007 was used to perform the final instrument analyses.

An aliquot of each sample was sequentially extracted using the steps listed below:

> **Step 1** - ***Exchangeable Fraction***: A 5 gram aliquot of sample was extracted with 25 mL of 1M magnesium sulfate (MgSO4), centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
>
> **Step 2** - ***Carbonate Fraction***: The sample residue from step 1 was extracted with 25 mL of 1M sodium acetate/acetic acid (NaOAc/HOAc) at pH 5, centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
>
> **Step 3** - ***Non-crystalline Materials Fraction***: The sample residue from step 2 was extracted with 25 mL of 0.2M ammonium oxalate (pH 3), centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
>
> **Step 4** - ***Metal Hydroxide Fraction***: The sample residue from step 3 was extracted with 25 mL of 1M hydroxylamine hydrochloride solution in 25% v/v acetic acid, centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
>
> **Step 5** - ***Organic-bound Fraction***: The sample residue from step 4 was extracted three times with 25 mL of 5% sodium hypochlorite (NaClO) at pH 9.5, centrifuged and filtered. The resulting leachates were combined and 5 mL were digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
>
> **Step 6** - ***Acid/Sulfide Fraction***: The sample residue from step 5 was extracted with 25 mL of a 3:1:2 v/v solution of HCl-HNO3-H2O, centrifuged and filtered. 5 mL of the resulting leachate was diluted to 50 mL with reagent water and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
>
> **Step 7** - ***Residual Fraction***: A 1.0 g aliquot of the sample residue from step 6 was digested using HF, HNO3, HCl and H3BO3. The digestate was analyzed by ICP using method 6010B. Results are reported in mg/kg on a dry weight basis.

In addition, a 1.0 g aliquot of the original sample was digested using HF, HNO3, HCl and H3BO3. The digestate was analyzed by ICP using method 6010B. Total metal results are reported in mg/kg on a dry weight basis.

Results were calculated using the following equation:

> Result, µg/g or mg/Kg, dry weight = (C × V × V1 × D) / (W × S × V2)

Job ID: 140-13229-1 (Continued)

Laboratory: TestAmerica Knoxville (Continued)

Where:
C = Concentration from instrument readout, µg/mL
V = Final volume of digestate, mL
D = Instrument dilution factor
V1 = Total volume of leachate, mL
V2 = Volume of leachate digested, mL
W = Wet weight of sample, g
S = Percent solids/100

A method blank, laboratory control sample and laboratory control sample duplicate were prepared and analyzed with each SEP step in order to provide information about both the presence of elements of interest in the extraction solutions, and the recovery of elements of interest from the extraction solutions. Results outside of laboratory QC limits do not reflect out of control performance, but rather the effect of the extraction solution upon the analyte.

A laboratory sample duplicate was prepared and analyzed with each batch of samples in order to provide information regarding the reproducibility of the procedure.

SEP Report Notes:
The final report lists the results for each step, the result for the total digestion of the sample, and a sum of the results of steps 1 through 7 by element.

The digestates for steps 1, 2 and 5 were analyzed at a dilution due to instrument problems caused by the high solids content of the digestates. The reporting limits were adjusted accordingly.

Method 6010B SEP: The method blank for preparation batch 140-25604 and analytical batch 140-25767 contained Iron above the reporting limit (RL). Associated samples were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank.

Methods 6010B, 6010B SEP: Samples BH-03 (30-32) (140-13229-1), BH-03 (70-75) (140-13229-2), BH-03 (110-115) (140-13229-3), DUP-1 (140-13229-4), BH-02 (70-72) (140-13229-7), BH-02 (125-130) (140-13229-8), BH-01 (75-80) (140-13229-10) and BH-01 (130-135) (140-13229-11) were diluted due to the presence of Silicon or Titanium which interferes with Arsenic and Lead. Elevated reporting limits (RLs) are provided.

Methods 3050B/6020
Sample BH-02 (70-72) (140-13229-7) could not be thoroughly homogenized before sub-sampling was performed due to sample matrix. The sample was clay.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
% Moisture: The samples were analyzed for percent moisture using SOP number KNOX-WC-0012 (based on Modified MCAWW 160.3 and SM2540B and on the percent moisture determinations described in methods 3540C and 3550B).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Comments
No additional comments.

Detection Summary

Client: Golder Associates Inc.
Project/Site: Rush Island Energy Center - Soil & Speci

TestAmerica Job ID: 140-13229-1

Client Sample ID: BH-03 (30-32)

Lab Sample ID: 140-13229-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Iron	34	*	17	10	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	22		12	2.4	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	2.4		0.58	0.15	mg/Kg	1	☼	6010B SEP	Step 3
Iron	1400		5.8	3.3	mg/Kg	1	☼	6010B SEP	Step 3
Lead	0.80	*	0.58	0.13	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	490		12	1.8	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	1.9	B	0.58	0.25	mg/Kg	1	☼	6010B SEP	Step 4
Iron	2000		5.8	3.3	mg/Kg	1	☼	6010B SEP	Step 4
Lead	1.5		0.58	0.13	mg/Kg	1	☼	6010B SEP	Step 4
Li	0.91	J	2.9	0.17	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	29	J *	170	27	mg/Kg	5	☼	6010B SEP	Step 5
Li	3.8	J B *	43	2.5	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	690		12	1.8	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	1.1		0.58	0.17	mg/Kg	1	☼	6010B SEP	Step 6
Iron	2700		5.8	3.3	mg/Kg	1	☼	6010B SEP	Step 6
Lead	0.50	J	0.58	0.13	mg/Kg	1	☼	6010B SEP	Step 6
Li	0.93	J	2.9	0.17	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	29000		120	18	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	2.1		1.2	0.30	mg/Kg	2	☼	6010B SEP	Step 7
Iron	3800	B	5.8	4.7	mg/Kg	1	☼	6010B SEP	Step 7
Lead	8.0		1.2	0.25	mg/Kg	2	☼	6010B SEP	Step 7
Li	3.3		2.9	0.17	mg/Kg	1	☼	6010B SEP	Step 7
Mo	0.20	J	2.3	0.095	mg/Kg	1	☼	6010B SEP	Step 7
Aluminum	30000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	7.5		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	10000		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Lead	11		0.50	0.11	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	9.0		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Mo	0.20	J	2.0	0.082	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Aluminum	33000		120	18	mg/Kg	10	☼	6010B	Total/NA
Arsenic	8.2		1.2	0.30	mg/Kg	2	☼	6010B	Total/NA
Iron	11000		5.8	4.7	mg/Kg	1	☼	6010B	Total/NA
Lead	9.8		1.2	0.25	mg/Kg	2	☼	6010B	Total/NA
Lithium	5.2		2.9	0.17	mg/Kg	1	☼	6010B	Total/NA
Aluminum	1100		3.5	1.7	mg/Kg	1	☼	EPA 6020A	Total/NA
Arsenic	1.8		0.12	0.031	mg/Kg	1	☼	EPA 6020A	Total/NA
Iron	4500		5.9	2.9	mg/Kg	1	☼	EPA 6020A	Total/NA
Lead	2.1		0.12	0.041	mg/Kg	1	☼	EPA 6020A	Total/NA
Lithium	1.9		0.59	0.33	mg/Kg	1	☼	EPA 6020A	Total/NA
Molybdenum	0.094	J	0.59	0.073	mg/Kg	1	☼	EPA 6020A	Total/NA

Client Sample ID: BH-03 (70-75)

Lab Sample ID: 140-13229-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	6.0	J *	36	5.7	mg/Kg	3	☼	6010B SEP	Step 2
Iron	60	*	18	10	mg/Kg	3	☼	6010B SEP	Step 2

This Detection Summary does not include radiochemical test results.

Detection Summary

Client Sample ID: BH-03 (70-75) (Continued)
Lab Sample ID: 140-13229-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	28		12	2.5	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.34	J	0.59	0.15	mg/Kg	1	☼	6010B SEP	Step 3
Iron	460		5.9	3.4	mg/Kg	1	☼	6010B SEP	Step 3
Lead	0.27	J *	0.59	0.13	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	330		12	1.9	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	0.65	B	0.59	0.26	mg/Kg	1	☼	6010B SEP	Step 4
Iron	1100		5.9	3.4	mg/Kg	1	☼	6010B SEP	Step 4
Lead	0.82		0.59	0.13	mg/Kg	1	☼	6010B SEP	Step 4
Li	0.71	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	38	J *	180	28	mg/Kg	5	☼	6010B SEP	Step 5
Li	3.7	J B *	45	2.6	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	470		12	1.9	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.65		0.59	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Iron	1500		5.9	3.4	mg/Kg	1	☼	6010B SEP	Step 6
Lead	0.39	J	0.59	0.13	mg/Kg	1	☼	6010B SEP	Step 6
Li	0.79	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	29000		120	19	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	0.88		0.59	0.15	mg/Kg	1	☼	6010B SEP	Step 7
Iron	1600	B	5.9	4.9	mg/Kg	1	☼	6010B SEP	Step 7
Lead	6.8		0.59	0.13	mg/Kg	1	☼	6010B SEP	Step 7
Li	2.3	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 7
Aluminum	30000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	2.5		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	4700		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Lead	8.3		0.50	0.11	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	7.5		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Aluminum	32000		120	19	mg/Kg	10	☼	6010B	Total/NA
Arsenic	5.3		1.2	0.31	mg/Kg	2	☼	6010B	Total/NA
Iron	6300		5.9	4.9	mg/Kg	1	☼	6010B	Total/NA
Lead	8.9		1.2	0.26	mg/Kg	2	☼	6010B	Total/NA
Lithium	4.4		3.0	0.18	mg/Kg	1	☼	6010B	Total/NA
Molybdenum	0.19	J	2.4	0.097	mg/Kg	1	☼	6010B	Total/NA
Aluminum	1000		3.5	1.7	mg/Kg	1	☼	EPA 6020A	Total/NA
Arsenic	15		0.12	0.030	mg/Kg	1	☼	EPA 6020A	Total/NA
Iron	4400		5.8	2.9	mg/Kg	1	☼	EPA 6020A	Total/NA
Lead	5.6		0.12	0.041	mg/Kg	1	☼	EPA 6020A	Total/NA
Lithium	1.8		0.58	0.32	mg/Kg	1	☼	EPA 6020A	Total/NA
Molybdenum	0.20	J	0.58	0.072	mg/Kg	1	☼	EPA 6020A	Total/NA

Client Sample ID: BH-03 (110-115)
Lab Sample ID: 140-13229-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	9.3	J *	35	5.6	mg/Kg	3	☼	6010B SEP	Step 2
Iron	83	*	18	10	mg/Kg	3	☼	6010B SEP	Step 2
Li	0.84	J	8.8	0.53	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	22		12	2.5	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.36	J	0.58	0.15	mg/Kg	1	☼	6010B SEP	Step 3

This Detection Summary does not include radiochemical test results.

Client Sample ID: BH-03 (110-115) (Continued)

Lab Sample ID: 140-13229-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Iron	440		5.8	3.4	mg/Kg	1	☼	6010B SEP	Step 3
Mo	0.67	J	2.3	0.096	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	290		12	1.9	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	0.66	B	0.58	0.26	mg/Kg	1	☼	6010B SEP	Step 4
Iron	1300		5.8	3.4	mg/Kg	1	☼	6010B SEP	Step 4
Lead	0.69		0.58	0.13	mg/Kg	1	☼	6010B SEP	Step 4
Li	0.86	J	2.9	0.18	mg/Kg	1	☼	6010B SEP	Step 4
Mo	0.41	J	2.3	0.096	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	42	J *	180	27	mg/Kg	5	☼	6010B SEP	Step 5
Li	4.4	J B *	44	2.6	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	1000		12	1.9	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.65		0.58	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Iron	3400		5.8	3.4	mg/Kg	1	☼	6010B SEP	Step 6
Lead	0.57	J	0.58	0.13	mg/Kg	1	☼	6010B SEP	Step 6
Li	1.9	J	2.9	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	33000		120	19	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	1.2		1.2	0.30	mg/Kg	2	☼	6010B SEP	Step 7
Iron	4900	B	5.8	4.8	mg/Kg	1	☼	6010B SEP	Step 7
Lead	4.6		1.2	0.26	mg/Kg	2	☼	6010B SEP	Step 7
Li	2.9		2.9	0.18	mg/Kg	1	☼	6010B SEP	Step 7
Mo	0.19	J	2.3	0.096	mg/Kg	1	☼	6010B SEP	Step 7
Aluminum	34000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	2.9		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	10000		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Lead	5.9		0.50	0.11	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	11		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Mo	1.3	J	2.0	0.082	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Aluminum	28000		120	19	mg/Kg	10	☼	6010B	Total/NA
Arsenic	4.3		1.2	0.30	mg/Kg	2	☼	6010B	Total/NA
Iron	9800		5.8	4.8	mg/Kg	1	☼	6010B	Total/NA
Lead	5.1		1.2	0.26	mg/Kg	2	☼	6010B	Total/NA
Lithium	5.8		2.9	0.18	mg/Kg	1	☼	6010B	Total/NA
Molybdenum	1.8	J	2.3	0.096	mg/Kg	1	☼	6010B	Total/NA
Aluminum	1200		3.6	1.7	mg/Kg	1	☼	EPA 6020A	Total/NA
Arsenic	1.2		0.12	0.031	mg/Kg	1	☼	EPA 6020A	Total/NA
Iron	3800		6.0	2.9	mg/Kg	1	☼	EPA 6020A	Total/NA
Lead	1.0		0.12	0.042	mg/Kg	1	☼	EPA 6020A	Total/NA
Lithium	2.5		0.60	0.33	mg/Kg	1	☼	EPA 6020A	Total/NA
Molybdenum	0.42	J	0.60	0.074	mg/Kg	1	☼	EPA 6020A	Total/NA

Client Sample ID: DUP-1

Lab Sample ID: 140-13229-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	6.5	J *	36	5.7	mg/Kg	3	☼	6010B SEP	Step 2
Iron	110	*	18	10	mg/Kg	3	☼	6010B SEP	Step 2
Li	0.78	J	8.9	0.54	mg/Kg	3	☼	6010B SEP	Step 2

Detection Summary

Client: Golder Associates Inc.
Project/Site: Rush Island Energy Center - Soil & Speci

TestAmerica Job ID: 140-13229-1

Client Sample ID: DUP-1 (Continued)

Lab Sample ID: 140-13229-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	23		12	2.5	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.38	J	0.59	0.15	mg/Kg	1	☼	6010B SEP	Step 3
Iron	580		5.9	3.5	mg/Kg	1	☼	6010B SEP	Step 3
Mo	1.3	J	2.4	0.098	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	370		12	1.9	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	0.95	B	0.59	0.26	mg/Kg	1	☼	6010B SEP	Step 4
Iron	1600		5.9	3.5	mg/Kg	1	☼	6010B SEP	Step 4
Lead	0.64		0.59	0.13	mg/Kg	1	☼	6010B SEP	Step 4
Li	0.99	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 4
Mo	0.68	J	2.4	0.098	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	38	J *	180	28	mg/Kg	5	☼	6010B SEP	Step 5
Li	3.3	J B *	45	2.6	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	900		12	1.9	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.78		0.59	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Iron	3500		5.9	3.5	mg/Kg	1	☼	6010B SEP	Step 6
Lead	0.43	J	0.59	0.13	mg/Kg	1	☼	6010B SEP	Step 6
Li	1.7	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	27000		120	19	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	1.2		1.2	0.31	mg/Kg	2	☼	6010B SEP	Step 7
Iron	3100	B	5.9	4.9	mg/Kg	1	☼	6010B SEP	Step 7
Lead	4.4		1.2	0.26	mg/Kg	2	☼	6010B SEP	Step 7
Li	3.1		3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 7
Aluminum	29000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	3.3		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	8900		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Lead	5.4		0.50	0.11	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	9.8		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Mo	2.0		2.0	0.082	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Aluminum	33000		120	19	mg/Kg	10	☼	6010B	Total/NA
Arsenic	3.0		1.2	0.31	mg/Kg	2	☼	6010B	Total/NA
Iron	10000		5.9	4.9	mg/Kg	1	☼	6010B	Total/NA
Lead	4.8		1.2	0.26	mg/Kg	2	☼	6010B	Total/NA
Lithium	6.4		3.0	0.18	mg/Kg	1	☼	6010B	Total/NA
Molybdenum	2.4		2.4	0.098	mg/Kg	1	☼	6010B	Total/NA
Aluminum	1300		3.5	1.7	mg/Kg	1	☼	EPA 6020A	Total/NA
Arsenic	1.1		0.12	0.030	mg/Kg	1	☼	EPA 6020A	Total/NA
Iron	4000		5.8	2.9	mg/Kg	1	☼	EPA 6020A	Total/NA
Lead	1.1		0.12	0.041	mg/Kg	1	☼	EPA 6020A	Total/NA
Lithium	2.8		0.58	0.32	mg/Kg	1	☼	EPA 6020A	Total/NA
Molybdenum	0.44	J	0.58	0.072	mg/Kg	1	☼	EPA 6020A	Total/NA

Client Sample ID: BH-02 (41-45)

Lab Sample ID: 140-13229-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	14	J *	36	5.8	mg/Kg	3	☼	6010B SEP	Step 2
Iron	290	*	18	11	mg/Kg	3	☼	6010B SEP	Step 2

This Detection Summary does not include radiochemical test results.

Client Sample ID: BH-02 (41-45) (Continued) Lab Sample ID: 140-13229-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.81	J	1.8	0.40	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	63		12	2.5	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.84		0.60	0.16	mg/Kg	1	☼	6010B SEP	Step 3
Iron	970		6.0	3.5	mg/Kg	1	☼	6010B SEP	Step 3
Lead	0.35	J *	0.60	0.13	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	550		12	1.9	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	1.2	B	0.60	0.27	mg/Kg	1	☼	6010B SEP	Step 4
Iron	1900		6.0	3.5	mg/Kg	1	☼	6010B SEP	Step 4
Lead	1.8		0.60	0.13	mg/Kg	1	☼	6010B SEP	Step 4
Li	1.2	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	33	J *	180	28	mg/Kg	5	☼	6010B SEP	Step 5
Li	4.4	J B *	45	2.7	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	1200		12	1.9	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	1.0		0.60	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Iron	2600		6.0	3.5	mg/Kg	1	☼	6010B SEP	Step 6
Lead	0.92		0.60	0.13	mg/Kg	1	☼	6010B SEP	Step 6
Li	1.6	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	30000		120	19	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	1.8		0.60	0.16	mg/Kg	1	☼	6010B SEP	Step 7
Iron	2600	B	6.0	5.0	mg/Kg	1	☼	6010B SEP	Step 7
Lead	5.7		0.60	0.13	mg/Kg	1	☼	6010B SEP	Step 7
Li	4.2		3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 7
Aluminum	32000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	4.9		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	8400		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Lead	9.5		0.50	0.11	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	11		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Aluminum	37000		120	19	mg/Kg	10	☼	6010B	Total/NA
Arsenic	4.2		0.60	0.16	mg/Kg	1	☼	6010B	Total/NA
Iron	8600		6.0	5.0	mg/Kg	1	☼	6010B	Total/NA
Lead	9.1		0.60	0.13	mg/Kg	1	☼	6010B	Total/NA
Lithium	7.5		3.0	0.18	mg/Kg	1	☼	6010B	Total/NA
Molybdenum	0.25	J	2.4	0.099	mg/Kg	1	☼	6010B	Total/NA
Aluminum	2100		3.8	1.8	mg/Kg	1	☼	EPA 6020A	Total/NA
Arsenic	1.7		0.13	0.033	mg/Kg	1	☼	EPA 6020A	Total/NA
Iron	5600		6.3	3.1	mg/Kg	1	☼	EPA 6020A	Total/NA
Lead	3.8		0.13	0.044	mg/Kg	1	☼	EPA 6020A	Total/NA
Lithium	3.3		0.63	0.35	mg/Kg	1	☼	EPA 6020A	Total/NA
Molybdenum	0.18	J	0.63	0.078	mg/Kg	1	☼	EPA 6020A	Total/NA

Client Sample ID: BH-02 (72-75) Lab Sample ID: 140-13229-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	6.1	J *	35	5.5	mg/Kg	3	☼	6010B SEP	Step 2
Iron	180	*	17	10	mg/Kg	3	☼	6010B SEP	Step 2
Lead	0.61	J	1.7	0.38	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	54		12	2.4	mg/Kg	1	☼	6010B SEP	Step 3

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Golder Associates Inc.
Project/Site: Rush Island Energy Center - Soil & Speci

TestAmerica Job ID: 140-13229-1

Client Sample ID: BH-02 (72-75) (Continued)

Lab Sample ID: 140-13229-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.32	J	0.58	0.15	mg/Kg	1	☼	6010B SEP	Step 3
Iron	650		5.8	3.4	mg/Kg	1	☼	6010B SEP	Step 3
Lead	0.26	J *	0.58	0.13	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	640		12	1.8	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	0.80	B	0.58	0.25	mg/Kg	1	☼	6010B SEP	Step 4
Iron	1700		5.8	3.4	mg/Kg	1	☼	6010B SEP	Step 4
Lead	1.3		0.58	0.13	mg/Kg	1	☼	6010B SEP	Step 4
Li	1.3	J	2.9	0.17	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	27	J *	170	27	mg/Kg	5	☼	6010B SEP	Step 5
Li	3.1	J B *	43	2.5	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	990		12	1.8	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.94		0.58	0.17	mg/Kg	1	☼	6010B SEP	Step 6
Iron	2300		5.8	3.4	mg/Kg	1	☼	6010B SEP	Step 6
Lead	0.68		0.58	0.13	mg/Kg	1	☼	6010B SEP	Step 6
Li	1.3	J	2.9	0.17	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	40000		120	18	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	1.4		0.58	0.15	mg/Kg	1	☼	6010B SEP	Step 7
Iron	3000	B	5.8	4.7	mg/Kg	1	☼	6010B SEP	Step 7
Lead	7.8		0.58	0.13	mg/Kg	1	☼	6010B SEP	Step 7
Li	3.6		2.9	0.17	mg/Kg	1	☼	6010B SEP	Step 7
Aluminum	42000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	3.5		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	7800		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Lead	11		0.50	0.11	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	9.3		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Aluminum	37000		120	18	mg/Kg	10	☼	6010B	Total/NA
Arsenic	3.3		0.58	0.15	mg/Kg	1	☼	6010B	Total/NA
Iron	8700		5.8	4.7	mg/Kg	1	☼	6010B	Total/NA
Lead	8.8		0.58	0.13	mg/Kg	1	☼	6010B	Total/NA
Lithium	6.6		2.9	0.17	mg/Kg	1	☼	6010B	Total/NA
Molybdenum	0.23	J	2.3	0.095	mg/Kg	1	☼	6010B	Total/NA
Aluminum	2800		3.5	1.6	mg/Kg	1	☼	EPA 6020A	Total/NA
Arsenic	2.0		0.12	0.030	mg/Kg	1	☼	EPA 6020A	Total/NA
Iron	5600		5.8	2.8	mg/Kg	1	☼	EPA 6020A	Total/NA
Lead	4.4		0.12	0.040	mg/Kg	1	☼	EPA 6020A	Total/NA
Lithium	3.9		0.58	0.32	mg/Kg	1	☼	EPA 6020A	Total/NA
Molybdenum	0.26	J	0.58	0.072	mg/Kg	1	☼	EPA 6020A	Total/NA

Client Sample ID: BH-02 (70-72)

Lab Sample ID: 140-13229-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Iron	24	J	26	15	mg/Kg	4	☼	6010B SEP	Step 1
Aluminum	18	J *	39	6.2	mg/Kg	3	☼	6010B SEP	Step 2
Iron	720	*	19	11	mg/Kg	3	☼	6010B SEP	Step 2
Lead	2.0		1.9	0.43	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	170		13	2.7	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.57	J	0.65	0.17	mg/Kg	1	☼	6010B SEP	Step 3

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Golder Associates Inc. TestAmerica Job ID: 140-13229-1
Project/Site: Rush Island Energy Center - Soil & Speci

Client Sample ID: BH-02 (70-72) (Continued) Lab Sample ID: 140-13229-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Iron	1500		6.5	3.8	mg/Kg	1	☼	6010B SEP	Step 3
Lead	0.26	J *	0.65	0.14	mg/Kg	1	☼	6010B SEP	Step 3
Li	0.21	J	3.2	0.19	mg/Kg	1	☼	6010B SEP	Step 3
Mo	0.12	J	2.6	0.11	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	2200		13	2.1	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	1.4	B	0.65	0.29	mg/Kg	1	☼	6010B SEP	Step 4
Iron	4500		6.5	3.8	mg/Kg	1	☼	6010B SEP	Step 4
Lead	5.1		0.65	0.14	mg/Kg	1	☼	6010B SEP	Step 4
Li	5.2		3.2	0.19	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	34	J *	190	30	mg/Kg	5	☼	6010B SEP	Step 5
Li	4.1	J B *	49	2.9	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	4100		13	2.1	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	1.6		0.65	0.19	mg/Kg	1	☼	6010B SEP	Step 6
Iron	6100		6.5	3.8	mg/Kg	1	☼	6010B SEP	Step 6
Lead	1.3		0.65	0.14	mg/Kg	1	☼	6010B SEP	Step 6
Li	3.6		3.2	0.19	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	26000		130	21	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	1.5		0.65	0.17	mg/Kg	1	☼	6010B SEP	Step 7
Iron	6200	B	6.5	5.3	mg/Kg	1	☼	6010B SEP	Step 7
Lead	2.6		0.65	0.14	mg/Kg	1	☼	6010B SEP	Step 7
Li	8.9		3.2	0.19	mg/Kg	1	☼	6010B SEP	Step 7
Aluminum	33000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	5.0		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	19000		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Lead	11		0.50	0.11	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	22		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Mo	0.12	J	2.0	0.082	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Aluminum	53000		130	21	mg/Kg	10	☼	6010B	Total/NA
Arsenic	3.8		0.65	0.17	mg/Kg	1	☼	6010B	Total/NA
Iron	19000		6.5	5.3	mg/Kg	1	☼	6010B	Total/NA
Lead	12		1.3	0.29	mg/Kg	2	☼	6010B	Total/NA
Lithium	24		3.2	0.19	mg/Kg	1	☼	6010B	Total/NA
Molybdenum	0.30	J	2.6	0.11	mg/Kg	1	☼	6010B	Total/NA
Aluminum	8300		3.9	1.9	mg/Kg	1	☼	EPA 6020A	Total/NA
Arsenic	2.6		0.13	0.034	mg/Kg	1	☼	EPA 6020A	Total/NA
Iron	15000		6.6	3.2	mg/Kg	1	☼	EPA 6020A	Total/NA
Lead	12		0.13	0.046	mg/Kg	1	☼	EPA 6020A	Total/NA
Lithium	12		0.66	0.36	mg/Kg	1	☼	EPA 6020A	Total/NA
Molybdenum	0.50	J	0.66	0.081	mg/Kg	1	☼	EPA 6020A	Total/NA

Client Sample ID: BH-02 (125-130) Lab Sample ID: 140-13229-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Iron	86	*	18	11	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	28		12	2.5	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.20	J	0.61	0.16	mg/Kg	1	☼	6010B SEP	Step 3

This Detection Summary does not include radiochemical test results.

Detection Summary

Client Sample ID: BH-02 (125-130) (Continued) Lab Sample ID: 140-13229-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Iron	640		6.1	3.5	mg/Kg	1	☼	6010B SEP	Step 3
Lead	0.18	J *	0.61	0.13	mg/Kg	1	☼	6010B SEP	Step 3
Mo	0.22	J	2.4	0.099	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	440		12	1.9	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	0.76	B	0.61	0.27	mg/Kg	1	☼	6010B SEP	Step 4
Iron	2000		6.1	3.5	mg/Kg	1	☼	6010B SEP	Step 4
Lead	0.73		0.61	0.13	mg/Kg	1	☼	6010B SEP	Step 4
Li	1.2	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	39	J *	180	28	mg/Kg	5	☼	6010B SEP	Step 5
Li	3.9	J B *	45	2.7	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	900		12	1.9	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.41	J	0.61	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Iron	3100		6.1	3.5	mg/Kg	1	☼	6010B SEP	Step 6
Lead	0.35	J	0.61	0.13	mg/Kg	1	☼	6010B SEP	Step 6
Li	1.7	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	27000		120	19	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	1.2		1.2	0.32	mg/Kg	2	☼	6010B SEP	Step 7
Iron	3200	B	6.1	5.0	mg/Kg	1	☼	6010B SEP	Step 7
Lead	4.3		1.2	0.27	mg/Kg	2	☼	6010B SEP	Step 7
Li	2.7	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 7
Aluminum	28000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	2.6		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	9000		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Lead	5.6		0.50	0.11	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	9.5		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Mo	0.22	J	2.0	0.082	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Aluminum	31000		120	19	mg/Kg	10	☼	6010B	Total/NA
Arsenic	2.2		1.2	0.32	mg/Kg	2	☼	6010B	Total/NA
Iron	9200		6.1	5.0	mg/Kg	1	☼	6010B	Total/NA
Lead	6.2		1.2	0.27	mg/Kg	2	☼	6010B	Total/NA
Lithium	4.8		3.0	0.18	mg/Kg	1	☼	6010B	Total/NA
Molybdenum	0.53	J	2.4	0.099	mg/Kg	1	☼	6010B	Total/NA
Aluminum	1200		3.5	1.6	mg/Kg	1	☼	EPA 6020A	Total/NA
Arsenic	0.60		0.12	0.030	mg/Kg	1	☼	EPA 6020A	Total/NA
Iron	4600		5.8	2.8	mg/Kg	1	☼	EPA 6020A	Total/NA
Lead	1.4		0.12	0.040	mg/Kg	1	☼	EPA 6020A	Total/NA
Lithium	2.5		0.58	0.32	mg/Kg	1	☼	EPA 6020A	Total/NA
Molybdenum	0.53	J	0.58	0.072	mg/Kg	1	☼	EPA 6020A	Total/NA

Client Sample ID: BH-01 (26-31) Lab Sample ID: 140-13229-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Iron	11	J *	18	10	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	15		12	2.5	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.62		0.60	0.16	mg/Kg	1	☼	6010B SEP	Step 3
Iron	230		6.0	3.5	mg/Kg	1	☼	6010B SEP	Step 3

This Detection Summary does not include radiochemical test results.

Detection Summary

Client Sample ID: BH-01 (26-31) (Continued) Lab Sample ID: 140-13229-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.50	J *	0.60	0.13	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	310		12	1.9	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	0.98	B	0.60	0.26	mg/Kg	1	☼	6010B SEP	Step 4
Iron	1200		6.0	3.5	mg/Kg	1	☼	6010B SEP	Step 4
Lead	0.91		0.60	0.13	mg/Kg	1	☼	6010B SEP	Step 4
Li	0.57	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	36	J *	180	28	mg/Kg	5	☼	6010B SEP	Step 5
Li	3.5	J B *	45	2.6	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	610		12	1.9	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.63		0.60	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Iron	1800		6.0	3.5	mg/Kg	1	☼	6010B SEP	Step 6
Lead	0.43	J	0.60	0.13	mg/Kg	1	☼	6010B SEP	Step 6
Li	1.1	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	32000		120	19	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	1.1		0.60	0.16	mg/Kg	1	☼	6010B SEP	Step 7
Iron	2200	B	6.0	4.9	mg/Kg	1	☼	6010B SEP	Step 7
Lead	11		0.60	0.13	mg/Kg	1	☼	6010B SEP	Step 7
Li	2.1	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 7
Aluminum	33000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	3.3		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	5400		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Lead	13		0.50	0.11	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	7.2		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Aluminum	54000		120	19	mg/Kg	10	☼	6010B	Total/NA
Arsenic	2.9		0.60	0.16	mg/Kg	1	☼	6010B	Total/NA
Iron	4500		6.0	4.9	mg/Kg	1	☼	6010B	Total/NA
Lead	17		0.60	0.13	mg/Kg	1	☼	6010B	Total/NA
Lithium	3.7		3.0	0.18	mg/Kg	1	☼	6010B	Total/NA
Aluminum	1200		3.7	1.8	mg/Kg	1	☼	EPA 6020A	Total/NA
Arsenic	1.3		0.12	0.032	mg/Kg	1	☼	EPA 6020A	Total/NA
Iron	3400		6.2	3.1	mg/Kg	1	☼	EPA 6020A	Total/NA
Lead	2.2		0.12	0.044	mg/Kg	1	☼	EPA 6020A	Total/NA
Lithium	1.5		0.62	0.34	mg/Kg	1	☼	EPA 6020A	Total/NA
Molybdenum	0.12	J	0.62	0.077	mg/Kg	1	☼	EPA 6020A	Total/NA

Client Sample ID: BH-01 (75-80) Lab Sample ID: 140-13229-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	8.7	J *	37	5.9	mg/Kg	3	☼	6010B SEP	Step 2
Iron	290	*	19	11	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	42		12	2.6	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.44	J	0.62	0.16	mg/Kg	1	☼	6010B SEP	Step 3
Iron	1100		6.2	3.6	mg/Kg	1	☼	6010B SEP	Step 3
Lead	0.26	J *	0.62	0.14	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	480		12	2.0	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	0.64	B	0.62	0.27	mg/Kg	1	☼	6010B SEP	Step 4
Iron	1700		6.2	3.6	mg/Kg	1	☼	6010B SEP	Step 4

This Detection Summary does not include radiochemical test results.

Client Sample ID: BH-01 (75-80) (Continued) Lab Sample ID: 140-13229-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.90		0.62	0.14	mg/Kg	1	☼	6010B SEP	Step 4
Li	0.97	J	3.1	0.19	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	40	J *	190	29	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	910		12	2.0	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.92		0.62	0.19	mg/Kg	1	☼	6010B SEP	Step 6
Iron	2700		6.2	3.6	mg/Kg	1	☼	6010B SEP	Step 6
Lead	0.44	J	0.62	0.14	mg/Kg	1	☼	6010B SEP	Step 6
Li	1.5	J	3.1	0.19	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	36000		120	20	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	1.4		1.2	0.32	mg/Kg	2	☼	6010B SEP	Step 7
Iron	2700	B	6.2	5.1	mg/Kg	1	☼	6010B SEP	Step 7
Lead	4.7		1.2	0.27	mg/Kg	2	☼	6010B SEP	Step 7
Li	2.8	J	3.1	0.19	mg/Kg	1	☼	6010B SEP	Step 7
Aluminum	38000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	3.4		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	8400		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Lead	6.3		0.50	0.11	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	5.3		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Aluminum	31000		120	20	mg/Kg	10	☼	6010B	Total/NA
Arsenic	4.3		1.2	0.32	mg/Kg	2	☼	6010B	Total/NA
Iron	8800		6.2	5.1	mg/Kg	1	☼	6010B	Total/NA
Lead	5.7		1.2	0.27	mg/Kg	2	☼	6010B	Total/NA
Lithium	5.3		3.1	0.19	mg/Kg	1	☼	6010B	Total/NA
Molybdenum	0.17	J	2.5	0.10	mg/Kg	1	☼	6010B	Total/NA
Aluminum	1200		3.6	1.7	mg/Kg	1	☼	EPA 6020A	Total/NA
Arsenic	2.3		0.12	0.031	mg/Kg	1	☼	EPA 6020A	Total/NA
Iron	4500		5.9	2.9	mg/Kg	1	☼	EPA 6020A	Total/NA
Lead	2.0		0.12	0.042	mg/Kg	1	☼	EPA 6020A	Total/NA
Lithium	2.1		0.59	0.33	mg/Kg	1	☼	EPA 6020A	Total/NA
Molybdenum	0.21	J	0.59	0.074	mg/Kg	1	☼	EPA 6020A	Total/NA

Client Sample ID: BH-01 (130-135) Lab Sample ID: 140-13229-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Iron	87	*	19	11	mg/Kg	3	☼	6010B SEP	Step 2
Li	0.58	J	9.5	0.57	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	26		13	2.6	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.19	J	0.63	0.16	mg/Kg	1	☼	6010B SEP	Step 3
Iron	610		6.3	3.7	mg/Kg	1	☼	6010B SEP	Step 3
Lead	0.18	J *	0.63	0.14	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	410		13	2.0	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	0.70	B	0.63	0.28	mg/Kg	1	☼	6010B SEP	Step 4
Iron	2100		6.3	3.7	mg/Kg	1	☼	6010B SEP	Step 4
Lead	0.93		0.63	0.14	mg/Kg	1	☼	6010B SEP	Step 4
Li	1.1	J	3.2	0.19	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	50	J *	190	30	mg/Kg	5	☼	6010B SEP	Step 5
Li	3.2	J B *	47	2.8	mg/Kg	5	☼	6010B SEP	Step 5

This Detection Summary does not include radiochemical test results.

Client Sample ID: BH-01 (130-135) (Continued) Lab Sample ID: 140-13229-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	830		13	2.0	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.60	J	0.63	0.19	mg/Kg	1	☼	6010B SEP	Step 6
Iron	3600		6.3	3.7	mg/Kg	1	☼	6010B SEP	Step 6
Lead	0.66		0.63	0.14	mg/Kg	1	☼	6010B SEP	Step 6
Li	1.4	J	3.2	0.19	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	24000		130	20	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	1.3		1.3	0.33	mg/Kg	2	☼	6010B SEP	Step 7
Iron	3500	B	6.3	5.2	mg/Kg	1	☼	6010B SEP	Step 7
Lead	3.9		1.3	0.28	mg/Kg	2	☼	6010B SEP	Step 7
Li	2.4	J	3.2	0.19	mg/Kg	1	☼	6010B SEP	Step 7
Aluminum	25000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	2.8		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	9800		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Lead	5.6		0.50	0.11	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	8.6		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Aluminum	28000		130	20	mg/Kg	10	☼	6010B	Total/NA
Arsenic	2.9		1.3	0.33	mg/Kg	2	☼	6010B	Total/NA
Iron	8700		6.3	5.2	mg/Kg	1	☼	6010B	Total/NA
Lead	6.3		1.3	0.28	mg/Kg	2	☼	6010B	Total/NA
Lithium	4.9		3.2	0.19	mg/Kg	1	☼	6010B	Total/NA
Molybdenum	0.16	J	2.5	0.10	mg/Kg	1	☼	6010B	Total/NA
Aluminum	1200		3.7	1.7	mg/Kg	1	☼	EPA 6020A	Total/NA
Arsenic	0.64		0.12	0.032	mg/Kg	1	☼	EPA 6020A	Total/NA
Iron	5100		6.1	3.0	mg/Kg	1	☼	EPA 6020A	Total/NA
Lead	1.7		0.12	0.043	mg/Kg	1	☼	EPA 6020A	Total/NA
Lithium	2.4		0.61	0.34	mg/Kg	1	☼	EPA 6020A	Total/NA
Molybdenum	0.23	J	0.61	0.076	mg/Kg	1	☼	EPA 6020A	Total/NA

Client Sample Results

Client Sample ID: BH-03 (30-32)

Lab Sample ID: 140-13229-1

Date Collected: 10/27/18 08:30
Matrix: Solid
Date Received: 11/01/18 12:00
Percent Solids: 86.6

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		46	7.4	mg/Kg	☼	11/14/18 08:00	11/17/18 10:56	4
Arsenic	ND		2.3	0.60	mg/Kg	☼	11/14/18 08:00	11/17/18 10:56	4
Iron	ND		23	13	mg/Kg	☼	11/14/18 08:00	11/17/18 10:56	4
Lead	ND		2.3	0.51	mg/Kg	☼	11/14/18 08:00	11/17/18 10:56	4
Li	ND		12	0.69	mg/Kg	☼	11/14/18 08:00	11/17/18 10:56	4
Mo	ND		9.2	0.38	mg/Kg	☼	11/14/18 08:00	11/17/18 10:56	4

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND	*	35	5.5	mg/Kg	☼	11/15/18 08:00	11/17/18 13:03	3
Arsenic	ND	*	1.7	0.45	mg/Kg	☼	11/15/18 08:00	11/17/18 13:03	3
Iron	**34**	*****	17	10	mg/Kg	☼	11/15/18 08:00	11/17/18 13:03	3
Lead	ND		1.7	0.38	mg/Kg	☼	11/15/18 08:00	11/17/18 13:03	3
Li	ND		8.7	0.52	mg/Kg	☼	11/15/18 08:00	11/17/18 13:03	3
Mo	ND		6.9	0.28	mg/Kg	☼	11/15/18 08:00	11/17/18 13:03	3

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**22**		12	2.4	mg/Kg	☼	11/16/18 08:00	11/19/18 13:48	1
Arsenic	**2.4**		0.58	0.15	mg/Kg	☼	11/16/18 08:00	11/19/18 13:48	1
Iron	**1400**		5.8	3.3	mg/Kg	☼	11/16/18 08:00	11/19/18 13:48	1
Lead	**0.80**	*****	0.58	0.13	mg/Kg	☼	11/16/18 08:00	11/19/18 13:48	1
Li	ND		2.9	0.17	mg/Kg	☼	11/16/18 08:00	11/19/18 13:48	1
Mo	ND		2.3	0.095	mg/Kg	☼	11/16/18 08:00	11/19/18 13:48	1

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**490**		12	1.8	mg/Kg	☼	11/17/18 08:00	11/19/18 15:53	1
Arsenic	**1.9**	**B**	0.58	0.25	mg/Kg	☼	11/17/18 08:00	11/19/18 15:53	1
Iron	**2000**		5.8	3.3	mg/Kg	☼	11/17/18 08:00	11/19/18 15:53	1
Lead	**1.5**		0.58	0.13	mg/Kg	☼	11/17/18 08:00	11/19/18 15:53	1
Li	**0.91**	**J**	2.9	0.17	mg/Kg	☼	11/17/18 08:00	11/19/18 15:53	1
Mo	ND		2.3	0.095	mg/Kg	☼	11/17/18 08:00	11/19/18 15:53	1

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**29**	**J ***	170	27	mg/Kg	☼	11/20/18 08:00	11/26/18 11:35	5
Arsenic	ND		8.7	2.2	mg/Kg	☼	11/20/18 08:00	11/26/18 11:35	5
Iron	ND	*	87	51	mg/Kg	☼	11/20/18 08:00	11/26/18 11:35	5
Lead	ND	*	8.7	1.9	mg/Kg	☼	11/20/18 08:00	11/26/18 11:35	5
Li	**3.8**	**J B ***	43	2.5	mg/Kg	☼	11/20/18 08:00	11/26/18 11:35	5
Mo	ND		35	1.4	mg/Kg	☼	11/20/18 08:00	11/26/18 11:35	5

Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**690**		12	1.8	mg/Kg	☼	11/20/18 09:43	11/26/18 13:42	1
Arsenic	**1.1**		0.58	0.17	mg/Kg	☼	11/20/18 09:43	11/26/18 13:42	1
Iron	**2700**		5.8	3.3	mg/Kg	☼	11/20/18 09:43	11/26/18 13:42	1
Lead	**0.50**	**J**	0.58	0.13	mg/Kg	☼	11/20/18 09:43	11/26/18 13:42	1
Li	**0.93**	**J**	2.9	0.17	mg/Kg	☼	11/20/18 09:43	11/26/18 13:42	1

Client Sample Results

Client Sample ID: BH-03 (30-32)

Date Collected: 10/27/18 08:30
Date Received: 11/01/18 12:00

Lab Sample ID: 140-13229-1

Matrix: Solid
Percent Solids: 86.6

Method: 6010B SEP - SEP Metals (ICP) - Step 6 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mo	ND		2.3	0.11	mg/Kg	☼	11/20/18 09:43	11/26/18 13:42	1

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**29000**		120	18	mg/Kg	☼	11/21/18 07:44	11/28/18 16:14	10
Arsenic	**2.1**		1.2	0.30	mg/Kg	☼	11/21/18 07:44	11/28/18 19:34	2
Iron	**3800**	**B**	5.8	4.7	mg/Kg	☼	11/21/18 07:44	11/28/18 12:11	1
Lead	**8.0**		1.2	0.25	mg/Kg	☼	11/21/18 07:44	11/28/18 19:34	2
Li	**3.3**		2.9	0.17	mg/Kg	☼	11/21/18 07:44	11/28/18 12:11	1
Mo	**0.20**	**J**	2.3	0.095	mg/Kg	☼	11/21/18 07:44	11/28/18 12:11	1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**30000**		10	1.6	mg/Kg			11/29/18 14:47	1
Arsenic	**7.5**		0.50	0.13	mg/Kg			11/29/18 14:47	1
Iron	**10000**		5.0	4.1	mg/Kg			11/29/18 14:47	1
Lead	**11**		0.50	0.11	mg/Kg			11/29/18 14:47	1
Li	**9.0**		2.5	0.15	mg/Kg			11/29/18 14:47	1
Mo	**0.20**	**J**	2.0	0.082	mg/Kg			11/29/18 14:47	1

Method: 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**33000**		120	18	mg/Kg	☼	11/12/18 08:00	11/28/18 17:48	10
Arsenic	**8.2**		1.2	0.30	mg/Kg	☼	11/12/18 08:00	11/28/18 20:40	2
Iron	**11000**		5.8	4.7	mg/Kg	☼	11/12/18 08:00	11/28/18 14:07	1
Lead	**9.8**		1.2	0.25	mg/Kg	☼	11/12/18 08:00	11/28/18 20:40	2
Lithium	**5.2**		2.9	0.17	mg/Kg	☼	11/12/18 08:00	11/28/18 14:07	1
Molybdenum	ND		2.3	0.095	mg/Kg	☼	11/12/18 08:00	11/28/18 14:07	1

Method: EPA 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1100**		3.5	1.7	mg/Kg	☼	11/21/18 14:04	11/28/18 20:07	1
Arsenic	**1.8**		0.12	0.031	mg/Kg	☼	11/21/18 14:04	11/28/18 20:07	1
Iron	**4500**		5.9	2.9	mg/Kg	☼	11/21/18 14:04	11/28/18 20:07	1
Lead	**2.1**		0.12	0.041	mg/Kg	☼	11/21/18 14:04	11/28/18 20:07	1
Lithium	**1.9**		0.59	0.33	mg/Kg	☼	11/21/18 14:04	11/28/18 20:07	1
Molybdenum	**0.094**	**J**	0.59	0.073	mg/Kg	☼	11/21/18 14:04	11/28/18 20:07	1

Client Sample Results

Client Sample ID: BH-03 (70-75)

Lab Sample ID: 140-13229-2

Date Collected: 10/27/18 12:15
Date Received: 11/01/18 12:00
Matrix: Solid
Percent Solids: 84.2

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		48	7.6	mg/Kg	☼	11/14/18 08:00	11/17/18 11:01	4
Arsenic	ND		2.4	0.62	mg/Kg	☼	11/14/18 08:00	11/17/18 11:01	4
Iron	ND		24	14	mg/Kg	☼	11/14/18 08:00	11/17/18 11:01	4
Lead	ND		2.4	0.52	mg/Kg	☼	11/14/18 08:00	11/17/18 11:01	4
Li	ND		12	0.71	mg/Kg	☼	11/14/18 08:00	11/17/18 11:01	4
Mo	ND		9.5	0.39	mg/Kg	☼	11/14/18 08:00	11/17/18 11:01	4

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**6.0**	**J ***	36	5.7	mg/Kg	☼	11/15/18 08:00	11/17/18 13:08	3
Arsenic	ND	*	1.8	0.46	mg/Kg	☼	11/15/18 08:00	11/17/18 13:08	3
Iron	**60**	*****	18	10	mg/Kg	☼	11/15/18 08:00	11/17/18 13:08	3
Lead	ND		1.8	0.39	mg/Kg	☼	11/15/18 08:00	11/17/18 13:08	3
Li	ND		8.9	0.53	mg/Kg	☼	11/15/18 08:00	11/17/18 13:08	3
Mo	ND		7.1	0.29	mg/Kg	☼	11/15/18 08:00	11/17/18 13:08	3

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**28**		12	2.5	mg/Kg	☼	11/16/18 08:00	11/19/18 13:53	1
Arsenic	**0.34**	**J**	0.59	0.15	mg/Kg	☼	11/16/18 08:00	11/19/18 13:53	1
Iron	**460**		5.9	3.4	mg/Kg	☼	11/16/18 08:00	11/19/18 13:53	1
Lead	**0.27**	**J ***	0.59	0.13	mg/Kg	☼	11/16/18 08:00	11/19/18 13:53	1
Li	ND		3.0	0.18	mg/Kg	☼	11/16/18 08:00	11/19/18 13:53	1
Mo	ND		2.4	0.097	mg/Kg	☼	11/16/18 08:00	11/19/18 13:53	1

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**330**		12	1.9	mg/Kg	☼	11/17/18 08:00	11/19/18 15:58	1
Arsenic	**0.65**	**B**	0.59	0.26	mg/Kg	☼	11/17/18 08:00	11/19/18 15:58	1
Iron	**1100**		5.9	3.4	mg/Kg	☼	11/17/18 08:00	11/19/18 15:58	1
Lead	**0.82**		0.59	0.13	mg/Kg	☼	11/17/18 08:00	11/19/18 15:58	1
Li	**0.71**	**J**	3.0	0.18	mg/Kg	☼	11/17/18 08:00	11/19/18 15:58	1
Mo	ND		2.4	0.097	mg/Kg	☼	11/17/18 08:00	11/19/18 15:58	1

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**38**	**J ***	180	28	mg/Kg	☼	11/20/18 08:00	11/26/18 11:40	5
Arsenic	ND		8.9	2.3	mg/Kg	☼	11/20/18 08:00	11/26/18 11:40	5
Iron	ND	*	89	52	mg/Kg	☼	11/20/18 08:00	11/26/18 11:40	5
Lead	ND	*	8.9	2.0	mg/Kg	☼	11/20/18 08:00	11/26/18 11:40	5
Li	**3.7**	**J B ***	45	2.6	mg/Kg	☼	11/20/18 08:00	11/26/18 11:40	5
Mo	ND		36	1.5	mg/Kg	☼	11/20/18 08:00	11/26/18 11:40	5

Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**470**		12	1.9	mg/Kg	☼	11/20/18 09:43	11/26/18 13:47	1
Arsenic	**0.65**		0.59	0.18	mg/Kg	☼	11/20/18 09:43	11/26/18 13:47	1
Iron	**1500**		5.9	3.4	mg/Kg	☼	11/20/18 09:43	11/26/18 13:47	1
Lead	**0.39**	**J**	0.59	0.13	mg/Kg	☼	11/20/18 09:43	11/26/18 13:47	1
Li	**0.79**	**J**	3.0	0.18	mg/Kg	☼	11/20/18 09:43	11/26/18 13:47	1

Client Sample ID: BH-03 (70-75)

Lab Sample ID: 140-13229-2

Date Collected: 10/27/18 12:15
Matrix: Solid
Date Received: 11/01/18 12:00
Percent Solids: 84.2

Method: 6010B SEP - SEP Metals (ICP) - Step 6 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mo	ND		2.4	0.12	mg/Kg	☼	11/20/18 09:43	11/26/18 13:47	1

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**29000**		120	19	mg/Kg	☼	11/21/18 07:44	11/28/18 16:19	10
Arsenic	**0.88**		0.59	0.15	mg/Kg	☼	11/21/18 07:44	11/28/18 12:17	1
Iron	**1600**	**B**	5.9	4.9	mg/Kg	☼	11/21/18 07:44	11/28/18 12:17	1
Lead	**6.8**		0.59	0.13	mg/Kg	☼	11/21/18 07:44	11/28/18 12:17	1
Li	**2.3**	**J**	3.0	0.18	mg/Kg	☼	11/21/18 07:44	11/28/18 12:17	1
Mo	ND		2.4	0.097	mg/Kg	☼	11/21/18 07:44	11/28/18 12:17	1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**30000**		10	1.6	mg/Kg			11/29/18 14:47	1
Arsenic	**2.5**		0.50	0.13	mg/Kg			11/29/18 14:47	1
Iron	**4700**		5.0	4.1	mg/Kg			11/29/18 14:47	1
Lead	**8.3**		0.50	0.11	mg/Kg			11/29/18 14:47	1
Li	**7.5**		2.5	0.15	mg/Kg			11/29/18 14:47	1
Mo	ND		2.0	0.082	mg/Kg			11/29/18 14:47	1

Method: 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**32000**		120	19	mg/Kg	☼	11/12/18 08:00	11/28/18 18:08	10
Arsenic	**5.3**		1.2	0.31	mg/Kg	☼	11/12/18 08:00	11/28/18 20:45	2
Iron	**6300**		5.9	4.9	mg/Kg	☼	11/12/18 08:00	11/28/18 14:13	1
Lead	**8.9**		1.2	0.26	mg/Kg	☼	11/12/18 08:00	11/28/18 20:45	2
Lithium	**4.4**		3.0	0.18	mg/Kg	☼	11/12/18 08:00	11/28/18 14:13	1
Molybdenum	**0.19**	**J**	2.4	0.097	mg/Kg	☼	11/12/18 08:00	11/28/18 14:13	1

Method: EPA 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1000**		3.5	1.7	mg/Kg	☼	11/21/18 14:04	11/28/18 20:12	1
Arsenic	**15**		0.12	0.030	mg/Kg	☼	11/21/18 14:04	11/28/18 20:12	1
Iron	**4400**		5.8	2.9	mg/Kg	☼	11/21/18 14:04	11/28/18 20:12	1
Lead	**5.6**		0.12	0.041	mg/Kg	☼	11/21/18 14:04	11/28/18 20:12	1
Lithium	**1.8**		0.58	0.32	mg/Kg	☼	11/21/18 14:04	11/28/18 20:12	1
Molybdenum	**0.20**	**J**	0.58	0.072	mg/Kg	☼	11/21/18 14:04	11/28/18 20:12	1

Client Sample ID: BH-03 (110-115)

Lab Sample ID: 140-13229-3

Date Collected: 10/27/18 16:20
Date Received: 11/01/18 12:00
Matrix: Solid
Percent Solids: 85.7

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		47	7.5	mg/Kg	☼	11/14/18 08:00	11/17/18 11:06	4
Arsenic	ND		2.3	0.61	mg/Kg	☼	11/14/18 08:00	11/17/18 11:06	4
Iron	ND		23	14	mg/Kg	☼	11/14/18 08:00	11/17/18 11:06	4
Lead	ND		2.3	0.51	mg/Kg	☼	11/14/18 08:00	11/17/18 11:06	4
Li	ND		12	0.70	mg/Kg	☼	11/14/18 08:00	11/17/18 11:06	4
Mo	ND		9.3	0.38	mg/Kg	☼	11/14/18 08:00	11/17/18 11:06	4

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**9.3**	**J ***	35	5.6	mg/Kg	☼	11/15/18 08:00	11/17/18 13:13	3
Arsenic	ND	*	1.8	0.46	mg/Kg	☼	11/15/18 08:00	11/17/18 13:13	3
Iron	**83**	*****	18	10	mg/Kg	☼	11/15/18 08:00	11/17/18 13:13	3
Lead	ND		1.8	0.39	mg/Kg	☼	11/15/18 08:00	11/17/18 13:13	3
Li	**0.84**	**J**	8.8	0.53	mg/Kg	☼	11/15/18 08:00	11/17/18 13:13	3
Mo	ND		7.0	0.29	mg/Kg	☼	11/15/18 08:00	11/17/18 13:13	3

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**22**		12	2.5	mg/Kg	☼	11/16/18 08:00	11/19/18 13:58	1
Arsenic	**0.36**	**J**	0.58	0.15	mg/Kg	☼	11/16/18 08:00	11/19/18 13:58	1
Iron	**440**		5.8	3.4	mg/Kg	☼	11/16/18 08:00	11/19/18 13:58	1
Lead	ND	*	0.58	0.13	mg/Kg	☼	11/16/18 08:00	11/19/18 13:58	1
Li	ND		2.9	0.18	mg/Kg	☼	11/16/18 08:00	11/19/18 13:58	1
Mo	**0.67**	**J**	2.3	0.096	mg/Kg	☼	11/16/18 08:00	11/19/18 13:58	1

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**290**		12	1.9	mg/Kg	☼	11/17/18 08:00	11/19/18 16:03	1
Arsenic	**0.66**	**B**	0.58	0.26	mg/Kg	☼	11/17/18 08:00	11/19/18 16:03	1
Iron	**1300**		5.8	3.4	mg/Kg	☼	11/17/18 08:00	11/19/18 16:03	1
Lead	**0.69**		0.58	0.13	mg/Kg	☼	11/17/18 08:00	11/19/18 16:03	1
Li	**0.86**	**J**	2.9	0.18	mg/Kg	☼	11/17/18 08:00	11/19/18 16:03	1
Mo	**0.41**	**J**	2.3	0.096	mg/Kg	☼	11/17/18 08:00	11/19/18 16:03	1

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**42**	**J ***	180	27	mg/Kg	☼	11/20/18 08:00	11/26/18 11:45	5
Arsenic	ND		8.8	2.2	mg/Kg	☼	11/20/18 08:00	11/26/18 11:45	5
Iron	ND	*	88	51	mg/Kg	☼	11/20/18 08:00	11/26/18 11:45	5
Lead	ND	*	8.8	1.9	mg/Kg	☼	11/20/18 08:00	11/26/18 11:45	5
Li	**4.4**	**J B ***	44	2.6	mg/Kg	☼	11/20/18 08:00	11/26/18 11:45	5
Mo	ND		35	1.5	mg/Kg	☼	11/20/18 08:00	11/26/18 11:45	5

Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1000**		12	1.9	mg/Kg	☼	11/20/18 09:43	11/26/18 13:52	1
Arsenic	**0.65**		0.58	0.18	mg/Kg	☼	11/20/18 09:43	11/26/18 13:52	1
Iron	**3400**		5.8	3.4	mg/Kg	☼	11/20/18 09:43	11/26/18 13:52	1
Lead	**0.57**	**J**	0.58	0.13	mg/Kg	☼	11/20/18 09:43	11/26/18 13:52	1
Li	**1.9**	**J**	2.9	0.18	mg/Kg	☼	11/20/18 09:43	11/26/18 13:52	1

Client Sample ID: BH-03 (110-115)

Lab Sample ID: 140-13229-3

Date Collected: 10/27/18 16:20

Matrix: Solid

Date Received: 11/01/18 12:00

Percent Solids: 85.7

Method: 6010B SEP - SEP Metals (ICP) - Step 6 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mo	ND		2.3	0.12	mg/Kg	☼	11/20/18 09:43	11/26/18 13:52	1

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**33000**		120	19	mg/Kg	☼	11/21/18 07:44	11/28/18 16:24	10
Arsenic	**1.2**		1.2	0.30	mg/Kg	☼	11/21/18 07:44	11/28/18 19:39	2
Iron	**4900**	**B**	5.8	4.8	mg/Kg	☼	11/21/18 07:44	11/28/18 12:22	1
Lead	**4.6**		1.2	0.26	mg/Kg	☼	11/21/18 07:44	11/28/18 19:39	2
Li	**2.9**		2.9	0.18	mg/Kg	☼	11/21/18 07:44	11/28/18 12:22	1
Mo	**0.19**	**J**	2.3	0.096	mg/Kg	☼	11/21/18 07:44	11/28/18 12:22	1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**34000**		10	1.6	mg/Kg			11/29/18 14:47	1
Arsenic	**2.9**		0.50	0.13	mg/Kg			11/29/18 14:47	1
Iron	**10000**		5.0	4.1	mg/Kg			11/29/18 14:47	1
Lead	**5.9**		0.50	0.11	mg/Kg			11/29/18 14:47	1
Li	**11**		2.5	0.15	mg/Kg			11/29/18 14:47	1
Mo	**1.3**	**J**	2.0	0.082	mg/Kg			11/29/18 14:47	1

Method: 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**28000**		120	19	mg/Kg	☼	11/12/18 08:00	11/28/18 18:13	10
Arsenic	**4.3**		1.2	0.30	mg/Kg	☼	11/12/18 08:00	11/28/18 20:50	2
Iron	**9800**		5.8	4.8	mg/Kg	☼	11/12/18 08:00	11/28/18 14:18	1
Lead	**5.1**		1.2	0.26	mg/Kg	☼	11/12/18 08:00	11/28/18 20:50	2
Lithium	**5.8**		2.9	0.18	mg/Kg	☼	11/12/18 08:00	11/28/18 14:18	1
Molybdenum	**1.8**	**J**	2.3	0.096	mg/Kg	☼	11/12/18 08:00	11/28/18 14:18	1

Method: EPA 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1200**		3.6	1.7	mg/Kg	☼	11/21/18 14:04	11/28/18 20:17	1
Arsenic	**1.2**		0.12	0.031	mg/Kg	☼	11/21/18 14:04	11/28/18 20:17	1
Iron	**3800**		6.0	2.9	mg/Kg	☼	11/21/18 14:04	11/28/18 20:17	1
Lead	**1.0**		0.12	0.042	mg/Kg	☼	11/21/18 14:04	11/28/18 20:17	1
Lithium	**2.5**		0.60	0.33	mg/Kg	☼	11/21/18 14:04	11/28/18 20:17	1
Molybdenum	**0.42**	**J**	0.60	0.074	mg/Kg	☼	11/21/18 14:04	11/28/18 20:17	1

Client Sample Results

Client: Golder Associates Inc.	TestAmerica Job ID: 140-13229-1
Project/Site: Rush Island Energy Center - Soil & Speci

Client Sample ID: DUP-1 — Lab Sample ID: 140-13229-4

Date Collected: 10/27/18 00:00
Date Received: 11/01/18 12:00
Matrix: Solid
Percent Solids: 84.0

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		48	7.6	mg/Kg	☼	11/14/18 08:00	11/17/18 11:12	4
Arsenic	ND		2.4	0.62	mg/Kg	☼	11/14/18 08:00	11/17/18 11:12	4
Iron	ND		24	14	mg/Kg	☼	11/14/18 08:00	11/17/18 11:12	4
Lead	ND		2.4	0.52	mg/Kg	☼	11/14/18 08:00	11/17/18 11:12	4
Li	ND		12	0.71	mg/Kg	☼	11/14/18 08:00	11/17/18 11:12	4
Mo	ND		9.5	0.39	mg/Kg	☼	11/14/18 08:00	11/17/18 11:12	4

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**6.5**	**J ***	36	5.7	mg/Kg	☼	11/15/18 08:00	11/17/18 13:18	3
Arsenic	ND	*	1.8	0.46	mg/Kg	☼	11/15/18 08:00	11/17/18 13:18	3
Iron	**110**	*****	18	10	mg/Kg	☼	11/15/18 08:00	11/17/18 13:18	3
Lead	ND		1.8	0.39	mg/Kg	☼	11/15/18 08:00	11/17/18 13:18	3
Li	**0.78**	**J**	8.9	0.54	mg/Kg	☼	11/15/18 08:00	11/17/18 13:18	3
Mo	ND		7.1	0.29	mg/Kg	☼	11/15/18 08:00	11/17/18 13:18	3

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**23**		12	2.5	mg/Kg	☼	11/16/18 08:00	11/19/18 14:03	1
Arsenic	**0.38**	**J**	0.59	0.15	mg/Kg	☼	11/16/18 08:00	11/19/18 14:03	1
Iron	**580**		5.9	3.5	mg/Kg	☼	11/16/18 08:00	11/19/18 14:03	1
Lead	ND	*	0.59	0.13	mg/Kg	☼	11/16/18 08:00	11/19/18 14:03	1
Li	ND		3.0	0.18	mg/Kg	☼	11/16/18 08:00	11/19/18 14:03	1
Mo	**1.3**	**J**	2.4	0.098	mg/Kg	☼	11/16/18 08:00	11/19/18 14:03	1

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**370**		12	1.9	mg/Kg	☼	11/17/18 08:00	11/19/18 16:08	1
Arsenic	**0.95**	**B**	0.59	0.26	mg/Kg	☼	11/17/18 08:00	11/19/18 16:08	1
Iron	**1600**		5.9	3.5	mg/Kg	☼	11/17/18 08:00	11/19/18 16:08	1
Lead	**0.64**		0.59	0.13	mg/Kg	☼	11/17/18 08:00	11/19/18 16:08	1
Li	**0.99**	**J**	3.0	0.18	mg/Kg	☼	11/17/18 08:00	11/19/18 16:08	1
Mo	**0.68**	**J**	2.4	0.098	mg/Kg	☼	11/17/18 08:00	11/19/18 16:08	1

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**38**	**J ***	180	28	mg/Kg	☼	11/20/18 08:00	11/26/18 11:50	5
Arsenic	ND		8.9	2.3	mg/Kg	☼	11/20/18 08:00	11/26/18 11:50	5
Iron	ND	*	89	52	mg/Kg	☼	11/20/18 08:00	11/26/18 11:50	5
Lead	ND	*	8.9	2.0	mg/Kg	☼	11/20/18 08:00	11/26/18 11:50	5
Li	**3.3**	**J B ***	45	2.6	mg/Kg	☼	11/20/18 08:00	11/26/18 11:50	5
Mo	ND		36	1.5	mg/Kg	☼	11/20/18 08:00	11/26/18 11:50	5

Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**900**		12	1.9	mg/Kg	☼	11/20/18 09:43	11/26/18 13:57	1
Arsenic	**0.78**		0.59	0.18	mg/Kg	☼	11/20/18 09:43	11/26/18 13:57	1
Iron	**3500**		5.9	3.5	mg/Kg	☼	11/20/18 09:43	11/26/18 13:57	1
Lead	**0.43**	**J**	0.59	0.13	mg/Kg	☼	11/20/18 09:43	11/26/18 13:57	1
Li	**1.7**	**J**	3.0	0.18	mg/Kg	☼	11/20/18 09:43	11/26/18 13:57	1

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Client Sample ID: DUP-1
Date Collected: 10/27/18 00:00
Date Received: 11/01/18 12:00

Lab Sample ID: 140-13229-4
Matrix: Solid
Percent Solids: 84.0

Method: 6010B SEP - SEP Metals (ICP) - Step 6 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mo	ND		2.4	0.12	mg/Kg	☼	11/20/18 09:43	11/26/18 13:57	1

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**27000**		120	19	mg/Kg	☼	11/21/18 07:44	11/28/18 16:29	10
Arsenic	**1.2**		1.2	0.31	mg/Kg	☼	11/21/18 07:44	11/28/18 19:44	2
Iron	**3100**	**B**	5.9	4.9	mg/Kg	☼	11/21/18 07:44	11/28/18 12:27	1
Lead	**4.4**		1.2	0.26	mg/Kg	☼	11/21/18 07:44	11/28/18 19:44	2
Li	**3.1**		3.0	0.18	mg/Kg	☼	11/21/18 07:44	11/28/18 12:27	1
Mo	ND		2.4	0.098	mg/Kg	☼	11/21/18 07:44	11/28/18 12:27	1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**29000**		10	1.6	mg/Kg			11/29/18 14:47	1
Arsenic	**3.3**		0.50	0.13	mg/Kg			11/29/18 14:47	1
Iron	**8900**		5.0	4.1	mg/Kg			11/29/18 14:47	1
Lead	**5.4**		0.50	0.11	mg/Kg			11/29/18 14:47	1
Li	**9.8**		2.5	0.15	mg/Kg			11/29/18 14:47	1
Mo	**2.0**		2.0	0.082	mg/Kg			11/29/18 14:47	1

Method: 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**33000**		120	19	mg/Kg	☼	11/12/18 08:00	11/28/18 18:18	10
Arsenic	**3.0**		1.2	0.31	mg/Kg	☼	11/12/18 08:00	11/28/18 20:56	2
Iron	**10000**		5.9	4.9	mg/Kg	☼	11/12/18 08:00	11/28/18 14:24	1
Lead	**4.8**		1.2	0.26	mg/Kg	☼	11/12/18 08:00	11/28/18 20:56	2
Lithium	**6.4**		3.0	0.18	mg/Kg	☼	11/12/18 08:00	11/28/18 14:24	1
Molybdenum	**2.4**		2.4	0.098	mg/Kg	☼	11/12/18 08:00	11/28/18 14:24	1

Method: EPA 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1300**		3.5	1.7	mg/Kg	☼	11/21/18 14:04	11/28/18 20:21	1
Arsenic	**1.1**		0.12	0.030	mg/Kg	☼	11/21/18 14:04	11/28/18 20:21	1
Iron	**4000**		5.8	2.9	mg/Kg	☼	11/21/18 14:04	11/28/18 20:21	1
Lead	**1.1**		0.12	0.041	mg/Kg	☼	11/21/18 14:04	11/28/18 20:21	1
Lithium	**2.8**		0.58	0.32	mg/Kg	☼	11/21/18 14:04	11/28/18 20:21	1
Molybdenum	**0.44**	**J**	0.58	0.072	mg/Kg	☼	11/21/18 14:04	11/28/18 20:21	1

Client Sample ID: BH-02 (41-45) Lab Sample ID: 140-13229-5

Date Collected: 10/28/18 15:50 **Matrix: Solid**
Date Received: 11/01/18 12:00 **Percent Solids: 82.6**

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		48	7.7	mg/Kg	☼	11/14/18 08:00	11/17/18 11:17	4
Arsenic	ND		2.4	0.63	mg/Kg	☼	11/14/18 08:00	11/17/18 11:17	4
Iron	ND		24	14	mg/Kg	☼	11/14/18 08:00	11/17/18 11:17	4
Lead	ND		2.4	0.53	mg/Kg	☼	11/14/18 08:00	11/17/18 11:17	4
Li	ND		12	0.73	mg/Kg	☼	11/14/18 08:00	11/17/18 11:17	4
Mo	ND		9.7	0.40	mg/Kg	☼	11/14/18 08:00	11/17/18 11:17	4

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**14**	**J ***	36	5.8	mg/Kg	☼	11/15/18 08:00	11/17/18 13:23	3
Arsenic	ND	*	1.8	0.47	mg/Kg	☼	11/15/18 08:00	11/17/18 13:23	3
Iron	**290**	*****	18	11	mg/Kg	☼	11/15/18 08:00	11/17/18 13:23	3
Lead	**0.81**	**J**	1.8	0.40	mg/Kg	☼	11/15/18 08:00	11/17/18 13:23	3
Li	ND		9.1	0.54	mg/Kg	☼	11/15/18 08:00	11/17/18 13:23	3
Mo	ND		7.3	0.30	mg/Kg	☼	11/15/18 08:00	11/17/18 13:23	3

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**63**		12	2.5	mg/Kg	☼	11/16/18 08:00	11/19/18 14:08	1
Arsenic	**0.84**		0.60	0.16	mg/Kg	☼	11/16/18 08:00	11/19/18 14:08	1
Iron	**970**		6.0	3.5	mg/Kg	☼	11/16/18 08:00	11/19/18 14:08	1
Lead	**0.35**	**J ***	0.60	0.13	mg/Kg	☼	11/16/18 08:00	11/19/18 14:08	1
Li	ND		3.0	0.18	mg/Kg	☼	11/16/18 08:00	11/19/18 14:08	1
Mo	ND		2.4	0.099	mg/Kg	☼	11/16/18 08:00	11/19/18 14:08	1

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**550**		12	1.9	mg/Kg	☼	11/17/18 08:00	11/19/18 16:13	1
Arsenic	**1.2**	**B**	0.60	0.27	mg/Kg	☼	11/17/18 08:00	11/19/18 16:13	1
Iron	**1900**		6.0	3.5	mg/Kg	☼	11/17/18 08:00	11/19/18 16:13	1
Lead	**1.8**		0.60	0.13	mg/Kg	☼	11/17/18 08:00	11/19/18 16:13	1
Li	**1.2**	**J**	3.0	0.18	mg/Kg	☼	11/17/18 08:00	11/19/18 16:13	1
Mo	ND		2.4	0.099	mg/Kg	☼	11/17/18 08:00	11/19/18 16:13	1

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**33**	**J ***	180	28	mg/Kg	☼	11/20/18 08:00	11/26/18 11:56	5
Arsenic	ND		9.1	2.3	mg/Kg	☼	11/20/18 08:00	11/26/18 11:56	5
Iron	ND	*	91	53	mg/Kg	☼	11/20/18 08:00	11/26/18 11:56	5
Lead	ND	*	9.1	2.0	mg/Kg	☼	11/20/18 08:00	11/26/18 11:56	5
Li	**4.4**	**J B ***	45	2.7	mg/Kg	☼	11/20/18 08:00	11/26/18 11:56	5
Mo	ND		36	1.5	mg/Kg	☼	11/20/18 08:00	11/26/18 11:56	5

Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1200**		12	1.9	mg/Kg	☼	11/20/18 09:43	11/26/18 14:02	1
Arsenic	**1.0**		0.60	0.18	mg/Kg	☼	11/20/18 09:43	11/26/18 14:02	1
Iron	**2600**		6.0	3.5	mg/Kg	☼	11/20/18 09:43	11/26/18 14:02	1
Lead	**0.92**		0.60	0.13	mg/Kg	☼	11/20/18 09:43	11/26/18 14:02	1
Li	**1.6**	**J**	3.0	0.18	mg/Kg	☼	11/20/18 09:43	11/26/18 14:02	1

Client Sample ID: BH-02 (41-45)

Date Collected: 10/28/18 15:50
Date Received: 11/01/18 12:00

Lab Sample ID: 140-13229-5

Matrix: Solid
Percent Solids: 82.6

Method: 6010B SEP - SEP Metals (ICP) - Step 6 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mo	ND		2.4	0.12	mg/Kg	☼	11/20/18 09:43	11/26/18 14:02	1

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**30000**		120	19	mg/Kg	☼	11/21/18 07:44	11/28/18 16:34	10
Arsenic	**1.8**		0.60	0.16	mg/Kg	☼	11/21/18 07:44	11/28/18 12:33	1
Iron	**2600**	**B**	6.0	5.0	mg/Kg	☼	11/21/18 07:44	11/28/18 12:33	1
Lead	**5.7**		0.60	0.13	mg/Kg	☼	11/21/18 07:44	11/28/18 12:33	1
Li	**4.2**		3.0	0.18	mg/Kg	☼	11/21/18 07:44	11/28/18 12:33	1
Mo	ND		2.4	0.099	mg/Kg	☼	11/21/18 07:44	11/28/18 12:33	1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**32000**		10	1.6	mg/Kg			11/29/18 14:47	1
Arsenic	**4.9**		0.50	0.13	mg/Kg			11/29/18 14:47	1
Iron	**8400**		5.0	4.1	mg/Kg			11/29/18 14:47	1
Lead	**9.5**		0.50	0.11	mg/Kg			11/29/18 14:47	1
Li	**11**		2.5	0.15	mg/Kg			11/29/18 14:47	1
Mo	ND		2.0	0.082	mg/Kg			11/29/18 14:47	1

Method: 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**37000**		120	19	mg/Kg	☼	11/12/18 08:00	11/28/18 18:23	10
Arsenic	**4.2**		0.60	0.16	mg/Kg	☼	11/12/18 08:00	11/28/18 14:30	1
Iron	**8600**		6.0	5.0	mg/Kg	☼	11/12/18 08:00	11/28/18 14:30	1
Lead	**9.1**		0.60	0.13	mg/Kg	☼	11/12/18 08:00	11/28/18 14:30	1
Lithium	**7.5**		3.0	0.18	mg/Kg	☼	11/12/18 08:00	11/28/18 14:30	1
Molybdenum	**0.25**	**J**	2.4	0.099	mg/Kg	☼	11/12/18 08:00	11/28/18 14:30	1

Method: EPA 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**2100**		3.8	1.8	mg/Kg	☼	11/21/18 14:04	11/28/18 20:26	1
Arsenic	**1.7**		0.13	0.033	mg/Kg	☼	11/21/18 14:04	11/28/18 20:26	1
Iron	**5600**		6.3	3.1	mg/Kg	☼	11/21/18 14:04	11/28/18 20:26	1
Lead	**3.8**		0.13	0.044	mg/Kg	☼	11/21/18 14:04	11/28/18 20:26	1
Lithium	**3.3**		0.63	0.35	mg/Kg	☼	11/21/18 14:04	11/28/18 20:26	1
Molybdenum	**0.18**	**J**	0.63	0.078	mg/Kg	☼	11/21/18 14:04	11/28/18 20:26	1

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Client Sample ID: BH-02 (72-75)

Lab Sample ID: 140-13229-6

Date Collected: 10/28/18 16:50

Matrix: Solid

Date Received: 11/01/18 12:00

Percent Solids: 86.5

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		46	7.4	mg/Kg	☼	11/14/18 08:00	11/17/18 11:22	4
Arsenic	ND		2.3	0.60	mg/Kg	☼	11/14/18 08:00	11/17/18 11:22	4
Iron	ND		23	13	mg/Kg	☼	11/14/18 08:00	11/17/18 11:22	4
Lead	ND		2.3	0.51	mg/Kg	☼	11/14/18 08:00	11/17/18 11:22	4
Li	ND		12	0.69	mg/Kg	☼	11/14/18 08:00	11/17/18 11:22	4
Mo	ND		9.2	0.38	mg/Kg	☼	11/14/18 08:00	11/17/18 11:22	4

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**6.1**	**J ***	35	5.5	mg/Kg	☼	11/15/18 08:00	11/17/18 13:28	3
Arsenic	ND	*	1.7	0.45	mg/Kg	☼	11/15/18 08:00	11/17/18 13:28	3
Iron	**180**	*****	17	10	mg/Kg	☼	11/15/18 08:00	11/17/18 13:28	3
Lead	**0.61**	**J**	1.7	0.38	mg/Kg	☼	11/15/18 08:00	11/17/18 13:28	3
Li	ND		8.7	0.52	mg/Kg	☼	11/15/18 08:00	11/17/18 13:28	3
Mo	ND		6.9	0.28	mg/Kg	☼	11/15/18 08:00	11/17/18 13:28	3

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**54**		12	2.4	mg/Kg	☼	11/16/18 08:00	11/19/18 14:14	1
Arsenic	**0.32**	**J**	0.58	0.15	mg/Kg	☼	11/16/18 08:00	11/19/18 14:14	1
Iron	**650**		5.8	3.4	mg/Kg	☼	11/16/18 08:00	11/19/18 14:14	1
Lead	**0.26**	**J ***	0.58	0.13	mg/Kg	☼	11/16/18 08:00	11/19/18 14:14	1
Li	ND		2.9	0.17	mg/Kg	☼	11/16/18 08:00	11/19/18 14:14	1
Mo	ND		2.3	0.095	mg/Kg	☼	11/16/18 08:00	11/19/18 14:14	1

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**640**		12	1.8	mg/Kg	☼	11/17/18 08:00	11/19/18 16:18	1
Arsenic	**0.80**	**B**	0.58	0.25	mg/Kg	☼	11/17/18 08:00	11/19/18 16:18	1
Iron	**1700**		5.8	3.4	mg/Kg	☼	11/17/18 08:00	11/19/18 16:18	1
Lead	**1.3**		0.58	0.13	mg/Kg	☼	11/17/18 08:00	11/19/18 16:18	1
Li	**1.3**	**J**	2.9	0.17	mg/Kg	☼	11/17/18 08:00	11/19/18 16:18	1
Mo	ND		2.3	0.095	mg/Kg	☼	11/17/18 08:00	11/19/18 16:18	1

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**27**	**J ***	170	27	mg/Kg	☼	11/20/18 08:00	11/26/18 12:01	5
Arsenic	ND		8.7	2.2	mg/Kg	☼	11/20/18 08:00	11/26/18 12:01	5
Iron	ND	*	87	51	mg/Kg	☼	11/20/18 08:00	11/26/18 12:01	5
Lead	ND	*	8.7	1.9	mg/Kg	☼	11/20/18 08:00	11/26/18 12:01	5
Li	**3.1**	**J B ***	43	2.5	mg/Kg	☼	11/20/18 08:00	11/26/18 12:01	5
Mo	ND		35	1.4	mg/Kg	☼	11/20/18 08:00	11/26/18 12:01	5

Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**990**		12	1.8	mg/Kg	☼	11/20/18 09:43	11/26/18 14:07	1
Arsenic	**0.94**		0.58	0.17	mg/Kg	☼	11/20/18 09:43	11/26/18 14:07	1
Iron	**2300**		5.8	3.4	mg/Kg	☼	11/20/18 09:43	11/26/18 14:07	1
Lead	**0.68**		0.58	0.13	mg/Kg	☼	11/20/18 09:43	11/26/18 14:07	1
Li	**1.3**	**J**	2.9	0.17	mg/Kg	☼	11/20/18 09:43	11/26/18 14:07	1

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Client Sample ID: BH-02 (72-75)

Lab Sample ID: 140-13229-6

Date Collected: 10/28/18 16:50
Matrix: Solid
Date Received: 11/01/18 12:00
Percent Solids: 86.5

Method: 6010B SEP - SEP Metals (ICP) - Step 6 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mo	ND		2.3	0.11	mg/Kg	☼	11/20/18 09:43	11/26/18 14:07	1

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**40000**		120	18	mg/Kg	☼	11/21/18 07:44	11/28/18 16:39	10
Arsenic	**1.4**		0.58	0.15	mg/Kg	☼	11/21/18 07:44	11/28/18 12:38	1
Iron	**3000**	**B**	5.8	4.7	mg/Kg	☼	11/21/18 07:44	11/28/18 12:38	1
Lead	**7.8**		0.58	0.13	mg/Kg	☼	11/21/18 07:44	11/28/18 12:38	1
Li	**3.6**		2.9	0.17	mg/Kg	☼	11/21/18 07:44	11/28/18 12:38	1
Mo	ND		2.3	0.095	mg/Kg	☼	11/21/18 07:44	11/28/18 12:38	1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**42000**		10	1.6	mg/Kg			11/29/18 14:47	1
Arsenic	**3.5**		0.50	0.13	mg/Kg			11/29/18 14:47	1
Iron	**7800**		5.0	4.1	mg/Kg			11/29/18 14:47	1
Lead	**11**		0.50	0.11	mg/Kg			11/29/18 14:47	1
Li	**9.3**		2.5	0.15	mg/Kg			11/29/18 14:47	1
Mo	ND		2.0	0.082	mg/Kg			11/29/18 14:47	1

Method: 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**37000**		120	18	mg/Kg	☼	11/12/18 08:00	11/28/18 18:28	10
Arsenic	**3.3**		0.58	0.15	mg/Kg	☼	11/12/18 08:00	11/28/18 14:35	1
Iron	**8700**		5.8	4.7	mg/Kg	☼	11/12/18 08:00	11/28/18 14:35	1
Lead	**8.8**		0.58	0.13	mg/Kg	☼	11/12/18 08:00	11/28/18 14:35	1
Lithium	**6.6**		2.9	0.17	mg/Kg	☼	11/12/18 08:00	11/28/18 14:35	1
Molybdenum	**0.23**	**J**	2.3	0.095	mg/Kg	☼	11/12/18 08:00	11/28/18 14:35	1

Method: EPA 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**2800**		3.5	1.6	mg/Kg	☼	11/21/18 14:04	11/28/18 20:30	1
Arsenic	**2.0**		0.12	0.030	mg/Kg	☼	11/21/18 14:04	11/28/18 20:30	1
Iron	**5600**		5.8	2.8	mg/Kg	☼	11/21/18 14:04	11/28/18 20:30	1
Lead	**4.4**		0.12	0.040	mg/Kg	☼	11/21/18 14:04	11/28/18 20:30	1
Lithium	**3.9**		0.58	0.32	mg/Kg	☼	11/21/18 14:04	11/28/18 20:30	1
Molybdenum	**0.26**	**J**	0.58	0.072	mg/Kg	☼	11/21/18 14:04	11/28/18 20:30	1

Client Sample ID: BH-02 (70-72) Lab Sample ID: 140-13229-7

Date Collected: 10/28/18 17:00 **Matrix: Solid**
Date Received: 11/01/18 12:00 **Percent Solids: 77.1**

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		52	8.3	mg/Kg	☼	11/14/18 08:00	11/17/18 11:27	4
Arsenic	ND		2.6	0.67	mg/Kg	☼	11/14/18 08:00	11/17/18 11:27	4
Iron	**24**	**J**	26	15	mg/Kg	☼	11/14/18 08:00	11/17/18 11:27	4
Lead	ND		2.6	0.57	mg/Kg	☼	11/14/18 08:00	11/17/18 11:27	4
Li	ND		13	0.78	mg/Kg	☼	11/14/18 08:00	11/17/18 11:27	4
Mo	ND		10	0.43	mg/Kg	☼	11/14/18 08:00	11/17/18 11:27	4

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**18**	**J ***	39	6.2	mg/Kg	☼	11/15/18 08:00	11/17/18 13:33	3
Arsenic	ND	*	1.9	0.51	mg/Kg	☼	11/15/18 08:00	11/17/18 13:33	3
Iron	**720**	*****	19	11	mg/Kg	☼	11/15/18 08:00	11/17/18 13:33	3
Lead	**2.0**		1.9	0.43	mg/Kg	☼	11/15/18 08:00	11/17/18 13:33	3
Li	ND		9.7	0.58	mg/Kg	☼	11/15/18 08:00	11/17/18 13:33	3
Mo	ND		7.8	0.32	mg/Kg	☼	11/15/18 08:00	11/17/18 13:33	3

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**170**		13	2.7	mg/Kg	☼	11/16/18 08:00	11/19/18 14:19	1
Arsenic	**0.57**	**J**	0.65	0.17	mg/Kg	☼	11/16/18 08:00	11/19/18 14:19	1
Iron	**1500**		6.5	3.8	mg/Kg	☼	11/16/18 08:00	11/19/18 14:19	1
Lead	**0.26**	**J ***	0.65	0.14	mg/Kg	☼	11/16/18 08:00	11/19/18 14:19	1
Li	**0.21**	**J**	3.2	0.19	mg/Kg	☼	11/16/18 08:00	11/19/18 14:19	1
Mo	**0.12**	**J**	2.6	0.11	mg/Kg	☼	11/16/18 08:00	11/19/18 14:19	1

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**2200**		13	2.1	mg/Kg	☼	11/17/18 08:00	11/19/18 16:23	1
Arsenic	**1.4**	**B**	0.65	0.29	mg/Kg	☼	11/17/18 08:00	11/19/18 16:23	1
Iron	**4500**		6.5	3.8	mg/Kg	☼	11/17/18 08:00	11/19/18 16:23	1
Lead	**5.1**		0.65	0.14	mg/Kg	☼	11/17/18 08:00	11/19/18 16:23	1
Li	**5.2**		3.2	0.19	mg/Kg	☼	11/17/18 08:00	11/19/18 16:23	1
Mo	ND		2.6	0.11	mg/Kg	☼	11/17/18 08:00	11/19/18 16:23	1

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**34**	**J ***	190	30	mg/Kg	☼	11/20/18 08:00	11/26/18 12:06	5
Arsenic	ND		9.7	2.5	mg/Kg	☼	11/20/18 08:00	11/26/18 12:06	5
Iron	ND	*	97	57	mg/Kg	☼	11/20/18 08:00	11/26/18 12:06	5
Lead	ND	*	9.7	2.1	mg/Kg	☼	11/20/18 08:00	11/26/18 12:06	5
Li	**4.1**	**J B ***	49	2.9	mg/Kg	☼	11/20/18 08:00	11/26/18 12:06	5
Mo	ND		39	1.6	mg/Kg	☼	11/20/18 08:00	11/26/18 12:06	5

Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**4100**		13	2.1	mg/Kg	☼	11/20/18 09:43	11/26/18 14:12	1
Arsenic	**1.6**		0.65	0.19	mg/Kg	☼	11/20/18 09:43	11/26/18 14:12	1
Iron	**6100**		6.5	3.8	mg/Kg	☼	11/20/18 09:43	11/26/18 14:12	1
Lead	**1.3**		0.65	0.14	mg/Kg	☼	11/20/18 09:43	11/26/18 14:12	1
Li	**3.6**		3.2	0.19	mg/Kg	☼	11/20/18 09:43	11/26/18 14:12	1

Client Sample Results

Client: Golder Associates Inc. TestAmerica Job ID: 140-13229-1
Project/Site: Rush Island Energy Center - Soil & Speci

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Client Sample ID: BH-02 (70-72) **Lab Sample ID: 140-13229-7**
Date Collected: 10/28/18 17:00 **Matrix: Solid**
Date Received: 11/01/18 12:00 **Percent Solids: 77.1**

Method: 6010B SEP - SEP Metals (ICP) - Step 6 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mo	ND		2.6	0.13	mg/Kg	☼	11/20/18 09:43	11/26/18 14:12	1

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**26000**		130	21	mg/Kg	☼	11/21/18 07:44	11/28/18 16:44	10
Arsenic	**1.5**		0.65	0.17	mg/Kg	☼	11/21/18 07:44	11/28/18 12:44	1
Iron	**6200**	**B**	6.5	5.3	mg/Kg	☼	11/21/18 07:44	11/28/18 12:44	1
Lead	**2.6**		0.65	0.14	mg/Kg	☼	11/21/18 07:44	11/28/18 12:44	1
Li	**8.9**		3.2	0.19	mg/Kg	☼	11/21/18 07:44	11/28/18 12:44	1
Mo	ND		2.6	0.11	mg/Kg	☼	11/21/18 07:44	11/28/18 12:44	1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**33000**		10	1.6	mg/Kg			11/29/18 14:47	1
Arsenic	**5.0**		0.50	0.13	mg/Kg			11/29/18 14:47	1
Iron	**19000**		5.0	4.1	mg/Kg			11/29/18 14:47	1
Lead	**11**		0.50	0.11	mg/Kg			11/29/18 14:47	1
Li	**22**		2.5	0.15	mg/Kg			11/29/18 14:47	1
Mo	**0.12**	**J**	2.0	0.082	mg/Kg			11/29/18 14:47	1

Method: 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**53000**		130	21	mg/Kg	☼	11/12/18 08:00	11/28/18 18:33	10
Arsenic	**3.8**		0.65	0.17	mg/Kg	☼	11/12/18 08:00	11/28/18 14:41	1
Iron	**19000**		6.5	5.3	mg/Kg	☼	11/12/18 08:00	11/28/18 14:41	1
Lead	**12**		1.3	0.29	mg/Kg	☼	11/12/18 08:00	11/28/18 21:11	2
Lithium	**24**		3.2	0.19	mg/Kg	☼	11/12/18 08:00	11/28/18 14:41	1
Molybdenum	**0.30**	**J**	2.6	0.11	mg/Kg	☼	11/12/18 08:00	11/28/18 14:41	1

Method: EPA 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**8300**		3.9	1.9	mg/Kg	☼	11/21/18 14:04	11/28/18 20:35	1
Arsenic	**2.6**		0.13	0.034	mg/Kg	☼	11/21/18 14:04	11/28/18 20:35	1
Iron	**15000**		6.6	3.2	mg/Kg	☼	11/21/18 14:04	11/28/18 20:35	1
Lead	**12**		0.13	0.046	mg/Kg	☼	11/21/18 14:04	11/28/18 20:35	1
Lithium	**12**		0.66	0.36	mg/Kg	☼	11/21/18 14:04	11/28/18 20:35	1
Molybdenum	**0.50**	**J**	0.66	0.081	mg/Kg	☼	11/21/18 14:04	11/28/18 20:35	1

Client Sample Results

Client: Golder Associates Inc. TestAmerica Job ID: 140-13229-1
Project/Site: Rush Island Energy Center - Soil & Speci

Client Sample ID: BH-02 (125-130) Lab Sample ID: 140-13229-8

Date Collected: 10/29/18 12:05 **Matrix: Solid**
Date Received: 11/01/18 12:00 **Percent Solids: 82.5**

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		48	7.8	mg/Kg	☼	11/14/18 08:00	11/17/18 11:31	4
Arsenic	ND		2.4	0.63	mg/Kg	☼	11/14/18 08:00	11/17/18 11:31	4
Iron	ND		24	14	mg/Kg	☼	11/14/18 08:00	11/17/18 11:31	4
Lead	ND		2.4	0.53	mg/Kg	☼	11/14/18 08:00	11/17/18 11:31	4
Li	ND		12	0.73	mg/Kg	☼	11/14/18 08:00	11/17/18 11:31	4
Mo	ND		9.7	0.40	mg/Kg	☼	11/14/18 08:00	11/17/18 11:31	4

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND	*	36	5.8	mg/Kg	☼	11/15/18 08:00	11/17/18 13:39	3
Arsenic	ND	*	1.8	0.47	mg/Kg	☼	11/15/18 08:00	11/17/18 13:39	3
Iron	**86**	*****	18	11	mg/Kg	☼	11/15/18 08:00	11/17/18 13:39	3
Lead	ND		1.8	0.40	mg/Kg	☼	11/15/18 08:00	11/17/18 13:39	3
Li	ND		9.1	0.55	mg/Kg	☼	11/15/18 08:00	11/17/18 13:39	3
Mo	ND		7.3	0.30	mg/Kg	☼	11/15/18 08:00	11/17/18 13:39	3

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**28**		12	2.5	mg/Kg	☼	11/16/18 08:00	11/19/18 14:24	1
Arsenic	**0.20**	**J**	0.61	0.16	mg/Kg	☼	11/16/18 08:00	11/19/18 14:24	1
Iron	**640**		6.1	3.5	mg/Kg	☼	11/16/18 08:00	11/19/18 14:24	1
Lead	**0.18**	**J ***	0.61	0.13	mg/Kg	☼	11/16/18 08:00	11/19/18 14:24	1
Li	ND		3.0	0.18	mg/Kg	☼	11/16/18 08:00	11/19/18 14:24	1
Mo	**0.22**	**J**	2.4	0.099	mg/Kg	☼	11/16/18 08:00	11/19/18 14:24	1

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**440**		12	1.9	mg/Kg	☼	11/17/18 08:00	11/19/18 16:28	1
Arsenic	**0.76**	**B**	0.61	0.27	mg/Kg	☼	11/17/18 08:00	11/19/18 16:28	1
Iron	**2000**		6.1	3.5	mg/Kg	☼	11/17/18 08:00	11/19/18 16:28	1
Lead	**0.73**		0.61	0.13	mg/Kg	☼	11/17/18 08:00	11/19/18 16:28	1
Li	**1.2**	**J**	3.0	0.18	mg/Kg	☼	11/17/18 08:00	11/19/18 16:28	1
Mo	ND		2.4	0.099	mg/Kg	☼	11/17/18 08:00	11/19/18 16:28	1

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**39**	**J ***	180	28	mg/Kg	☼	11/20/18 08:00	11/26/18 12:11	5
Arsenic	ND		9.1	2.3	mg/Kg	☼	11/20/18 08:00	11/26/18 12:11	5
Iron	ND	*	91	53	mg/Kg	☼	11/20/18 08:00	11/26/18 12:11	5
Lead	ND	*	9.1	2.0	mg/Kg	☼	11/20/18 08:00	11/26/18 12:11	5
Li	**3.9**	**J B ***	45	2.7	mg/Kg	☼	11/20/18 08:00	11/26/18 12:11	5
Mo	ND		36	1.5	mg/Kg	☼	11/20/18 08:00	11/26/18 12:11	5

Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**900**		12	1.9	mg/Kg	☼	11/20/18 09:43	11/26/18 14:17	1
Arsenic	**0.41**	**J**	0.61	0.18	mg/Kg	☼	11/20/18 09:43	11/26/18 14:17	1
Iron	**3100**		6.1	3.5	mg/Kg	☼	11/20/18 09:43	11/26/18 14:17	1
Lead	**0.35**	**J**	0.61	0.13	mg/Kg	☼	11/20/18 09:43	11/26/18 14:17	1
Li	**1.7**	**J**	3.0	0.18	mg/Kg	☼	11/20/18 09:43	11/26/18 14:17	1

Client Sample ID: BH-02 (125-130) Lab Sample ID: 140-13229-8

Date Collected: 10/29/18 12:05 **Matrix: Solid**
Date Received: 11/01/18 12:00 **Percent Solids: 82.5**

Method: 6010B SEP - SEP Metals (ICP) - Step 6 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mo	ND		2.4	0.12	mg/Kg	☼	11/20/18 09:43	11/26/18 14:17	1

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**27000**		120	19	mg/Kg	☼	11/21/18 07:44	11/28/18 16:49	10
Arsenic	**1.2**		1.2	0.32	mg/Kg	☼	11/21/18 07:44	11/28/18 19:49	2
Iron	**3200**	**B**	6.1	5.0	mg/Kg	☼	11/21/18 07:44	11/28/18 12:59	1
Lead	**4.3**		1.2	0.27	mg/Kg	☼	11/21/18 07:44	11/28/18 19:49	2
Li	**2.7**	**J**	3.0	0.18	mg/Kg	☼	11/21/18 07:44	11/28/18 12:59	1
Mo	ND		2.4	0.099	mg/Kg	☼	11/21/18 07:44	11/28/18 12:59	1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**28000**		10	1.6	mg/Kg			11/29/18 14:47	1
Arsenic	**2.6**		0.50	0.13	mg/Kg			11/29/18 14:47	1
Iron	**9000**		5.0	4.1	mg/Kg			11/29/18 14:47	1
Lead	**5.6**		0.50	0.11	mg/Kg			11/29/18 14:47	1
Li	**9.5**		2.5	0.15	mg/Kg			11/29/18 14:47	1
Mo	**0.22**	**J**	2.0	0.082	mg/Kg			11/29/18 14:47	1

Method: 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**31000**		120	19	mg/Kg	☼	11/12/18 08:00	11/28/18 18:38	10
Arsenic	**2.2**		1.2	0.32	mg/Kg	☼	11/12/18 08:00	11/28/18 21:16	2
Iron	**9200**		6.1	5.0	mg/Kg	☼	11/12/18 08:00	11/28/18 14:47	1
Lead	**6.2**		1.2	0.27	mg/Kg	☼	11/12/18 08:00	11/28/18 21:16	2
Lithium	**4.8**		3.0	0.18	mg/Kg	☼	11/12/18 08:00	11/28/18 14:47	1
Molybdenum	**0.53**	**J**	2.4	0.099	mg/Kg	☼	11/12/18 08:00	11/28/18 14:47	1

Method: EPA 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1200**		3.5	1.6	mg/Kg	☼	11/21/18 14:04	11/28/18 20:53	1
Arsenic	**0.60**		0.12	0.030	mg/Kg	☼	11/21/18 14:04	11/28/18 20:53	1
Iron	**4600**		5.8	2.8	mg/Kg	☼	11/21/18 14:04	11/28/18 20:53	1
Lead	**1.4**		0.12	0.040	mg/Kg	☼	11/21/18 14:04	11/28/18 20:53	1
Lithium	**2.5**		0.58	0.32	mg/Kg	☼	11/21/18 14:04	11/28/18 20:53	1
Molybdenum	**0.53**	**J**	0.58	0.072	mg/Kg	☼	11/21/18 14:04	11/28/18 20:53	1

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Client Sample ID: BH-01 (26-31)

Lab Sample ID: 140-13229-9

Date Collected: 10/30/18 08:00
Date Received: 11/01/18 12:00

Matrix: Solid
Percent Solids: 83.6

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		48	7.7	mg/Kg	☼	11/14/18 08:00	11/17/18 11:36	4
Arsenic	ND		2.4	0.62	mg/Kg	☼	11/14/18 08:00	11/17/18 11:36	4
Iron	ND		24	14	mg/Kg	☼	11/14/18 08:00	11/17/18 11:36	4
Lead	ND		2.4	0.53	mg/Kg	☼	11/14/18 08:00	11/17/18 11:36	4
Li	ND		12	0.72	mg/Kg	☼	11/14/18 08:00	11/17/18 11:36	4
Mo	ND		9.6	0.39	mg/Kg	☼	11/14/18 08:00	11/17/18 11:36	4

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND	*	36	5.7	mg/Kg	☼	11/15/18 08:00	11/17/18 13:44	3
Arsenic	ND	*	1.8	0.47	mg/Kg	☼	11/15/18 08:00	11/17/18 13:44	3
Iron	**11**	**J ***	18	10	mg/Kg	☼	11/15/18 08:00	11/17/18 13:44	3
Lead	ND		1.8	0.39	mg/Kg	☼	11/15/18 08:00	11/17/18 13:44	3
Li	ND		9.0	0.54	mg/Kg	☼	11/15/18 08:00	11/17/18 13:44	3
Mo	ND		7.2	0.29	mg/Kg	☼	11/15/18 08:00	11/17/18 13:44	3

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**15**		12	2.5	mg/Kg	☼	11/16/18 08:00	11/19/18 14:29	1
Arsenic	**0.62**		0.60	0.16	mg/Kg	☼	11/16/18 08:00	11/19/18 14:29	1
Iron	**230**		6.0	3.5	mg/Kg	☼	11/16/18 08:00	11/19/18 14:29	1
Lead	**0.50**	**J ***	0.60	0.13	mg/Kg	☼	11/16/18 08:00	11/19/18 14:29	1
Li	ND		3.0	0.18	mg/Kg	☼	11/16/18 08:00	11/19/18 14:29	1
Mo	ND		2.4	0.098	mg/Kg	☼	11/16/18 08:00	11/19/18 14:29	1

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**310**		12	1.9	mg/Kg	☼	11/17/18 08:00	11/19/18 16:32	1
Arsenic	**0.98**	**B**	0.60	0.26	mg/Kg	☼	11/17/18 08:00	11/19/18 16:32	1
Iron	**1200**		6.0	3.5	mg/Kg	☼	11/17/18 08:00	11/19/18 16:32	1
Lead	**0.91**		0.60	0.13	mg/Kg	☼	11/17/18 08:00	11/19/18 16:32	1
Li	**0.57**	**J**	3.0	0.18	mg/Kg	☼	11/17/18 08:00	11/19/18 16:32	1
Mo	ND		2.4	0.098	mg/Kg	☼	11/17/18 08:00	11/19/18 16:32	1

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**36**	**J ***	180	28	mg/Kg	☼	11/20/18 08:00	11/26/18 12:16	5
Arsenic	ND		9.0	2.3	mg/Kg	☼	11/20/18 08:00	11/26/18 12:16	5
Iron	ND	*	90	53	mg/Kg	☼	11/20/18 08:00	11/26/18 12:16	5
Lead	ND	*	9.0	2.0	mg/Kg	☼	11/20/18 08:00	11/26/18 12:16	5
Li	**3.5**	**J B ***	45	2.6	mg/Kg	☼	11/20/18 08:00	11/26/18 12:16	5
Mo	ND		36	1.5	mg/Kg	☼	11/20/18 08:00	11/26/18 12:16	5

Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**610**		12	1.9	mg/Kg	☼	11/20/18 09:43	11/26/18 14:22	1
Arsenic	**0.63**		0.60	0.18	mg/Kg	☼	11/20/18 09:43	11/26/18 14:22	1
Iron	**1800**		6.0	3.5	mg/Kg	☼	11/20/18 09:43	11/26/18 14:22	1
Lead	**0.43**	**J**	0.60	0.13	mg/Kg	☼	11/20/18 09:43	11/26/18 14:22	1
Li	**1.1**	**J**	3.0	0.18	mg/Kg	☼	11/20/18 09:43	11/26/18 14:22	1

Client Sample ID: BH-01 (26-31)

Lab Sample ID: 140-13229-9

Date Collected: 10/30/18 08:00

Matrix: Solid

Date Received: 11/01/18 12:00

Percent Solids: 83.6

Method: 6010B SEP - SEP Metals (ICP) - Step 6 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mo	ND		2.4	0.12	mg/Kg	☼	11/20/18 09:43	11/26/18 14:22	1

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**32000**		120	19	mg/Kg	☼	11/21/18 07:44	11/28/18 16:54	10
Arsenic	**1.1**		0.60	0.16	mg/Kg	☼	11/21/18 07:44	11/28/18 13:04	1
Iron	**2200**	**B**	6.0	4.9	mg/Kg	☼	11/21/18 07:44	11/28/18 13:04	1
Lead	**11**		0.60	0.13	mg/Kg	☼	11/21/18 07:44	11/28/18 13:04	1
Li	**2.1**	**J**	3.0	0.18	mg/Kg	☼	11/21/18 07:44	11/28/18 13:04	1
Mo	ND		2.4	0.098	mg/Kg	☼	11/21/18 07:44	11/28/18 13:04	1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**33000**		10	1.6	mg/Kg			11/29/18 14:47	1
Arsenic	**3.3**		0.50	0.13	mg/Kg			11/29/18 14:47	1
Iron	**5400**		5.0	4.1	mg/Kg			11/29/18 14:47	1
Lead	**13**		0.50	0.11	mg/Kg			11/29/18 14:47	1
Li	**7.2**		2.5	0.15	mg/Kg			11/29/18 14:47	1
Mo	ND		2.0	0.082	mg/Kg			11/29/18 14:47	1

Method: 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**54000**		120	19	mg/Kg	☼	11/12/18 08:00	11/28/18 18:43	10
Arsenic	**2.9**		0.60	0.16	mg/Kg	☼	11/12/18 08:00	11/28/18 14:52	1
Iron	**4500**		6.0	4.9	mg/Kg	☼	11/12/18 08:00	11/28/18 14:52	1
Lead	**17**		0.60	0.13	mg/Kg	☼	11/12/18 08:00	11/28/18 14:52	1
Lithium	**3.7**		3.0	0.18	mg/Kg	☼	11/12/18 08:00	11/28/18 14:52	1
Molybdenum	ND		2.4	0.098	mg/Kg	☼	11/12/18 08:00	11/28/18 14:52	1

Method: EPA 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1200**		3.7	1.8	mg/Kg	☼	11/21/18 14:04	11/28/18 20:57	1
Arsenic	**1.3**		0.12	0.032	mg/Kg	☼	11/21/18 14:04	11/28/18 20:57	1
Iron	**3400**		6.2	3.1	mg/Kg	☼	11/21/18 14:04	11/28/18 20:57	1
Lead	**2.2**		0.12	0.044	mg/Kg	☼	11/21/18 14:04	11/28/18 20:57	1
Lithium	**1.5**		0.62	0.34	mg/Kg	☼	11/21/18 14:04	11/28/18 20:57	1
Molybdenum	**0.12**	**J**	0.62	0.077	mg/Kg	☼	11/21/18 14:04	11/28/18 20:57	1

Client Sample Results

Client: Golder Associates Inc. TestAmerica Job ID: 140-13229-1
Project/Site: Rush Island Energy Center - Soil & Speci

Client Sample ID: BH-01 (75-80)

Date Collected: 10/30/18 10:50
Date Received: 11/01/18 12:00

Lab Sample ID: 140-13229-10
Matrix: Solid
Percent Solids: 81.0

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		49	7.9	mg/Kg	☼	11/14/18 08:00	11/17/18 11:42	4
Arsenic	ND		2.5	0.64	mg/Kg	☼	11/14/18 08:00	11/17/18 11:42	4
Iron	ND		25	14	mg/Kg	☼	11/14/18 08:00	11/17/18 11:42	4
Lead	ND		2.5	0.54	mg/Kg	☼	11/14/18 08:00	11/17/18 11:42	4
Li	ND		12	0.74	mg/Kg	☼	11/14/18 08:00	11/17/18 11:42	4
Mo	ND		9.9	0.40	mg/Kg	☼	11/14/18 08:00	11/17/18 11:42	4

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**8.7**	**J ***	37	5.9	mg/Kg	☼	11/15/18 08:00	11/17/18 13:59	3
Arsenic	ND	*	1.9	0.48	mg/Kg	☼	11/15/18 08:00	11/17/18 13:59	3
Iron	**290**	*****	19	11	mg/Kg	☼	11/15/18 08:00	11/17/18 13:59	3
Lead	ND		1.9	0.41	mg/Kg	☼	11/15/18 08:00	11/17/18 13:59	3
Li	ND		9.3	0.56	mg/Kg	☼	11/15/18 08:00	11/17/18 13:59	3
Mo	ND		7.4	0.30	mg/Kg	☼	11/15/18 08:00	11/17/18 13:59	3

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**42**		12	2.6	mg/Kg	☼	11/16/18 08:00	11/19/18 14:34	1
Arsenic	**0.44**	**J**	0.62	0.16	mg/Kg	☼	11/16/18 08:00	11/19/18 14:34	1
Iron	**1100**		6.2	3.6	mg/Kg	☼	11/16/18 08:00	11/19/18 14:34	1
Lead	**0.26**	**J ***	0.62	0.14	mg/Kg	☼	11/16/18 08:00	11/19/18 14:34	1
Li	ND		3.1	0.19	mg/Kg	☼	11/16/18 08:00	11/19/18 14:34	1
Mo	ND		2.5	0.10	mg/Kg	☼	11/16/18 08:00	11/19/18 14:34	1

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**480**		12	2.0	mg/Kg	☼	11/17/18 08:00	11/19/18 16:47	1
Arsenic	**0.64**	**B**	0.62	0.27	mg/Kg	☼	11/17/18 08:00	11/19/18 16:47	1
Iron	**1700**		6.2	3.6	mg/Kg	☼	11/17/18 08:00	11/19/18 16:47	1
Lead	**0.90**		0.62	0.14	mg/Kg	☼	11/17/18 08:00	11/19/18 16:47	1
Li	**0.97**	**J**	3.1	0.19	mg/Kg	☼	11/17/18 08:00	11/19/18 16:47	1
Mo	ND		2.5	0.10	mg/Kg	☼	11/17/18 08:00	11/19/18 16:47	1

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**40**	**J ***	190	29	mg/Kg	☼	11/20/18 08:00	11/26/18 12:21	5
Arsenic	ND		9.3	2.3	mg/Kg	☼	11/20/18 08:00	11/26/18 12:21	5
Iron	ND	*	93	54	mg/Kg	☼	11/20/18 08:00	11/26/18 12:21	5
Lead	ND	*	9.3	2.0	mg/Kg	☼	11/20/18 08:00	11/26/18 12:21	5
Li	ND	*	46	2.7	mg/Kg	☼	11/20/18 08:00	11/26/18 12:21	5
Mo	ND		37	1.5	mg/Kg	☼	11/20/18 08:00	11/26/18 12:21	5

Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**910**		12	2.0	mg/Kg	☼	11/20/18 09:43	11/26/18 14:37	1
Arsenic	**0.92**		0.62	0.19	mg/Kg	☼	11/20/18 09:43	11/26/18 14:37	1
Iron	**2700**		6.2	3.6	mg/Kg	☼	11/20/18 09:43	11/26/18 14:37	1
Lead	**0.44**	**J**	0.62	0.14	mg/Kg	☼	11/20/18 09:43	11/26/18 14:37	1
Li	**1.5**	**J**	3.1	0.19	mg/Kg	☼	11/20/18 09:43	11/26/18 14:37	1

Client Sample ID: BH-01 (75-80) **Lab Sample ID: 140-13229-10**
Date Collected: 10/30/18 10:50 **Matrix: Solid**
Date Received: 11/01/18 12:00 **Percent Solids: 81.0**

Method: 6010B SEP - SEP Metals (ICP) - Step 6 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mo	ND		2.5	0.12	mg/Kg	☼	11/20/18 09:43	11/26/18 14:37	1

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**36000**		120	20	mg/Kg	☼	11/21/18 07:44	11/28/18 17:09	10
Arsenic	**1.4**		1.2	0.32	mg/Kg	☼	11/21/18 07:44	11/28/18 20:09	2
Iron	**2700**	**B**	6.2	5.1	mg/Kg	☼	11/21/18 07:44	11/28/18 13:10	1
Lead	**4.7**		1.2	0.27	mg/Kg	☼	11/21/18 07:44	11/28/18 20:09	2
Li	**2.8**	**J**	3.1	0.19	mg/Kg	☼	11/21/18 07:44	11/28/18 13:10	1
Mo	ND		2.5	0.10	mg/Kg	☼	11/21/18 07:44	11/28/18 13:10	1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**38000**		10	1.6	mg/Kg			11/29/18 14:47	1
Arsenic	**3.4**		0.50	0.13	mg/Kg			11/29/18 14:47	1
Iron	**8400**		5.0	4.1	mg/Kg			11/29/18 14:47	1
Lead	**6.3**		0.50	0.11	mg/Kg			11/29/18 14:47	1
Li	**5.3**		2.5	0.15	mg/Kg			11/29/18 14:47	1
Mo	ND		2.0	0.082	mg/Kg			11/29/18 14:47	1

Method: 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**31000**		120	20	mg/Kg	☼	11/12/18 08:00	11/28/18 18:48	10
Arsenic	**4.3**		1.2	0.32	mg/Kg	☼	11/12/18 08:00	11/28/18 21:21	2
Iron	**8800**		6.2	5.1	mg/Kg	☼	11/12/18 08:00	11/28/18 15:08	1
Lead	**5.7**		1.2	0.27	mg/Kg	☼	11/12/18 08:00	11/28/18 21:21	2
Lithium	**5.3**		3.1	0.19	mg/Kg	☼	11/12/18 08:00	11/28/18 15:08	1
Molybdenum	**0.17**	**J**	2.5	0.10	mg/Kg	☼	11/12/18 08:00	11/28/18 15:08	1

Method: EPA 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1200**		3.6	1.7	mg/Kg	☼	11/21/18 14:04	11/28/18 21:02	1
Arsenic	**2.3**		0.12	0.031	mg/Kg	☼	11/21/18 14:04	11/28/18 21:02	1
Iron	**4500**		5.9	2.9	mg/Kg	☼	11/21/18 14:04	11/28/18 21:02	1
Lead	**2.0**		0.12	0.042	mg/Kg	☼	11/21/18 14:04	11/28/18 21:02	1
Lithium	**2.1**		0.59	0.33	mg/Kg	☼	11/21/18 14:04	11/28/18 21:02	1
Molybdenum	**0.21**	**J**	0.59	0.074	mg/Kg	☼	11/21/18 14:04	11/28/18 21:02	1

Client Sample ID: BH-01 (130-135)

Lab Sample ID: 140-13229-11

Date Collected: 10/30/18 16:50

Matrix: Solid

Date Received: 11/01/18 12:00

Percent Solids: 79.3

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		50	8.1	mg/Kg	☼	11/14/18 08:00	11/17/18 11:56	4
Arsenic	ND		2.5	0.66	mg/Kg	☼	11/14/18 08:00	11/17/18 11:56	4
Iron	ND		25	15	mg/Kg	☼	11/14/18 08:00	11/17/18 11:56	4
Lead	ND		2.5	0.55	mg/Kg	☼	11/14/18 08:00	11/17/18 11:56	4
Li	ND		13	0.76	mg/Kg	☼	11/14/18 08:00	11/17/18 11:56	4
Mo	ND		10	0.41	mg/Kg	☼	11/14/18 08:00	11/17/18 11:56	4

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND	*	38	6.1	mg/Kg	☼	11/15/18 08:00	11/17/18 14:04	3
Arsenic	ND	*	1.9	0.49	mg/Kg	☼	11/15/18 08:00	11/17/18 14:04	3
Iron	**87**	*****	19	11	mg/Kg	☼	11/15/18 08:00	11/17/18 14:04	3
Lead	ND		1.9	0.42	mg/Kg	☼	11/15/18 08:00	11/17/18 14:04	3
Li	**0.58**	**J**	9.5	0.57	mg/Kg	☼	11/15/18 08:00	11/17/18 14:04	3
Mo	ND		7.6	0.31	mg/Kg	☼	11/15/18 08:00	11/17/18 14:04	3

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**26**		13	2.6	mg/Kg	☼	11/16/18 08:00	11/19/18 14:49	1
Arsenic	**0.19**	**J**	0.63	0.16	mg/Kg	☼	11/16/18 08:00	11/19/18 14:49	1
Iron	**610**		6.3	3.7	mg/Kg	☼	11/16/18 08:00	11/19/18 14:49	1
Lead	**0.18**	**J ***	0.63	0.14	mg/Kg	☼	11/16/18 08:00	11/19/18 14:49	1
Li	ND		3.2	0.19	mg/Kg	☼	11/16/18 08:00	11/19/18 14:49	1
Mo	ND		2.5	0.10	mg/Kg	☼	11/16/18 08:00	11/19/18 14:49	1

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**410**		13	2.0	mg/Kg	☼	11/17/18 08:00	11/19/18 16:52	1
Arsenic	**0.70**	**B**	0.63	0.28	mg/Kg	☼	11/17/18 08:00	11/19/18 16:52	1
Iron	**2100**		6.3	3.7	mg/Kg	☼	11/17/18 08:00	11/19/18 16:52	1
Lead	**0.93**		0.63	0.14	mg/Kg	☼	11/17/18 08:00	11/19/18 16:52	1
Li	**1.1**	**J**	3.2	0.19	mg/Kg	☼	11/17/18 08:00	11/19/18 16:52	1
Mo	ND		2.5	0.10	mg/Kg	☼	11/17/18 08:00	11/19/18 16:52	1

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**50**	**J ***	190	30	mg/Kg	☼	11/20/18 08:00	11/26/18 12:36	5
Arsenic	ND		9.5	2.4	mg/Kg	☼	11/20/18 08:00	11/26/18 12:36	5
Iron	ND	*	95	55	mg/Kg	☼	11/20/18 08:00	11/26/18 12:36	5
Lead	ND	*	9.5	2.1	mg/Kg	☼	11/20/18 08:00	11/26/18 12:36	5
Li	**3.2**	**J B ***	47	2.8	mg/Kg	☼	11/20/18 08:00	11/26/18 12:36	5
Mo	ND		38	1.6	mg/Kg	☼	11/20/18 08:00	11/26/18 12:36	5

Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**830**		13	2.0	mg/Kg	☼	11/20/18 09:43	11/26/18 14:42	1
Arsenic	**0.60**	**J**	0.63	0.19	mg/Kg	☼	11/20/18 09:43	11/26/18 14:42	1
Iron	**3600**		6.3	3.7	mg/Kg	☼	11/20/18 09:43	11/26/18 14:42	1
Lead	**0.66**		0.63	0.14	mg/Kg	☼	11/20/18 09:43	11/26/18 14:42	1
Li	**1.4**	**J**	3.2	0.19	mg/Kg	☼	11/20/18 09:43	11/26/18 14:42	1

Client Sample ID: BH-01 (130-135)

Lab Sample ID: 140-13229-11

Date Collected: 10/30/18 16:50
Date Received: 11/01/18 12:00
Matrix: Solid
Percent Solids: 79.3

Method: 6010B SEP - SEP Metals (ICP) - Step 6 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mo	ND		2.5	0.12	mg/Kg	☼	11/20/18 09:43	11/26/18 14:42	1

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**24000**		130	20	mg/Kg	☼	11/21/18 07:44	11/28/18 17:14	10
Arsenic	**1.3**		1.3	0.33	mg/Kg	☼	11/21/18 07:44	11/28/18 20:20	2
Iron	**3500**	**B**	6.3	5.2	mg/Kg	☼	11/21/18 07:44	11/28/18 13:15	1
Lead	**3.9**		1.3	0.28	mg/Kg	☼	11/21/18 07:44	11/28/18 20:20	2
Li	**2.4**	**J**	3.2	0.19	mg/Kg	☼	11/21/18 07:44	11/28/18 13:15	1
Mo	ND		2.5	0.10	mg/Kg	☼	11/21/18 07:44	11/28/18 20:14	1

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**25000**		10	1.6	mg/Kg			11/29/18 14:47	1
Arsenic	**2.8**		0.50	0.13	mg/Kg			11/29/18 14:47	1
Iron	**9800**		5.0	4.1	mg/Kg			11/29/18 14:47	1
Lead	**5.6**		0.50	0.11	mg/Kg			11/29/18 14:47	1
Li	**8.6**		2.5	0.15	mg/Kg			11/29/18 14:47	1
Mo	ND		2.0	0.082	mg/Kg			11/29/18 14:47	1

Method: 6010B - SEP Metals (ICP) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**28000**		130	20	mg/Kg	☼	11/12/18 08:00	11/28/18 18:53	10
Arsenic	**2.9**		1.3	0.33	mg/Kg	☼	11/12/18 08:00	11/28/18 21:26	2
Iron	**8700**		6.3	5.2	mg/Kg	☼	11/12/18 08:00	11/28/18 15:14	1
Lead	**6.3**		1.3	0.28	mg/Kg	☼	11/12/18 08:00	11/28/18 21:26	2
Lithium	**4.9**		3.2	0.19	mg/Kg	☼	11/12/18 08:00	11/28/18 15:14	1
Molybdenum	**0.16**	**J**	2.5	0.10	mg/Kg	☼	11/12/18 08:00	11/28/18 15:14	1

Method: EPA 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1200**		3.7	1.7	mg/Kg	☼	11/21/18 14:05	11/28/18 21:07	1
Arsenic	**0.64**		0.12	0.032	mg/Kg	☼	11/21/18 14:05	11/28/18 21:07	1
Iron	**5100**		6.1	3.0	mg/Kg	☼	11/21/18 14:05	11/28/18 21:07	1
Lead	**1.7**		0.12	0.043	mg/Kg	☼	11/21/18 14:05	11/28/18 21:07	1
Lithium	**2.4**		0.61	0.34	mg/Kg	☼	11/21/18 14:05	11/28/18 21:07	1
Molybdenum	**0.23**	**J**	0.61	0.076	mg/Kg	☼	11/21/18 14:05	11/28/18 21:07	1

Method: 6010B SEP - SEP Metals (ICP) - Step 1

Prep: 3010A

SEP: Exchangeable

Analyte	RL	MDL	Units	Method
Aluminum	10	1.6	mg/Kg	6010B SEP
Arsenic	0.50	0.13	mg/Kg	6010B SEP
Iron	5.0	2.9	mg/Kg	6010B SEP
Lead	0.50	0.11	mg/Kg	6010B SEP
Li	2.5	0.15	mg/Kg	6010B SEP
Mo	2.0	0.082	mg/Kg	6010B SEP

Method: 6010B SEP - SEP Metals (ICP) - Step 2

Prep: 3010A

SEP: Carbonate

Analyte	RL	MDL	Units	Method
Aluminum	10	1.6	mg/Kg	6010B SEP
Arsenic	0.50	0.13	mg/Kg	6010B SEP
Iron	5.0	2.9	mg/Kg	6010B SEP
Lead	0.50	0.11	mg/Kg	6010B SEP
Li	2.5	0.15	mg/Kg	6010B SEP
Mo	2.0	0.082	mg/Kg	6010B SEP

Method: 6010B SEP - SEP Metals (ICP) - Step 3

Prep: 3010A

SEP: Non-Crystalline

Analyte	RL	MDL	Units	Method
Aluminum	10	2.1	mg/Kg	6010B SEP
Arsenic	0.50	0.13	mg/Kg	6010B SEP
Iron	5.0	2.9	mg/Kg	6010B SEP
Lead	0.50	0.11	mg/Kg	6010B SEP
Li	2.5	0.15	mg/Kg	6010B SEP
Mo	2.0	0.082	mg/Kg	6010B SEP

Method: 6010B SEP - SEP Metals (ICP) - Step 4

Prep: 3010A

SEP: Metal Hydroxide

Analyte	RL	MDL	Units	Method
Aluminum	10	1.6	mg/Kg	6010B SEP
Arsenic	0.50	0.22	mg/Kg	6010B SEP
Iron	5.0	2.9	mg/Kg	6010B SEP
Lead	0.50	0.11	mg/Kg	6010B SEP
Li	2.5	0.15	mg/Kg	6010B SEP
Mo	2.0	0.082	mg/Kg	6010B SEP

Method: 6010B SEP - SEP Metals (ICP) - Step 5

Prep: 3010A

SEP: Organic-Bound

Analyte	RL	MDL	Units	Method
Aluminum	30	4.7	mg/Kg	6010B SEP
Arsenic	1.5	0.38	mg/Kg	6010B SEP
Iron	15	8.8	mg/Kg	6010B SEP

Method: 6010B SEP - SEP Metals (ICP) - Step 5 (Continued)

Prep: 3010A

SEP: Organic-Bound

Analyte	RL	MDL	Units	Method
Lead	1.5	0.33	mg/Kg	6010B SEP
Li	7.5	0.44	mg/Kg	6010B SEP
Mo	6.0	0.25	mg/Kg	6010B SEP

Method: 6010B SEP - SEP Metals (ICP) - Step 6

SEP: Acid/Sulfide

Analyte	RL	MDL	Units	Method
Aluminum	10	1.6	mg/Kg	6010B SEP
Arsenic	0.50	0.15	mg/Kg	6010B SEP
Iron	5.0	2.9	mg/Kg	6010B SEP
Lead	0.50	0.11	mg/Kg	6010B SEP
Li	2.5	0.15	mg/Kg	6010B SEP
Mo	2.0	0.099	mg/Kg	6010B SEP

Method: 6010B SEP - SEP Metals (ICP) - Step 7

Prep: Residual

Analyte	RL	MDL	Units	Method
Aluminum	10	1.6	mg/Kg	6010B SEP
Arsenic	0.50	0.13	mg/Kg	6010B SEP
Iron	5.0	4.1	mg/Kg	6010B SEP
Lead	0.50	0.11	mg/Kg	6010B SEP
Li	2.5	0.15	mg/Kg	6010B SEP
Mo	2.0	0.082	mg/Kg	6010B SEP

Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	RL	MDL	Units	Method
Aluminum	10	1.6	mg/Kg	6010B SEP
Arsenic	0.50	0.13	mg/Kg	6010B SEP
Iron	5.0	4.1	mg/Kg	6010B SEP
Lead	0.50	0.11	mg/Kg	6010B SEP
Li	2.5	0.15	mg/Kg	6010B SEP
Mo	2.0	0.082	mg/Kg	6010B SEP

Method: 6010B - SEP Metals (ICP) - Total

Prep: Total

Analyte	RL	MDL	Units	Method
Aluminum	10	1.6	mg/Kg	6010B
Arsenic	0.50	0.13	mg/Kg	6010B
Iron	5.0	4.1	mg/Kg	6010B
Lead	0.50	0.11	mg/Kg	6010B
Lithium	2.5	0.15	mg/Kg	6010B
Molybdenum	2.0	0.082	mg/Kg	6010B

Method: EPA 6020A - Metals (ICP/MS)

Prep: 3050B

Default Detection Limits

Method: EPA 6020A - Metals (ICP/MS)

Prep: 3050B

Analyte	RL	MDL	Units	Method
Aluminum	3.0	1.4	mg/Kg	EPA 6020A
Arsenic	0.10	0.026	mg/Kg	EPA 6020A
Iron	5.0	2.5	mg/Kg	EPA 6020A
Lead	0.10	0.035	mg/Kg	EPA 6020A
Lithium	0.50	0.28	mg/Kg	EPA 6020A
Molybdenum	0.50	0.062	mg/Kg	EPA 6020A

QC Sample Results

Method: 6010B - SEP Metals (ICP) - Total

Lab Sample ID: MB 140-25278/18-A
Matrix: Solid
Analysis Batch: 25767

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 25278

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		11/12/18 08:00	11/28/18 11:10	1
Arsenic	ND		0.50	0.13	mg/Kg		11/12/18 08:00	11/28/18 11:10	1
Iron	ND		5.0	4.1	mg/Kg		11/12/18 08:00	11/28/18 11:10	1
Lead	ND		0.50	0.11	mg/Kg		11/12/18 08:00	11/28/18 11:10	1
Lithium	ND		2.5	0.15	mg/Kg		11/12/18 08:00	11/28/18 11:10	1
Molybdenum	ND		2.0	0.082	mg/Kg		11/12/18 08:00	11/28/18 11:10	1

Lab Sample ID: LCS 140-25278/19-A
Matrix: Solid
Analysis Batch: 25767

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 25278

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	101		mg/Kg		101	75 - 125
Arsenic	5.00	5.26		mg/Kg		105	75 - 125
Iron	50.0	53.9		mg/Kg		108	75 - 125
Lead	5.00	5.12		mg/Kg		102	75 - 125
Lithium	5.00	5.18		mg/Kg		104	75 - 125
Molybdenum	25.0	27.1		mg/Kg		108	75 - 125

Lab Sample ID: LCSD 140-25278/20-A
Matrix: Solid
Analysis Batch: 25767

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 25278

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	107		mg/Kg		107	75 - 125	6	30
Arsenic	5.00	5.14		mg/Kg		103	75 - 125	2	30
Iron	50.0	54.6		mg/Kg		109	75 - 125	1	30
Lead	5.00	5.06		mg/Kg		101	75 - 125	1	30
Lithium	5.00	5.15		mg/Kg		103	75 - 125	1	30
Molybdenum	25.0	26.6		mg/Kg		106	75 - 125	2	30

Method: 6010B SEP - SEP Metals (ICP)

Lab Sample ID: MB 140-25320/18-B ^4
Matrix: Solid
Analysis Batch: 25503

Client Sample ID: Method Blank
Prep Type: Step 1
Prep Batch: 25357

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		40	6.4	mg/Kg		11/14/18 08:00	11/17/18 09:57	4
Arsenic	ND		2.0	0.52	mg/Kg		11/14/18 08:00	11/17/18 09:57	4
Iron	ND		20	12	mg/Kg		11/14/18 08:00	11/17/18 09:57	4
Lead	ND		2.0	0.44	mg/Kg		11/14/18 08:00	11/17/18 09:57	4
Li	ND		10	0.60	mg/Kg		11/14/18 08:00	11/17/18 09:57	4
Mo	ND		8.0	0.33	mg/Kg		11/14/18 08:00	11/17/18 09:57	4

QC Sample Results

Client: Golder Associates Inc.
Project/Site: Rush Island Energy Center - Soil & Speci

TestAmerica Job ID: 140-13229-1

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: LCS 140-25320/19-B ^5
Matrix: Solid
Analysis Batch: 25503

Client Sample ID: Lab Control Sample
Prep Type: Step 1
Prep Batch: 25357

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	95.1		mg/Kg		95	75 - 125
Arsenic	5.00	4.78		mg/Kg		96	75 - 125
Iron	50.0	48.1		mg/Kg		96	75 - 125
Lead	5.00	4.68		mg/Kg		94	75 - 125
Li	5.00	5.00	J	mg/Kg		100	75 - 125
Mo	25.0	24.4		mg/Kg		98	75 - 125

Lab Sample ID: LCSD 140-25320/20-B ^5
Matrix: Solid
Analysis Batch: 25503

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 1
Prep Batch: 25357

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	97.2		mg/Kg		97	75 - 125	2	30
Arsenic	5.00	4.83		mg/Kg		97	75 - 125	1	30
Iron	50.0	49.6		mg/Kg		99	75 - 125	3	30
Lead	5.00	4.84		mg/Kg		97	75 - 125	3	30
Li	5.00	5.08	J	mg/Kg		102	75 - 125	2	30
Mo	25.0	24.7		mg/Kg		99	75 - 125	1	30

Lab Sample ID: MB 140-25362/18-B ^3
Matrix: Solid
Analysis Batch: 25503

Client Sample ID: Method Blank
Prep Type: Step 2
Prep Batch: 25392

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		30	4.8	mg/Kg		11/15/18 08:00	11/17/18 12:01	3
Arsenic	ND		1.5	0.39	mg/Kg		11/15/18 08:00	11/17/18 12:01	3
Iron	ND		15	8.7	mg/Kg		11/15/18 08:00	11/17/18 12:01	3
Lead	ND		1.5	0.33	mg/Kg		11/15/18 08:00	11/17/18 12:01	3
Li	ND		7.5	0.45	mg/Kg		11/15/18 08:00	11/17/18 12:01	3
Mo	ND		6.0	0.25	mg/Kg		11/15/18 08:00	11/17/18 12:01	3

Lab Sample ID: LCS 140-25362/19-B ^5
Matrix: Solid
Analysis Batch: 25503

Client Sample ID: Lab Control Sample
Prep Type: Step 2
Prep Batch: 25392

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	ND	*	mg/Kg		1	75 - 125
Arsenic	5.00	3.67	*	mg/Kg		73	75 - 125
Iron	50.0	ND	*	mg/Kg		3	75 - 125
Lead	5.00	3.92		mg/Kg		78	75 - 125
Li	5.00	4.35	J	mg/Kg		87	75 - 125
Mo	25.0	20.8		mg/Kg		83	75 - 125

Lab Sample ID: LCSD 140-25362/20-B ^5
Matrix: Solid
Analysis Batch: 25503

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 2
Prep Batch: 25392

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	ND	*	mg/Kg		-0.04	75 - 125	210	30

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: LCSD 140-25362/20-B ^5
Matrix: Solid
Analysis Batch: 25503

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 2
Prep Batch: 25392

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	5.00	3.72	*	mg/Kg		74	75 - 125	1	30
Iron	50.0	ND	*	mg/Kg		2	75 - 125	16	30
Lead	5.00	4.33		mg/Kg		87	75 - 125	10	30
Li	5.00	4.46	J	mg/Kg		89	75 - 125	3	30
Mo	25.0	21.0		mg/Kg		84	75 - 125	1	30

Lab Sample ID: MB 140-25394/18-B
Matrix: Solid
Analysis Batch: 25554

Client Sample ID: Method Blank
Prep Type: Step 3
Prep Batch: 25444

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	2.1	mg/Kg		11/16/18 08:00	11/19/18 12:49	1
Arsenic	ND		0.50	0.13	mg/Kg		11/16/18 08:00	11/19/18 12:49	1
Iron	ND		5.0	2.9	mg/Kg		11/16/18 08:00	11/19/18 12:49	1
Lead	ND		0.50	0.11	mg/Kg		11/16/18 08:00	11/19/18 12:49	1
Li	ND		2.5	0.15	mg/Kg		11/16/18 08:00	11/19/18 12:49	1
Mo	ND		2.0	0.082	mg/Kg		11/16/18 08:00	11/19/18 12:49	1

Lab Sample ID: LCS 140-25394/19-B
Matrix: Solid
Analysis Batch: 25554

Client Sample ID: Lab Control Sample
Prep Type: Step 3
Prep Batch: 25444

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	93.5		mg/Kg		93	75 - 125
Arsenic	5.00	4.87		mg/Kg		97	75 - 125
Iron	50.0	49.9		mg/Kg		100	75 - 125
Lead	5.00	0.173	J *	mg/Kg		3	75 - 125
Li	5.00	4.79		mg/Kg		96	75 - 125
Mo	25.0	24.7		mg/Kg		99	75 - 125

Lab Sample ID: LCSD 140-25394/20-B
Matrix: Solid
Analysis Batch: 25554

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 3
Prep Batch: 25444

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	96.0		mg/Kg		96	75 - 125	3	30
Arsenic	5.00	4.99		mg/Kg		100	75 - 125	2	30
Iron	50.0	51.4		mg/Kg		103	75 - 125	3	30
Lead	5.00	0.161	J *	mg/Kg		3	75 - 125	7	30
Li	5.00	4.91		mg/Kg		98	75 - 125	3	30
Mo	25.0	25.4		mg/Kg		102	75 - 125	3	30

Lab Sample ID: MB 140-25447/18-B
Matrix: Solid
Analysis Batch: 25554

Client Sample ID: Method Blank
Prep Type: Step 4
Prep Batch: 25493

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		11/17/18 08:00	11/19/18 14:54	1
Arsenic	0.473	J	0.50	0.22	mg/Kg		11/17/18 08:00	11/19/18 14:54	1

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: MB 140-25447/18-B
Client Sample ID: Method Blank
Matrix: Solid
Prep Type: Step 4
Analysis Batch: 25554
Prep Batch: 25493

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		5.0	2.9	mg/Kg		11/17/18 08:00	11/19/18 14:54	1
Lead	ND		0.50	0.11	mg/Kg		11/17/18 08:00	11/19/18 14:54	1
Li	ND		2.5	0.15	mg/Kg		11/17/18 08:00	11/19/18 14:54	1
Mo	ND		2.0	0.082	mg/Kg		11/17/18 08:00	11/19/18 14:54	1

Lab Sample ID: LCS 140-25447/19-B
Client Sample ID: Lab Control Sample
Matrix: Solid
Prep Type: Step 4
Analysis Batch: 25554
Prep Batch: 25493

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	96.7		mg/Kg		97	75 - 125
Arsenic	5.00	5.63		mg/Kg		113	75 - 125
Iron	50.0	50.4		mg/Kg		101	75 - 125
Lead	5.00	4.99		mg/Kg		100	75 - 125
Li	5.00	5.05		mg/Kg		101	75 - 125
Mo	25.0	25.3		mg/Kg		101	75 - 125

Lab Sample ID: LCSD 140-25447/20-B
Client Sample ID: Lab Control Sample Dup
Matrix: Solid
Prep Type: Step 4
Analysis Batch: 25554
Prep Batch: 25493

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	99.7		mg/Kg		100	75 - 125	3	30
Arsenic	5.00	5.79		mg/Kg		116	75 - 125	3	30
Iron	50.0	52.1		mg/Kg		104	75 - 125	3	30
Lead	5.00	5.13		mg/Kg		103	75 - 125	3	30
Li	5.00	5.20		mg/Kg		104	75 - 125	3	30
Mo	25.0	26.8		mg/Kg		107	75 - 125	6	30

Lab Sample ID: MB 140-25494/18-B ^5
Client Sample ID: Method Blank
Matrix: Solid
Prep Type: Step 5
Analysis Batch: 25679
Prep Batch: 25553

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		150	24	mg/Kg		11/20/18 08:00	11/26/18 10:33	5
Arsenic	ND		7.5	1.9	mg/Kg		11/20/18 08:00	11/26/18 10:33	5
Iron	ND		75	44	mg/Kg		11/20/18 08:00	11/26/18 10:33	5
Lead	ND		7.5	1.7	mg/Kg		11/20/18 08:00	11/26/18 10:33	5
Li	4.52	J	38	2.2	mg/Kg		11/20/18 08:00	11/26/18 10:33	5
Mo	ND		30	1.3	mg/Kg		11/20/18 08:00	11/26/18 10:33	5

Lab Sample ID: LCS 140-25494/19-B ^5
Client Sample ID: Lab Control Sample
Matrix: Solid
Prep Type: Step 5
Analysis Batch: 25679
Prep Batch: 25553

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	300	31.4	J *	mg/Kg		10	75 - 125
Arsenic	15.0	12.1		mg/Kg		81	75 - 125
Iron	150	ND	*	mg/Kg		1	75 - 125

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: LCS 140-25494/19-B ^5
Matrix: Solid
Analysis Batch: 25679

Client Sample ID: Lab Control Sample
Prep Type: Step 5
Prep Batch: 25553

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	15.0	7.22	J *	mg/Kg		48	75 - 125
Li	15.0	20.4	J *	mg/Kg		136	75 - 125
Mo	75.0	65.3		mg/Kg		87	75 - 125

Lab Sample ID: LCSD 140-25494/20-B ^5
Matrix: Solid
Analysis Batch: 25679

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 5
Prep Batch: 25553

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	300	28.8	J *	mg/Kg		10	75 - 125	9	30
Arsenic	15.0	12.8		mg/Kg		85	75 - 125	5	30
Iron	150	ND	*	mg/Kg		2	75 - 125	26	30
Lead	15.0	6.72	J *	mg/Kg		45	75 - 125	7	30
Li	15.0	20.3	J *	mg/Kg		135	75 - 125	0	30
Mo	75.0	66.5		mg/Kg		89	75 - 125	2	30

Lab Sample ID: MB 140-25574/18-A
Matrix: Solid
Analysis Batch: 25679

Client Sample ID: Method Blank
Prep Type: Step 6
Prep Batch: 25574

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		11/20/18 09:43	11/26/18 12:42	1
Arsenic	ND		0.50	0.15	mg/Kg		11/20/18 09:43	11/26/18 12:42	1
Iron	ND		5.0	2.9	mg/Kg		11/20/18 09:43	11/26/18 12:42	1
Lead	ND		0.50	0.11	mg/Kg		11/20/18 09:43	11/26/18 12:42	1
Li	ND		2.5	0.15	mg/Kg		11/20/18 09:43	11/26/18 12:42	1
Mo	ND		2.0	0.099	mg/Kg		11/20/18 09:43	11/26/18 12:42	1

Lab Sample ID: LCS 140-25574/19-A
Matrix: Solid
Analysis Batch: 25679

Client Sample ID: Lab Control Sample
Prep Type: Step 6
Prep Batch: 25574

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	91.7		mg/Kg		92	75 - 125
Arsenic	5.00	4.83		mg/Kg		97	75 - 125
Iron	50.0	47.1		mg/Kg		94	75 - 125
Lead	5.00	4.81		mg/Kg		96	75 - 125
Li	5.00	4.64		mg/Kg		93	75 - 125
Mo	25.0	24.4		mg/Kg		98	75 - 125

Lab Sample ID: LCSD 140-25574/20-A
Matrix: Solid
Analysis Batch: 25679

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 6
Prep Batch: 25574

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	95.7		mg/Kg		96	75 - 125	4	30
Arsenic	5.00	5.00		mg/Kg		100	75 - 125	3	30
Iron	50.0	49.1		mg/Kg		98	75 - 125	4	30
Lead	5.00	4.95		mg/Kg		99	75 - 125	3	30

Method: 6010B SEP - SEP Metals (ICP) (Continued)

Lab Sample ID: LCSD 140-25574/20-A
Matrix: Solid
Analysis Batch: 25679

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 6
Prep Batch: 25574

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Li	5.00	4.73		mg/Kg		95	75 - 125	2	30
Mo	25.0	24.8		mg/Kg		99	75 - 125	1	30

Lab Sample ID: MB 140-25604/18-A
Matrix: Solid
Analysis Batch: 25767

Client Sample ID: Method Blank
Prep Type: Step 7
Prep Batch: 25604

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		11/21/18 07:44	11/28/18 10:55	1
Arsenic	ND		0.50	0.13	mg/Kg		11/21/18 07:44	11/28/18 10:55	1
Iron	5.08		5.0	4.1	mg/Kg		11/21/18 07:44	11/28/18 10:55	1
Lead	ND		0.50	0.11	mg/Kg		11/21/18 07:44	11/28/18 10:55	1
Li	ND		2.5	0.15	mg/Kg		11/21/18 07:44	11/28/18 10:55	1
Mo	ND		2.0	0.082	mg/Kg		11/21/18 07:44	11/28/18 10:55	1

Lab Sample ID: LCS 140-25604/19-A
Matrix: Solid
Analysis Batch: 25767

Client Sample ID: Lab Control Sample
Prep Type: Step 7
Prep Batch: 25604

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	102		mg/Kg		102	75 - 125
Arsenic	5.00	5.29		mg/Kg		106	75 - 125
Iron	50.0	54.6		mg/Kg		109	75 - 125
Lead	5.00	5.14		mg/Kg		103	75 - 125
Li	5.00	5.24		mg/Kg		105	75 - 125
Mo	25.0	27.2		mg/Kg		109	75 - 125

Lab Sample ID: LCSD 140-25604/20-A
Matrix: Solid
Analysis Batch: 25767

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 7
Prep Batch: 25604

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	100		mg/Kg		100	75 - 125	1	30
Arsenic	5.00	5.17		mg/Kg		103	75 - 125	2	30
Iron	50.0	54.0		mg/Kg		108	75 - 125	1	30
Lead	5.00	5.05		mg/Kg		101	75 - 125	2	30
Li	5.00	5.14		mg/Kg		103	75 - 125	2	30
Mo	25.0	26.3		mg/Kg		105	75 - 125	3	30

Method: EPA 6020A - Metals (ICP/MS)

Lab Sample ID: MB 180-263578/1-A
Matrix: Solid
Analysis Batch: 264070

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 263578

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		3.0	1.4	mg/Kg		11/21/18 14:04	11/28/18 18:54	1
Arsenic	ND		0.10	0.026	mg/Kg		11/21/18 14:04	11/28/18 18:54	1
Iron	ND		5.0	2.5	mg/Kg		11/21/18 14:04	11/28/18 18:54	1

Method: EPA 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 180-263578/1-A **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 264070 **Prep Batch: 263578**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.10	0.035	mg/Kg		11/21/18 14:04	11/28/18 18:54	1
Lithium	ND		0.50	0.28	mg/Kg		11/21/18 14:04	11/28/18 18:54	1
Molybdenum	ND		0.50	0.062	mg/Kg		11/21/18 14:04	11/28/18 18:54	1

Lab Sample ID: LCS 180-263578/2-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 264070 **Prep Batch: 263578**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	200	190		mg/Kg		95	80 - 120
Arsenic	4.00	3.90		mg/Kg		97	80 - 120
Iron	100	106		mg/Kg		106	80 - 120
Lead	2.00	2.17		mg/Kg		109	80 - 120
Lithium	5.00	4.85		mg/Kg		97	80 - 120
Molybdenum	100	102		mg/Kg		102	80 - 120

Metals

Prep Batch: 25278

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Total/NA	Solid	Total	
140-13229-2	BH-03 (70-75)	Total/NA	Solid	Total	
140-13229-3	BH-03 (110-115)	Total/NA	Solid	Total	
140-13229-4	DUP-1	Total/NA	Solid	Total	
140-13229-5	BH-02 (41-45)	Total/NA	Solid	Total	
140-13229-6	BH-02 (72-75)	Total/NA	Solid	Total	
140-13229-7	BH-02 (70-72)	Total/NA	Solid	Total	
140-13229-8	BH-02 (125-130)	Total/NA	Solid	Total	
140-13229-9	BH-01 (26-31)	Total/NA	Solid	Total	
140-13229-10	BH-01 (75-80)	Total/NA	Solid	Total	
140-13229-11	BH-01 (130-135)	Total/NA	Solid	Total	
MB 140-25278/18-A	Method Blank	Total/NA	Solid	Total	
LCS 140-25278/19-A	Lab Control Sample	Total/NA	Solid	Total	
LCSD 140-25278/20-A	Lab Control Sample Dup	Total/NA	Solid	Total	

SEP Batch: 25320

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 1	Solid	Exchangeable	
140-13229-2	BH-03 (70-75)	Step 1	Solid	Exchangeable	
140-13229-3	BH-03 (110-115)	Step 1	Solid	Exchangeable	
140-13229-4	DUP-1	Step 1	Solid	Exchangeable	
140-13229-5	BH-02 (41-45)	Step 1	Solid	Exchangeable	
140-13229-6	BH-02 (72-75)	Step 1	Solid	Exchangeable	
140-13229-7	BH-02 (70-72)	Step 1	Solid	Exchangeable	
140-13229-8	BH-02 (125-130)	Step 1	Solid	Exchangeable	
140-13229-9	BH-01 (26-31)	Step 1	Solid	Exchangeable	
140-13229-10	BH-01 (75-80)	Step 1	Solid	Exchangeable	
140-13229-11	BH-01 (130-135)	Step 1	Solid	Exchangeable	
MB 140-25320/18-B ^4	Method Blank	Step 1	Solid	Exchangeable	
LCS 140-25320/19-B ^5	Lab Control Sample	Step 1	Solid	Exchangeable	
LCSD 140-25320/20-B ^5	Lab Control Sample Dup	Step 1	Solid	Exchangeable	

Prep Batch: 25357

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 1	Solid	3010A	25320
140-13229-2	BH-03 (70-75)	Step 1	Solid	3010A	25320
140-13229-3	BH-03 (110-115)	Step 1	Solid	3010A	25320
140-13229-4	DUP-1	Step 1	Solid	3010A	25320
140-13229-5	BH-02 (41-45)	Step 1	Solid	3010A	25320
140-13229-6	BH-02 (72-75)	Step 1	Solid	3010A	25320
140-13229-7	BH-02 (70-72)	Step 1	Solid	3010A	25320
140-13229-8	BH-02 (125-130)	Step 1	Solid	3010A	25320
140-13229-9	BH-01 (26-31)	Step 1	Solid	3010A	25320
140-13229-10	BH-01 (75-80)	Step 1	Solid	3010A	25320
140-13229-11	BH-01 (130-135)	Step 1	Solid	3010A	25320
MB 140-25320/18-B ^4	Method Blank	Step 1	Solid	3010A	25320
LCS 140-25320/19-B ^5	Lab Control Sample	Step 1	Solid	3010A	25320
LCSD 140-25320/20-B ^5	Lab Control Sample Dup	Step 1	Solid	3010A	25320

Metals (Continued)

SEP Batch: 25362

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 2	Solid	Carbonate	
140-13229-2	BH-03 (70-75)	Step 2	Solid	Carbonate	
140-13229-3	BH-03 (110-115)	Step 2	Solid	Carbonate	
140-13229-4	DUP-1	Step 2	Solid	Carbonate	
140-13229-5	BH-02 (41-45)	Step 2	Solid	Carbonate	
140-13229-6	BH-02 (72-75)	Step 2	Solid	Carbonate	
140-13229-7	BH-02 (70-72)	Step 2	Solid	Carbonate	
140-13229-8	BH-02 (125-130)	Step 2	Solid	Carbonate	
140-13229-9	BH-01 (26-31)	Step 2	Solid	Carbonate	
140-13229-10	BH-01 (75-80)	Step 2	Solid	Carbonate	
140-13229-11	BH-01 (130-135)	Step 2	Solid	Carbonate	
MB 140-25362/18-B ^3	Method Blank	Step 2	Solid	Carbonate	
LCS 140-25362/19-B ^5	Lab Control Sample	Step 2	Solid	Carbonate	
LCSD 140-25362/20-B ^5	Lab Control Sample Dup	Step 2	Solid	Carbonate	

Prep Batch: 25392

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 2	Solid	3010A	25362
140-13229-2	BH-03 (70-75)	Step 2	Solid	3010A	25362
140-13229-3	BH-03 (110-115)	Step 2	Solid	3010A	25362
140-13229-4	DUP-1	Step 2	Solid	3010A	25362
140-13229-5	BH-02 (41-45)	Step 2	Solid	3010A	25362
140-13229-6	BH-02 (72-75)	Step 2	Solid	3010A	25362
140-13229-7	BH-02 (70-72)	Step 2	Solid	3010A	25362
140-13229-8	BH-02 (125-130)	Step 2	Solid	3010A	25362
140-13229-9	BH-01 (26-31)	Step 2	Solid	3010A	25362
140-13229-10	BH-01 (75-80)	Step 2	Solid	3010A	25362
140-13229-11	BH-01 (130-135)	Step 2	Solid	3010A	25362
MB 140-25362/18-B ^3	Method Blank	Step 2	Solid	3010A	25362
LCS 140-25362/19-B ^5	Lab Control Sample	Step 2	Solid	3010A	25362
LCSD 140-25362/20-B ^5	Lab Control Sample Dup	Step 2	Solid	3010A	25362

SEP Batch: 25394

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 3	Solid	Non-Crystalline	
140-13229-2	BH-03 (70-75)	Step 3	Solid	Non-Crystalline	
140-13229-3	BH-03 (110-115)	Step 3	Solid	Non-Crystalline	
140-13229-4	DUP-1	Step 3	Solid	Non-Crystalline	
140-13229-5	BH-02 (41-45)	Step 3	Solid	Non-Crystalline	
140-13229-6	BH-02 (72-75)	Step 3	Solid	Non-Crystalline	
140-13229-7	BH-02 (70-72)	Step 3	Solid	Non-Crystalline	
140-13229-8	BH-02 (125-130)	Step 3	Solid	Non-Crystalline	
140-13229-9	BH-01 (26-31)	Step 3	Solid	Non-Crystalline	
140-13229-10	BH-01 (75-80)	Step 3	Solid	Non-Crystalline	
140-13229-11	BH-01 (130-135)	Step 3	Solid	Non-Crystalline	
MB 140-25394/18-B	Method Blank	Step 3	Solid	Non-Crystalline	
LCS 140-25394/19-B	Lab Control Sample	Step 3	Solid	Non-Crystalline	
LCSD 140-25394/20-B	Lab Control Sample Dup	Step 3	Solid	Non-Crystalline	

Metals (Continued)

Prep Batch: 25444

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 3	Solid	3010A	25394
140-13229-2	BH-03 (70-75)	Step 3	Solid	3010A	25394
140-13229-3	BH-03 (110-115)	Step 3	Solid	3010A	25394
140-13229-4	DUP-1	Step 3	Solid	3010A	25394
140-13229-5	BH-02 (41-45)	Step 3	Solid	3010A	25394
140-13229-6	BH-02 (72-75)	Step 3	Solid	3010A	25394
140-13229-7	BH-02 (70-72)	Step 3	Solid	3010A	25394
140-13229-8	BH-02 (125-130)	Step 3	Solid	3010A	25394
140-13229-9	BH-01 (26-31)	Step 3	Solid	3010A	25394
140-13229-10	BH-01 (75-80)	Step 3	Solid	3010A	25394
140-13229-11	BH-01 (130-135)	Step 3	Solid	3010A	25394
MB 140-25394/18-B	Method Blank	Step 3	Solid	3010A	25394
LCS 140-25394/19-B	Lab Control Sample	Step 3	Solid	3010A	25394
LCSD 140-25394/20-B	Lab Control Sample Dup	Step 3	Solid	3010A	25394

SEP Batch: 25447

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 4	Solid	Metal Hydroxide	
140-13229-2	BH-03 (70-75)	Step 4	Solid	Metal Hydroxide	
140-13229-3	BH-03 (110-115)	Step 4	Solid	Metal Hydroxide	
140-13229-4	DUP-1	Step 4	Solid	Metal Hydroxide	
140-13229-5	BH-02 (41-45)	Step 4	Solid	Metal Hydroxide	
140-13229-6	BH-02 (72-75)	Step 4	Solid	Metal Hydroxide	
140-13229-7	BH-02 (70-72)	Step 4	Solid	Metal Hydroxide	
140-13229-8	BH-02 (125-130)	Step 4	Solid	Metal Hydroxide	
140-13229-9	BH-01 (26-31)	Step 4	Solid	Metal Hydroxide	
140-13229-10	BH-01 (75-80)	Step 4	Solid	Metal Hydroxide	
140-13229-11	BH-01 (130-135)	Step 4	Solid	Metal Hydroxide	
MB 140-25447/18-B	Method Blank	Step 4	Solid	Metal Hydroxide	
LCS 140-25447/19-B	Lab Control Sample	Step 4	Solid	Metal Hydroxide	
LCSD 140-25447/20-B	Lab Control Sample Dup	Step 4	Solid	Metal Hydroxide	

Prep Batch: 25493

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 4	Solid	3010A	25447
140-13229-2	BH-03 (70-75)	Step 4	Solid	3010A	25447
140-13229-3	BH-03 (110-115)	Step 4	Solid	3010A	25447
140-13229-4	DUP-1	Step 4	Solid	3010A	25447
140-13229-5	BH-02 (41-45)	Step 4	Solid	3010A	25447
140-13229-6	BH-02 (72-75)	Step 4	Solid	3010A	25447
140-13229-7	BH-02 (70-72)	Step 4	Solid	3010A	25447
140-13229-8	BH-02 (125-130)	Step 4	Solid	3010A	25447
140-13229-9	BH-01 (26-31)	Step 4	Solid	3010A	25447
140-13229-10	BH-01 (75-80)	Step 4	Solid	3010A	25447
140-13229-11	BH-01 (130-135)	Step 4	Solid	3010A	25447
MB 140-25447/18-B	Method Blank	Step 4	Solid	3010A	25447
LCS 140-25447/19-B	Lab Control Sample	Step 4	Solid	3010A	25447
LCSD 140-25447/20-B	Lab Control Sample Dup	Step 4	Solid	3010A	25447

Metals (Continued)

SEP Batch: 25494

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 5	Solid	Organic-Bound	
140-13229-2	BH-03 (70-75)	Step 5	Solid	Organic-Bound	
140-13229-3	BH-03 (110-115)	Step 5	Solid	Organic-Bound	
140-13229-4	DUP-1	Step 5	Solid	Organic-Bound	
140-13229-5	BH-02 (41-45)	Step 5	Solid	Organic-Bound	
140-13229-6	BH-02 (72-75)	Step 5	Solid	Organic-Bound	
140-13229-7	BH-02 (70-72)	Step 5	Solid	Organic-Bound	
140-13229-8	BH-02 (125-130)	Step 5	Solid	Organic-Bound	
140-13229-9	BH-01 (26-31)	Step 5	Solid	Organic-Bound	
140-13229-10	BH-01 (75-80)	Step 5	Solid	Organic-Bound	
140-13229-11	BH-01 (130-135)	Step 5	Solid	Organic-Bound	
MB 140-25494/18-B ^5	Method Blank	Step 5	Solid	Organic-Bound	
LCS 140-25494/19-B ^5	Lab Control Sample	Step 5	Solid	Organic-Bound	
LCSD 140-25494/20-B ^5	Lab Control Sample Dup	Step 5	Solid	Organic-Bound	

Analysis Batch: 25503

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 1	Solid	6010B SEP	25357
140-13229-1	BH-03 (30-32)	Step 2	Solid	6010B SEP	25392
140-13229-2	BH-03 (70-75)	Step 1	Solid	6010B SEP	25357
140-13229-2	BH-03 (70-75)	Step 2	Solid	6010B SEP	25392
140-13229-3	BH-03 (110-115)	Step 1	Solid	6010B SEP	25357
140-13229-3	BH-03 (110-115)	Step 2	Solid	6010B SEP	25392
140-13229-4	DUP-1	Step 1	Solid	6010B SEP	25357
140-13229-4	DUP-1	Step 2	Solid	6010B SEP	25392
140-13229-5	BH-02 (41-45)	Step 1	Solid	6010B SEP	25357
140-13229-5	BH-02 (41-45)	Step 2	Solid	6010B SEP	25392
140-13229-6	BH-02 (72-75)	Step 1	Solid	6010B SEP	25357
140-13229-6	BH-02 (72-75)	Step 2	Solid	6010B SEP	25392
140-13229-7	BH-02 (70-72)	Step 1	Solid	6010B SEP	25357
140-13229-7	BH-02 (70-72)	Step 2	Solid	6010B SEP	25392
140-13229-8	BH-02 (125-130)	Step 1	Solid	6010B SEP	25357
140-13229-8	BH-02 (125-130)	Step 2	Solid	6010B SEP	25392
140-13229-9	BH-01 (26-31)	Step 1	Solid	6010B SEP	25357
140-13229-9	BH-01 (26-31)	Step 2	Solid	6010B SEP	25392
140-13229-10	BH-01 (75-80)	Step 1	Solid	6010B SEP	25357
140-13229-10	BH-01 (75-80)	Step 2	Solid	6010B SEP	25392
140-13229-11	BH-01 (130-135)	Step 1	Solid	6010B SEP	25357
140-13229-11	BH-01 (130-135)	Step 2	Solid	6010B SEP	25392
MB 140-25320/18-B ^4	Method Blank	Step 1	Solid	6010B SEP	25357
MB 140-25362/18-B ^3	Method Blank	Step 2	Solid	6010B SEP	25392
LCS 140-25320/19-B ^5	Lab Control Sample	Step 1	Solid	6010B SEP	25357
LCS 140-25362/19-B ^5	Lab Control Sample	Step 2	Solid	6010B SEP	25392
LCSD 140-25320/20-B ^5	Lab Control Sample Dup	Step 1	Solid	6010B SEP	25357
LCSD 140-25362/20-B ^5	Lab Control Sample Dup	Step 2	Solid	6010B SEP	25392

Prep Batch: 25553

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 5	Solid	3010A	25494
140-13229-2	BH-03 (70-75)	Step 5	Solid	3010A	25494
140-13229-3	BH-03 (110-115)	Step 5	Solid	3010A	25494

QC Association Summary

Metals (Continued)

Prep Batch: 25553 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-4	DUP-1	Step 5	Solid	3010A	25494
140-13229-5	BH-02 (41-45)	Step 5	Solid	3010A	25494
140-13229-6	BH-02 (72-75)	Step 5	Solid	3010A	25494
140-13229-7	BH-02 (70-72)	Step 5	Solid	3010A	25494
140-13229-8	BH-02 (125-130)	Step 5	Solid	3010A	25494
140-13229-9	BH-01 (26-31)	Step 5	Solid	3010A	25494
140-13229-10	BH-01 (75-80)	Step 5	Solid	3010A	25494
140-13229-11	BH-01 (130-135)	Step 5	Solid	3010A	25494
MB 140-25494/18-B ^5	Method Blank	Step 5	Solid	3010A	25494
LCS 140-25494/19-B ^5	Lab Control Sample	Step 5	Solid	3010A	25494
LCSD 140-25494/20-B ^5	Lab Control Sample Dup	Step 5	Solid	3010A	25494

Analysis Batch: 25554

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 3	Solid	6010B SEP	25444
140-13229-1	BH-03 (30-32)	Step 4	Solid	6010B SEP	25493
140-13229-2	BH-03 (70-75)	Step 3	Solid	6010B SEP	25444
140-13229-2	BH-03 (70-75)	Step 4	Solid	6010B SEP	25493
140-13229-3	BH-03 (110-115)	Step 3	Solid	6010B SEP	25444
140-13229-3	BH-03 (110-115)	Step 4	Solid	6010B SEP	25493
140-13229-4	DUP-1	Step 3	Solid	6010B SEP	25444
140-13229-4	DUP-1	Step 4	Solid	6010B SEP	25493
140-13229-5	BH-02 (41-45)	Step 3	Solid	6010B SEP	25444
140-13229-5	BH-02 (41-45)	Step 4	Solid	6010B SEP	25493
140-13229-6	BH-02 (72-75)	Step 3	Solid	6010B SEP	25444
140-13229-6	BH-02 (72-75)	Step 4	Solid	6010B SEP	25493
140-13229-7	BH-02 (70-72)	Step 3	Solid	6010B SEP	25444
140-13229-7	BH-02 (70-72)	Step 4	Solid	6010B SEP	25493
140-13229-8	BH-02 (125-130)	Step 3	Solid	6010B SEP	25444
140-13229-8	BH-02 (125-130)	Step 4	Solid	6010B SEP	25493
140-13229-9	BH-01 (26-31)	Step 3	Solid	6010B SEP	25444
140-13229-9	BH-01 (26-31)	Step 4	Solid	6010B SEP	25493
140-13229-10	BH-01 (75-80)	Step 3	Solid	6010B SEP	25444
140-13229-10	BH-01 (75-80)	Step 4	Solid	6010B SEP	25493
140-13229-11	BH-01 (130-135)	Step 3	Solid	6010B SEP	25444
140-13229-11	BH-01 (130-135)	Step 4	Solid	6010B SEP	25493
MB 140-25394/18-B	Method Blank	Step 3	Solid	6010B SEP	25444
MB 140-25447/18-B	Method Blank	Step 4	Solid	6010B SEP	25493
LCS 140-25394/19-B	Lab Control Sample	Step 3	Solid	6010B SEP	25444
LCS 140-25447/19-B	Lab Control Sample	Step 4	Solid	6010B SEP	25493
LCSD 140-25394/20-B	Lab Control Sample Dup	Step 3	Solid	6010B SEP	25444
LCSD 140-25447/20-B	Lab Control Sample Dup	Step 4	Solid	6010B SEP	25493

SEP Batch: 25574

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 6	Solid	Acid/Sulfide	
140-13229-2	BH-03 (70-75)	Step 6	Solid	Acid/Sulfide	
140-13229-3	BH-03 (110-115)	Step 6	Solid	Acid/Sulfide	
140-13229-4	DUP-1	Step 6	Solid	Acid/Sulfide	
140-13229-5	BH-02 (41-45)	Step 6	Solid	Acid/Sulfide	
140-13229-6	BH-02 (72-75)	Step 6	Solid	Acid/Sulfide	

Metals (Continued)

SEP Batch: 25574 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-7	BH-02 (70-72)	Step 6	Solid	Acid/Sulfide	
140-13229-8	BH-02 (125-130)	Step 6	Solid	Acid/Sulfide	
140-13229-9	BH-01 (26-31)	Step 6	Solid	Acid/Sulfide	
140-13229-10	BH-01 (75-80)	Step 6	Solid	Acid/Sulfide	
140-13229-11	BH-01 (130-135)	Step 6	Solid	Acid/Sulfide	
MB 140-25574/18-A	Method Blank	Step 6	Solid	Acid/Sulfide	
LCS 140-25574/19-A	Lab Control Sample	Step 6	Solid	Acid/Sulfide	
LCSD 140-25574/20-A	Lab Control Sample Dup	Step 6	Solid	Acid/Sulfide	

Prep Batch: 25604

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 7	Solid	Residual	
140-13229-2	BH-03 (70-75)	Step 7	Solid	Residual	
140-13229-3	BH-03 (110-115)	Step 7	Solid	Residual	
140-13229-4	DUP-1	Step 7	Solid	Residual	
140-13229-5	BH-02 (41-45)	Step 7	Solid	Residual	
140-13229-6	BH-02 (72-75)	Step 7	Solid	Residual	
140-13229-7	BH-02 (70-72)	Step 7	Solid	Residual	
140-13229-8	BH-02 (125-130)	Step 7	Solid	Residual	
140-13229-9	BH-01 (26-31)	Step 7	Solid	Residual	
140-13229-10	BH-01 (75-80)	Step 7	Solid	Residual	
140-13229-11	BH-01 (130-135)	Step 7	Solid	Residual	
MB 140-25604/18-A	Method Blank	Step 7	Solid	Residual	
LCS 140-25604/19-A	Lab Control Sample	Step 7	Solid	Residual	
LCSD 140-25604/20-A	Lab Control Sample Dup	Step 7	Solid	Residual	

Analysis Batch: 25679

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 5	Solid	6010B SEP	25553
140-13229-1	BH-03 (30-32)	Step 6	Solid	6010B SEP	25574
140-13229-2	BH-03 (70-75)	Step 5	Solid	6010B SEP	25553
140-13229-2	BH-03 (70-75)	Step 6	Solid	6010B SEP	25574
140-13229-3	BH-03 (110-115)	Step 5	Solid	6010B SEP	25553
140-13229-3	BH-03 (110-115)	Step 6	Solid	6010B SEP	25574
140-13229-4	DUP-1	Step 5	Solid	6010B SEP	25553
140-13229-4	DUP-1	Step 6	Solid	6010B SEP	25574
140-13229-5	BH-02 (41-45)	Step 5	Solid	6010B SEP	25553
140-13229-5	BH-02 (41-45)	Step 6	Solid	6010B SEP	25574
140-13229-6	BH-02 (72-75)	Step 5	Solid	6010B SEP	25553
140-13229-6	BH-02 (72-75)	Step 6	Solid	6010B SEP	25574
140-13229-7	BH-02 (70-72)	Step 5	Solid	6010B SEP	25553
140-13229-7	BH-02 (70-72)	Step 6	Solid	6010B SEP	25574
140-13229-8	BH-02 (125-130)	Step 5	Solid	6010B SEP	25553
140-13229-8	BH-02 (125-130)	Step 6	Solid	6010B SEP	25574
140-13229-9	BH-01 (26-31)	Step 5	Solid	6010B SEP	25553
140-13229-9	BH-01 (26-31)	Step 6	Solid	6010B SEP	25574
140-13229-10	BH-01 (75-80)	Step 5	Solid	6010B SEP	25553
140-13229-10	BH-01 (75-80)	Step 6	Solid	6010B SEP	25574
140-13229-11	BH-01 (130-135)	Step 5	Solid	6010B SEP	25553
140-13229-11	BH-01 (130-135)	Step 6	Solid	6010B SEP	25574
MB 140-25494/18-B ^5	Method Blank	Step 5	Solid	6010B SEP	25553

QC Association Summary

Metals (Continued)

Analysis Batch: 25679 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 140-25574/18-A	Method Blank	Step 6	Solid	6010B SEP	25574
LCS 140-25494/19-B ^5	Lab Control Sample	Step 5	Solid	6010B SEP	25553
LCS 140-25574/19-A	Lab Control Sample	Step 6	Solid	6010B SEP	25574
LCSD 140-25494/20-B ^5	Lab Control Sample Dup	Step 5	Solid	6010B SEP	25553
LCSD 140-25574/20-A	Lab Control Sample Dup	Step 6	Solid	6010B SEP	25574

Analysis Batch: 25767

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Step 7	Solid	6010B SEP	25604
140-13229-1	BH-03 (30-32)	Step 7	Solid	6010B SEP	25604
140-13229-1	BH-03 (30-32)	Step 7	Solid	6010B SEP	25604
140-13229-1	BH-03 (30-32)	Total/NA	Solid	6010B	25278
140-13229-1	BH-03 (30-32)	Total/NA	Solid	6010B	25278
140-13229-1	BH-03 (30-32)	Total/NA	Solid	6010B	25278
140-13229-2	BH-03 (70-75)	Step 7	Solid	6010B SEP	25604
140-13229-2	BH-03 (70-75)	Step 7	Solid	6010B SEP	25604
140-13229-2	BH-03 (70-75)	Total/NA	Solid	6010B	25278
140-13229-2	BH-03 (70-75)	Total/NA	Solid	6010B	25278
140-13229-2	BH-03 (70-75)	Total/NA	Solid	6010B	25278
140-13229-3	BH-03 (110-115)	Step 7	Solid	6010B SEP	25604
140-13229-3	BH-03 (110-115)	Step 7	Solid	6010B SEP	25604
140-13229-3	BH-03 (110-115)	Step 7	Solid	6010B SEP	25604
140-13229-3	BH-03 (110-115)	Total/NA	Solid	6010B	25278
140-13229-3	BH-03 (110-115)	Total/NA	Solid	6010B	25278
140-13229-3	BH-03 (110-115)	Total/NA	Solid	6010B	25278
140-13229-4	DUP-1	Step 7	Solid	6010B SEP	25604
140-13229-4	DUP-1	Step 7	Solid	6010B SEP	25604
140-13229-4	DUP-1	Step 7	Solid	6010B SEP	25604
140-13229-4	DUP-1	Total/NA	Solid	6010B	25278
140-13229-4	DUP-1	Total/NA	Solid	6010B	25278
140-13229-4	DUP-1	Total/NA	Solid	6010B	25278
140-13229-5	BH-02 (41-45)	Step 7	Solid	6010B SEP	25604
140-13229-5	BH-02 (41-45)	Step 7	Solid	6010B SEP	25604
140-13229-5	BH-02 (41-45)	Total/NA	Solid	6010B	25278
140-13229-5	BH-02 (41-45)	Total/NA	Solid	6010B	25278
140-13229-6	BH-02 (72-75)	Step 7	Solid	6010B SEP	25604
140-13229-6	BH-02 (72-75)	Step 7	Solid	6010B SEP	25604
140-13229-6	BH-02 (72-75)	Total/NA	Solid	6010B	25278
140-13229-6	BH-02 (72-75)	Total/NA	Solid	6010B	25278
140-13229-7	BH-02 (70-72)	Step 7	Solid	6010B SEP	25604
140-13229-7	BH-02 (70-72)	Step 7	Solid	6010B SEP	25604
140-13229-7	BH-02 (70-72)	Total/NA	Solid	6010B	25278
140-13229-7	BH-02 (70-72)	Total/NA	Solid	6010B	25278
140-13229-7	BH-02 (70-72)	Total/NA	Solid	6010B	25278
140-13229-8	BH-02 (125-130)	Step 7	Solid	6010B SEP	25604
140-13229-8	BH-02 (125-130)	Step 7	Solid	6010B SEP	25604
140-13229-8	BH-02 (125-130)	Step 7	Solid	6010B SEP	25604
140-13229-8	BH-02 (125-130)	Total/NA	Solid	6010B	25278
140-13229-8	BH-02 (125-130)	Total/NA	Solid	6010B	25278
140-13229-8	BH-02 (125-130)	Total/NA	Solid	6010B	25278
140-13229-9	BH-01 (26-31)	Step 7	Solid	6010B SEP	25604

Metals (Continued)

Analysis Batch: 25767 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-9	BH-01 (26-31)	Step 7	Solid	6010B SEP	25604
140-13229-9	BH-01 (26-31)	Total/NA	Solid	6010B	25278
140-13229-9	BH-01 (26-31)	Total/NA	Solid	6010B	25278
140-13229-10	BH-01 (75-80)	Step 7	Solid	6010B SEP	25604
140-13229-10	BH-01 (75-80)	Step 7	Solid	6010B SEP	25604
140-13229-10	BH-01 (75-80)	Step 7	Solid	6010B SEP	25604
140-13229-10	BH-01 (75-80)	Total/NA	Solid	6010B	25278
140-13229-10	BH-01 (75-80)	Total/NA	Solid	6010B	25278
140-13229-10	BH-01 (75-80)	Total/NA	Solid	6010B	25278
140-13229-11	BH-01 (130-135)	Step 7	Solid	6010B SEP	25604
140-13229-11	BH-01 (130-135)	Step 7	Solid	6010B SEP	25604
140-13229-11	BH-01 (130-135)	Step 7	Solid	6010B SEP	25604
140-13229-11	BH-01 (130-135)	Step 7	Solid	6010B SEP	25604
140-13229-11	BH-01 (130-135)	Total/NA	Solid	6010B	25278
140-13229-11	BH-01 (130-135)	Total/NA	Solid	6010B	25278
140-13229-11	BH-01 (130-135)	Total/NA	Solid	6010B	25278
MB 140-25278/18-A	Method Blank	Total/NA	Solid	6010B	25278
MB 140-25604/18-A	Method Blank	Step 7	Solid	6010B SEP	25604
LCS 140-25278/19-A	Lab Control Sample	Total/NA	Solid	6010B	25278
LCS 140-25604/19-A	Lab Control Sample	Step 7	Solid	6010B SEP	25604
LCSD 140-25278/20-A	Lab Control Sample Dup	Total/NA	Solid	6010B	25278
LCSD 140-25604/20-A	Lab Control Sample Dup	Step 7	Solid	6010B SEP	25604

Analysis Batch: 25806

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Sum of Steps 1-7	Solid	6010B SEP	
140-13229-2	BH-03 (70-75)	Sum of Steps 1-7	Solid	6010B SEP	
140-13229-3	BH-03 (110-115)	Sum of Steps 1-7	Solid	6010B SEP	
140-13229-4	DUP-1	Sum of Steps 1-7	Solid	6010B SEP	
140-13229-5	BH-02 (41-45)	Sum of Steps 1-7	Solid	6010B SEP	
140-13229-6	BH-02 (72-75)	Sum of Steps 1-7	Solid	6010B SEP	
140-13229-7	BH-02 (70-72)	Sum of Steps 1-7	Solid	6010B SEP	
140-13229-8	BH-02 (125-130)	Sum of Steps 1-7	Solid	6010B SEP	
140-13229-9	BH-01 (26-31)	Sum of Steps 1-7	Solid	6010B SEP	
140-13229-10	BH-01 (75-80)	Sum of Steps 1-7	Solid	6010B SEP	
140-13229-11	BH-01 (130-135)	Sum of Steps 1-7	Solid	6010B SEP	

Prep Batch: 263578

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Total/NA	Solid	3050B	
140-13229-2	BH-03 (70-75)	Total/NA	Solid	3050B	
140-13229-3	BH-03 (110-115)	Total/NA	Solid	3050B	
140-13229-4	DUP-1	Total/NA	Solid	3050B	
140-13229-5	BH-02 (41-45)	Total/NA	Solid	3050B	
140-13229-6	BH-02 (72-75)	Total/NA	Solid	3050B	
140-13229-7	BH-02 (70-72)	Total/NA	Solid	3050B	
140-13229-8	BH-02 (125-130)	Total/NA	Solid	3050B	
140-13229-9	BH-01 (26-31)	Total/NA	Solid	3050B	
140-13229-10	BH-01 (75-80)	Total/NA	Solid	3050B	
140-13229-11	BH-01 (130-135)	Total/NA	Solid	3050B	
MB 180-263578/1-A	Method Blank	Total/NA	Solid	3050B	

Metals (Continued)

Prep Batch: 263578 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 180-263578/2-A	Lab Control Sample	Total/NA	Solid	3050B	

Analysis Batch: 264070

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Total/NA	Solid	EPA 6020A	263578
140-13229-2	BH-03 (70-75)	Total/NA	Solid	EPA 6020A	263578
140-13229-3	BH-03 (110-115)	Total/NA	Solid	EPA 6020A	263578
140-13229-4	DUP-1	Total/NA	Solid	EPA 6020A	263578
140-13229-5	BH-02 (41-45)	Total/NA	Solid	EPA 6020A	263578
140-13229-6	BH-02 (72-75)	Total/NA	Solid	EPA 6020A	263578
140-13229-7	BH-02 (70-72)	Total/NA	Solid	EPA 6020A	263578
140-13229-8	BH-02 (125-130)	Total/NA	Solid	EPA 6020A	263578
140-13229-9	BH-01 (26-31)	Total/NA	Solid	EPA 6020A	263578
140-13229-10	BH-01 (75-80)	Total/NA	Solid	EPA 6020A	263578
140-13229-11	BH-01 (130-135)	Total/NA	Solid	EPA 6020A	263578
MB 180-263578/1-A	Method Blank	Total/NA	Solid	EPA 6020A	263578
LCS 180-263578/2-A	Lab Control Sample	Total/NA	Solid	EPA 6020A	263578

Analysis Batch: 264192

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Total/NA	Solid	EPA 6020A	263578
140-13229-2	BH-03 (70-75)	Total/NA	Solid	EPA 6020A	263578
140-13229-3	BH-03 (110-115)	Total/NA	Solid	EPA 6020A	263578
140-13229-4	DUP-1	Total/NA	Solid	EPA 6020A	263578
140-13229-5	BH-02 (41-45)	Total/NA	Solid	EPA 6020A	263578
140-13229-6	BH-02 (72-75)	Total/NA	Solid	EPA 6020A	263578
140-13229-7	BH-02 (70-72)	Total/NA	Solid	EPA 6020A	263578
140-13229-8	BH-02 (125-130)	Total/NA	Solid	EPA 6020A	263578
140-13229-9	BH-01 (26-31)	Total/NA	Solid	EPA 6020A	263578
140-13229-10	BH-01 (75-80)	Total/NA	Solid	EPA 6020A	263578
140-13229-11	BH-01 (130-135)	Total/NA	Solid	EPA 6020A	263578
MB 180-263578/1-A	Method Blank	Total/NA	Solid	EPA 6020A	263578
LCS 180-263578/2-A	Lab Control Sample	Total/NA	Solid	EPA 6020A	263578

General Chemistry

Analysis Batch: 25110

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13229-1	BH-03 (30-32)	Total/NA	Solid	Moisture	
140-13229-2	BH-03 (70-75)	Total/NA	Solid	Moisture	
140-13229-3	BH-03 (110-115)	Total/NA	Solid	Moisture	
140-13229-4	DUP-1	Total/NA	Solid	Moisture	
140-13229-5	BH-02 (41-45)	Total/NA	Solid	Moisture	
140-13229-6	BH-02 (72-75)	Total/NA	Solid	Moisture	
140-13229-7	BH-02 (70-72)	Total/NA	Solid	Moisture	
140-13229-8	BH-02 (125-130)	Total/NA	Solid	Moisture	
140-13229-9	BH-01 (26-31)	Total/NA	Solid	Moisture	
140-13229-10	BH-01 (75-80)	Total/NA	Solid	Moisture	
140-13229-11	BH-01 (130-135)	Total/NA	Solid	Moisture	
140-13229-5 DU	BH-02 (41-45)	Total/NA	Solid	Moisture	

Lab Chronicle

Client: Golder Associates Inc.
Project/Site: Rush Island Energy Center - Soil & Speci

TestAmerica Job ID: 140-13229-1

Client Sample ID: BH-03 (30-32)

Date Collected: 10/27/18 08:30
Date Received: 11/01/18 12:00

Lab Sample ID: 140-13229-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			25806	11/29/18 14:47	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			25110	11/06/18 08:29	BKD	TAL KNX
	Instrument ID: W3									

Client Sample ID: BH-03 (30-32)

Date Collected: 10/27/18 08:30
Date Received: 11/01/18 12:00

Lab Sample ID: 140-13229-1
Matrix: Solid
Percent Solids: 86.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			25767	11/28/18 14:07	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			25767	11/28/18 17:48	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		2			25767	11/28/18 20:40	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	25320	11/13/18 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	25357	11/14/18 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			25503	11/17/18 10:56	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.000 g	25 mL	25362	11/14/18 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	25392	11/15/18 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			25503	11/17/18 13:03	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	25394	11/15/18 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	25444	11/16/18 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			25554	11/19/18 13:48	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	25447	11/16/18 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	25493	11/17/18 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			25554	11/19/18 15:53	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	25494	11/19/18 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	25553	11/20/18 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			25679	11/26/18 11:35	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	25574	11/20/18 09:43	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			25679	11/26/18 13:42	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 12:11	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			25767	11/28/18 16:14	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			25767	11/28/18 19:34	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	3050B			0.98 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	264070	11/28/18 20:07	WTR	TAL PIT
	Instrument ID: M									
Total/NA	Prep	3050B			0.98 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			264192	11/28/18 20:07	WTR	TAL PIT
	Instrument ID: M									

Client Sample ID: BH-03 (70-75)

Lab Sample ID: 140-13229-2

Date Collected: 10/27/18 12:15

Matrix: Solid

Date Received: 11/01/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			25806	11/29/18 14:47	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			25110	11/06/18 08:29	BKD	TAL KNX
	Instrument ID: W3									

Client Sample ID: BH-03 (70-75)

Lab Sample ID: 140-13229-2

Date Collected: 10/27/18 12:15

Matrix: Solid

Date Received: 11/01/18 12:00

Percent Solids: 84.2

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			25767	11/28/18 14:13	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			25767	11/28/18 18:08	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		2			25767	11/28/18 20:45	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	25320	11/13/18 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	25357	11/14/18 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			25503	11/17/18 11:01	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.000 g	25 mL	25362	11/14/18 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	25392	11/15/18 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			25503	11/17/18 13:08	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	25394	11/15/18 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	25444	11/16/18 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			25554	11/19/18 13:53	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Golder Associates Inc. TestAmerica Job ID: 140-13229-1

Project/Site: Rush Island Energy Center - Soil & Speci

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	25447	11/16/18 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	25493	11/17/18 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			25554	11/19/18 15:58	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	25494	11/19/18 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	25553	11/20/18 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			25679	11/26/18 11:40	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	25574	11/20/18 09:43	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			25679	11/26/18 13:47	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 12:17	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			25767	11/28/18 16:19	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	3050B			1.02 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	264070	11/28/18 20:12	WTR	TAL PIT
	Instrument ID: M									
Total/NA	Prep	3050B			1.02 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			264192	11/28/18 20:12	WTR	TAL PIT
	Instrument ID: M									

Client Sample ID: BH-03 (110-115) Lab Sample ID: 140-13229-3

Date Collected: 10/27/18 16:20 **Matrix: Solid**

Date Received: 11/01/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			25806	11/29/18 14:47	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			25110	11/06/18 08:29	BKD	TAL KNX
	Instrument ID: W3									

Client Sample ID: BH-03 (110-115) Lab Sample ID: 140-13229-3

Date Collected: 10/27/18 16:20 **Matrix: Solid**

Date Received: 11/01/18 12:00 **Percent Solids: 85.7**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			25767	11/28/18 14:18	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			25767	11/28/18 18:13	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		2			25767	11/28/18 20:50	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Golder Associates Inc.
Project/Site: Rush Island Energy Center - Soil & Speci

TestAmerica Job ID: 140-13229-1

Client Sample ID: BH-03 (110-115)

Lab Sample ID: 140-13229-3

Date Collected: 10/27/18 16:20
Date Received: 11/01/18 12:00

Matrix: Solid
Percent Solids: 85.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.000 g	25 mL	25320	11/13/18 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	25357	11/14/18 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			25503	11/17/18 11:06	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.000 g	25 mL	25362	11/14/18 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	25392	11/15/18 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			25503	11/17/18 13:13	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	25394	11/15/18 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	25444	11/16/18 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			25554	11/19/18 13:58	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	25447	11/16/18 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	25493	11/17/18 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			25554	11/19/18 16:03	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	25494	11/19/18 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	25553	11/20/18 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			25679	11/26/18 11:45	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	25574	11/20/18 09:43	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			25679	11/26/18 13:52	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 12:22	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			25767	11/28/18 16:24	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			25767	11/28/18 19:39	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	3050B			0.98 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	264070	11/28/18 20:17	WTR	TAL PIT
	Instrument ID: M									
Total/NA	Prep	3050B			0.98 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			264192	11/28/18 20:17	WTR	TAL PIT
	Instrument ID: M									

Client Sample ID: DUP-1

Lab Sample ID: 140-13229-4

Date Collected: 10/27/18 00:00
Date Received: 11/01/18 12:00

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			25806	11/29/18 14:47	DKW	TAL KNX

Lab Chronicle

Client: Golder Associates Inc. TestAmerica Job ID: 140-13229-1
Project/Site: Rush Island Energy Center - Soil & Speci

Client Sample ID: DUP-1 Lab Sample ID: 140-13229-4

Date Collected: 10/27/18 00:00 **Matrix: Solid**
Date Received: 11/01/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			25806	11/29/18 14:47	DKW	TAL KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Moisture		1			25110	11/06/18 08:29	BKD	TAL KNX
	Instrument ID:	W3								

Client Sample ID: DUP-1 Lab Sample ID: 140-13229-4

Date Collected: 10/27/18 00:00 **Matrix: Solid**
Date Received: 11/01/18 12:00 **Percent Solids: 84.0**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			25767	11/28/18 14:24	KNC	TAL KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			25767	11/28/18 18:18	KNC	TAL KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		2			25767	11/28/18 20:56	KNC	TAL KNX
	Instrument ID:	DUO								
Step 1	SEP	Exchangeable			5.000 g	25 mL	25320	11/13/18 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	25357	11/14/18 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			25503	11/17/18 11:12	KNC	TAL KNX
	Instrument ID:	DUO								
Step 2	SEP	Carbonate			5.000 g	25 mL	25362	11/14/18 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	25392	11/15/18 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			25503	11/17/18 13:18	KNC	TAL KNX
	Instrument ID:	DUO								
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	25394	11/15/18 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	25444	11/16/18 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			25554	11/19/18 14:03	KNC	TAL KNX
	Instrument ID:	DUO								
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	25447	11/16/18 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	25493	11/17/18 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			25554	11/19/18 16:08	KNC	TAL KNX
	Instrument ID:	DUO								
Step 5	SEP	Organic-Bound			5.000 g	75 mL	25494	11/19/18 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	25553	11/20/18 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			25679	11/26/18 11:50	KNC	TAL KNX
	Instrument ID:	DUO								
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	25574	11/20/18 09:43	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			25679	11/26/18 13:57	KNC	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 12:27	KNC	TAL KNX
	Instrument ID:	DUO								

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Client Sample ID: DUP-1 Lab Sample ID: 140-13229-4

Date Collected: 10/27/18 00:00 **Matrix: Solid**
Date Received: 11/01/18 12:00 **Percent Solids: 84.0**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			25767	11/28/18 16:29	KNC	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			25767	11/28/18 19:44	KNC	TAL KNX
	Instrument ID:	DUO								
Total/NA	Prep	3050B			1.02 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	264070	11/28/18 20:21	WTR	TAL PIT
	Instrument ID:	M								
Total/NA	Prep	3050B			1.02 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			264192	11/28/18 20:21	WTR	TAL PIT
	Instrument ID:	M								

Client Sample ID: BH-02 (41-45) Lab Sample ID: 140-13229-5

Date Collected: 10/28/18 15:50 **Matrix: Solid**
Date Received: 11/01/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			25806	11/29/18 14:47	DKW	TAL KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Moisture		1			25110	11/06/18 08:29	BKD	TAL KNX
	Instrument ID:	W3								

Client Sample ID: BH-02 (41-45) Lab Sample ID: 140-13229-5

Date Collected: 10/28/18 15:50 **Matrix: Solid**
Date Received: 11/01/18 12:00 **Percent Solids: 82.6**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			25767	11/28/18 14:30	KNC	TAL KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			25767	11/28/18 18:23	KNC	TAL KNX
	Instrument ID:	DUO								
Step 1	SEP	Exchangeable			5.000 g	25 mL	25320	11/13/18 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	25357	11/14/18 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			25503	11/17/18 11:17	KNC	TAL KNX
	Instrument ID:	DUO								
Step 2	SEP	Carbonate			5.000 g	25 mL	25362	11/14/18 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	25392	11/15/18 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			25503	11/17/18 13:23	KNC	TAL KNX
	Instrument ID:	DUO								
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	25394	11/15/18 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	25444	11/16/18 08:00	KNC	TAL KNX

Lab Chronicle

Client Sample ID: BH-02 (41-45)

Lab Sample ID: 140-13229-5

Date Collected: 10/28/18 15:50

Matrix: Solid

Date Received: 11/01/18 12:00

Percent Solids: 82.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	Analysis	6010B SEP		1			25554	11/19/18 14:08	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	25447	11/16/18 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	25493	11/17/18 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			25554	11/19/18 16:13	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	25494	11/19/18 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	25553	11/20/18 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			25679	11/26/18 11:56	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	25574	11/20/18 09:43	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			25679	11/26/18 14:02	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 12:33	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			25767	11/28/18 16:34	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	3050B			0.96 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	264070	11/28/18 20:26	WTR	TAL PIT
	Instrument ID: M									
Total/NA	Prep	3050B			0.96 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			264192	11/28/18 20:26	WTR	TAL PIT
	Instrument ID: M									

Client Sample ID: BH-02 (72-75)

Lab Sample ID: 140-13229-6

Date Collected: 10/28/18 16:50

Matrix: Solid

Date Received: 11/01/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			25806	11/29/18 14:47	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			25110	11/06/18 08:29	BKD	TAL KNX
	Instrument ID: W3									

Client Sample ID: BH-02 (72-75)

Lab Sample ID: 140-13229-6

Date Collected: 10/28/18 16:50

Matrix: Solid

Date Received: 11/01/18 12:00

Percent Solids: 86.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			25767	11/28/18 14:35	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client Sample ID: BH-02 (72-75)

Lab Sample ID: 140-13229-6

Date Collected: 10/28/18 16:50
Matrix: Solid
Date Received: 11/01/18 12:00
Percent Solids: 86.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			25767	11/28/18 18:28	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	25320	11/13/18 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	25357	11/14/18 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			25503	11/17/18 11:22	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.000 g	25 mL	25362	11/14/18 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	25392	11/15/18 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			25503	11/17/18 13:28	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	25394	11/15/18 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	25444	11/16/18 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			25554	11/19/18 14:14	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	25447	11/16/18 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	25493	11/17/18 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			25554	11/19/18 16:18	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	25494	11/19/18 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	25553	11/20/18 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			25679	11/26/18 12:01	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	25574	11/20/18 09:43	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			25679	11/26/18 14:07	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 12:38	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			25767	11/28/18 16:39	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	3050B			1.00 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	264070	11/28/18 20:30	WTR	TAL PIT
	Instrument ID: M									
Total/NA	Prep	3050B			1.00 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			264192	11/28/18 20:30	WTR	TAL PIT
	Instrument ID: M									

Client Sample ID: BH-02 (70-72)

Lab Sample ID: 140-13229-7

Date Collected: 10/28/18 17:00
Matrix: Solid
Date Received: 11/01/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			25806	11/29/18 14:47	DKW	TAL KNX

Lab Chronicle

Client: Golder Associates Inc. TestAmerica Job ID: 140-13229-1
Project/Site: Rush Island Energy Center - Soil & Speci

Client Sample ID: BH-02 (70-72) Lab Sample ID: 140-13229-7

Date Collected: 10/28/18 17:00 **Matrix: Solid**
Date Received: 11/01/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			25806	11/29/18 14:47	DKW	TAL KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Moisture		1			25110	11/06/18 08:29	BKD	TAL KNX
	Instrument ID:	W3								

Client Sample ID: BH-02 (70-72) Lab Sample ID: 140-13229-7

Date Collected: 10/28/18 17:00 **Matrix: Solid**
Date Received: 11/01/18 12:00 **Percent Solids: 77.1**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			25767	11/28/18 14:41	KNC	TAL KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			25767	11/28/18 18:33	KNC	TAL KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		2			25767	11/28/18 21:11	KNC	TAL KNX
	Instrument ID:	DUO								
Step 1	SEP	Exchangeable			5.000 g	25 mL	25320	11/13/18 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	25357	11/14/18 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			25503	11/17/18 11:27	KNC	TAL KNX
	Instrument ID:	DUO								
Step 2	SEP	Carbonate			5.000 g	25 mL	25362	11/14/18 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	25392	11/15/18 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			25503	11/17/18 13:33	KNC	TAL KNX
	Instrument ID:	DUO								
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	25394	11/15/18 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	25444	11/16/18 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			25554	11/19/18 14:19	KNC	TAL KNX
	Instrument ID:	DUO								
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	25447	11/16/18 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	25493	11/17/18 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			25554	11/19/18 16:23	KNC	TAL KNX
	Instrument ID:	DUO								
Step 5	SEP	Organic-Bound			5.000 g	75 mL	25494	11/19/18 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	25553	11/20/18 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			25679	11/26/18 12:06	KNC	TAL KNX
	Instrument ID:	DUO								
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	25574	11/20/18 09:43	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			25679	11/26/18 14:12	KNC	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 12:44	KNC	TAL KNX
	Instrument ID:	DUO								

Lab Chronicle

Client: Golder Associates Inc. TestAmerica Job ID: 140-13229-1
Project/Site: Rush Island Energy Center - Soil & Speci

Client Sample ID: BH-02 (70-72) Lab Sample ID: 140-13229-7

Date Collected: 10/28/18 17:00 **Matrix: Solid**
Date Received: 11/01/18 12:00 **Percent Solids: 77.1**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			25767	11/28/18 16:44	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	3050B			0.99 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	264070	11/28/18 20:35	WTR	TAL PIT
	Instrument ID: M									
Total/NA	Prep	3050B			0.99 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			264192	11/28/18 20:35	WTR	TAL PIT
	Instrument ID: M									

Client Sample ID: BH-02 (125-130) Lab Sample ID: 140-13229-8

Date Collected: 10/29/18 12:05 **Matrix: Solid**
Date Received: 11/01/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			25806	11/29/18 14:47	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			25110	11/06/18 08:29	BKD	TAL KNX
	Instrument ID: W3									

Client Sample ID: BH-02 (125-130) Lab Sample ID: 140-13229-8

Date Collected: 10/29/18 12:05 **Matrix: Solid**
Date Received: 11/01/18 12:00 **Percent Solids: 82.5**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			25767	11/28/18 14:47	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			25767	11/28/18 18:38	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		2			25767	11/28/18 21:16	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	25320	11/13/18 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	25357	11/14/18 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			25503	11/17/18 11:31	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.000 g	25 mL	25362	11/14/18 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	25392	11/15/18 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			25503	11/17/18 13:39	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	25394	11/15/18 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	25444	11/16/18 08:00	KNC	TAL KNX

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Client Sample ID: BH-02 (125-130)

Date Collected: 10/29/18 12:05
Date Received: 11/01/18 12:00

Lab Sample ID: 140-13229-8

Matrix: Solid
Percent Solids: 82.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	Analysis	6010B SEP		1			25554	11/19/18 14:24	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	25447	11/16/18 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	25493	11/17/18 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			25554	11/19/18 16:28	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	25494	11/19/18 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	25553	11/20/18 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			25679	11/26/18 12:11	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	25574	11/20/18 09:43	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			25679	11/26/18 14:17	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 12:59	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			25767	11/28/18 16:49	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			25767	11/28/18 19:49	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	3050B			1.05 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	264070	11/28/18 20:53	WTR	TAL PIT
	Instrument ID: M									
Total/NA	Prep	3050B			1.05 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			264192	11/28/18 20:53	WTR	TAL PIT
	Instrument ID: M									

Client Sample ID: BH-01 (26-31)

Date Collected: 10/30/18 08:00
Date Received: 11/01/18 12:00

Lab Sample ID: 140-13229-9

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			25806	11/29/18 14:47	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			25110	11/06/18 08:29	BKD	TAL KNX
	Instrument ID: W3									

Lab Chronicle

Client: Golder Associates Inc.
Project/Site: Rush Island Energy Center - Soil & Speci

TestAmerica Job ID: 140-13229-1

Client Sample ID: BH-01 (26-31)

Date Collected: 10/30/18 08:00
Date Received: 11/01/18 12:00

Lab Sample ID: 140-13229-9

Matrix: Solid
Percent Solids: 83.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			25767	11/28/18 14:52	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			25767	11/28/18 18:43	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	25320	11/13/18 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	25357	11/14/18 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			25503	11/17/18 11:36	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.000 g	25 mL	25362	11/14/18 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	25392	11/15/18 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			25503	11/17/18 13:44	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	25394	11/15/18 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	25444	11/16/18 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			25554	11/19/18 14:29	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	25447	11/16/18 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	25493	11/17/18 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			25554	11/19/18 16:32	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	25494	11/19/18 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	25553	11/20/18 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			25679	11/26/18 12:16	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	25574	11/20/18 09:43	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			25679	11/26/18 14:22	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 13:04	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			25767	11/28/18 16:54	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	3050B			0.96 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	264070	11/28/18 20:57	WTR	TAL PIT
	Instrument ID: M									
Total/NA	Prep	3050B			0.96 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			264192	11/28/18 20:57	WTR	TAL PIT
	Instrument ID: M									

Lab Chronicle

Client Sample ID: BH-01 (75-80)

Lab Sample ID: 140-13229-10

Date Collected: 10/30/18 10:50

Matrix: Solid

Date Received: 11/01/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			25806	11/29/18 14:47	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			25110	11/06/18 08:29	BKD	TAL KNX
	Instrument ID: W3									

Client Sample ID: BH-01 (75-80)

Lab Sample ID: 140-13229-10

Date Collected: 10/30/18 10:50

Matrix: Solid

Date Received: 11/01/18 12:00

Percent Solids: 81.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			25767	11/28/18 15:08	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			25767	11/28/18 18:48	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		2			25767	11/28/18 21:21	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	25320	11/13/18 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	25357	11/14/18 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			25503	11/17/18 11:42	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.000 g	25 mL	25362	11/14/18 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	25392	11/15/18 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			25503	11/17/18 13:59	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	25394	11/15/18 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	25444	11/16/18 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			25554	11/19/18 14:34	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	25447	11/16/18 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	25493	11/17/18 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			25554	11/19/18 16:47	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	25494	11/19/18 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	25553	11/20/18 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			25679	11/26/18 12:21	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	25574	11/20/18 09:43	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			25679	11/26/18 14:37	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 13:10	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client Sample ID: BH-01 (75-80)

Lab Sample ID: 140-13229-10

Date Collected: 10/30/18 10:50

Matrix: Solid

Date Received: 11/01/18 12:00

Percent Solids: 81.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			25767	11/28/18 17:09	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			25767	11/28/18 20:09	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	3050B			1.04 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	264070	11/28/18 21:02	WTR	TAL PIT
	Instrument ID: M									
Total/NA	Prep	3050B			1.04 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			264192	11/28/18 21:02	WTR	TAL PIT
	Instrument ID: M									

Client Sample ID: BH-01 (130-135)

Lab Sample ID: 140-13229-11

Date Collected: 10/30/18 16:50

Matrix: Solid

Date Received: 11/01/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			25806	11/29/18 14:47	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			25110	11/06/18 08:29	BKD	TAL KNX
	Instrument ID: W3									

Client Sample ID: BH-01 (130-135)

Lab Sample ID: 140-13229-11

Date Collected: 10/30/18 16:50

Matrix: Solid

Date Received: 11/01/18 12:00

Percent Solids: 79.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			25767	11/28/18 15:14	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			25767	11/28/18 18:53	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		2			25767	11/28/18 21:26	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	25320	11/13/18 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	25357	11/14/18 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			25503	11/17/18 11:56	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.000 g	25 mL	25362	11/14/18 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	25392	11/15/18 08:00	KNC	TAL KNX

Lab Chronicle

Client Sample ID: BH-01 (130-135)

Lab Sample ID: 140-13229-11

Date Collected: 10/30/18 16:50

Matrix: Solid

Date Received: 11/01/18 12:00

Percent Solids: 79.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	Analysis	6010B SEP		3			25503	11/17/18 14:04	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	25394	11/15/18 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	25444	11/16/18 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			25554	11/19/18 14:49	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	25447	11/16/18 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	25493	11/17/18 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			25554	11/19/18 16:52	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	25494	11/19/18 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	25553	11/20/18 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			25679	11/26/18 12:36	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	25574	11/20/18 09:43	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			25679	11/26/18 14:42	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 13:15	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			25767	11/28/18 17:14	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 20:14	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			25767	11/28/18 20:20	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	3050B			1.03 g	100 mL	263578	11/21/18 14:05	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	264070	11/28/18 21:07	WTR	TAL PIT
	Instrument ID: M									
Total/NA	Prep	3050B			1.03 g	100 mL	263578	11/21/18 14:05	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			264192	11/28/18 21:07	WTR	TAL PIT
	Instrument ID: M									

Client Sample ID: Method Blank

Lab Sample ID: MB 140-25278/18-A

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			25767	11/28/18 11:10	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client Sample ID: Method Blank

Lab Sample ID: MB 140-25320/18-B ^4

Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.000 g	25 mL	25320	11/13/18 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	25357	11/14/18 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			25503	11/17/18 09:57	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank

Lab Sample ID: MB 140-25362/18-B ^3

Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.000 g	25 mL	25362	11/14/18 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	25392	11/15/18 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			25503	11/17/18 12:01	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank

Lab Sample ID: MB 140-25394/18-B

Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	25394	11/15/18 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	25444	11/16/18 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			25554	11/19/18 12:49	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank

Lab Sample ID: MB 140-25447/18-B

Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	25447	11/16/18 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	25493	11/17/18 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			25554	11/19/18 14:54	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank

Lab Sample ID: MB 140-25494/18-B ^5

Date Collected: N/A
Matrix: Solid
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.000 g	75 mL	25494	11/19/18 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	25553	11/20/18 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			25679	11/26/18 10:33	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank

Lab Sample ID: MB 140-25574/18-A

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	25574	11/20/18 09:43	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			25679	11/26/18 12:42	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank

Lab Sample ID: MB 140-25604/18-A

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 10:55	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank

Lab Sample ID: MB 180-263578/1-A

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			1.0 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	264070	11/28/18 18:54	WTR	TAL PIT
	Instrument ID: M									
Total/NA	Prep	3050B			1.0 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			264192	11/28/18 18:54	WTR	TAL PIT
	Instrument ID: M									

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-25278/19-A

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			25767	11/28/18 11:15	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-25320/19-B ^5

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.000 g	25 mL	25320	11/13/18 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	25357	11/14/18 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		5			25503	11/17/18 10:02	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-25362/19-B ^5

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.000 g	25 mL	25362	11/14/18 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	25392	11/15/18 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		5			25503	11/17/18 12:07	KNC	TAL KNX

Instrument ID: DUO

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-25394/19-B

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	25394	11/15/18 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	25444	11/16/18 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			25554	11/19/18 12:54	KNC	TAL KNX

Instrument ID: DUO

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-25447/19-B

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	25447	11/16/18 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	25493	11/17/18 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			25554	11/19/18 14:59	KNC	TAL KNX

Instrument ID: DUO

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-25494/19-B ^5

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.000 g	75 mL	25494	11/19/18 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	25553	11/20/18 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			25679	11/26/18 10:39	KNC	TAL KNX

Instrument ID: DUO

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-25574/19-A

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	25574	11/20/18 09:43	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			25679	11/26/18 12:47	KNC	TAL KNX

Instrument ID: DUO

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-25604/19-A

Date Collected: N/A
Date Received: N/A
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 11:00	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 180-263578/2-A

Date Collected: N/A
Date Received: N/A
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			1.0 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	264070	11/28/18 18:40	WTR	TAL PIT
	Instrument ID: M									
Total/NA	Prep	3050B			1.0 g	100 mL	263578	11/21/18 14:04	NAM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			264192	11/28/18 18:40	WTR	TAL PIT
	Instrument ID: M									

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 140-25278/20-A

Date Collected: N/A
Date Received: N/A
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	25278	11/12/18 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			25767	11/28/18 11:20	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 140-25320/20-B ^5

Date Collected: N/A
Date Received: N/A
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.000 g	25 mL	25320	11/13/18 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	25357	11/14/18 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		5			25503	11/17/18 10:07	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 140-25362/20-B ^5

Date Collected: N/A
Date Received: N/A
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.000 g	25 mL	25362	11/14/18 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	25392	11/15/18 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		5			25503	11/17/18 12:12	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup Lab Sample ID: LCSD 140-25394/20-B

Date Collected: N/A **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	25394	11/15/18 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	25444	11/16/18 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			25554	11/19/18 12:58	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup Lab Sample ID: LCSD 140-25447/20-B

Date Collected: N/A **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	25447	11/16/18 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	25493	11/17/18 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			25554	11/19/18 15:04	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup Lab Sample ID: LCSD 140-25494/20-B ^5

Date Collected: N/A **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.000 g	75 mL	25494	11/19/18 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	25553	11/20/18 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			25679	11/26/18 10:44	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup Lab Sample ID: LCSD 140-25574/20-A

Date Collected: N/A **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	25574	11/20/18 09:43	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			25679	11/26/18 12:52	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup Lab Sample ID: LCSD 140-25604/20-A

Date Collected: N/A **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	25604	11/21/18 07:44	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			25767	11/28/18 11:05	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: BH-02 (41-45)

Lab Sample ID: 140-13229-5 DU

Date Collected: 10/28/18 15:50
Matrix: Solid
Date Received: 11/01/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			25110	11/06/18 08:29	BKD	TAL KNX
	Instrument ID: W3									

Laboratory References:

TAL KNX = TestAmerica Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

TAL PIT = TestAmerica Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Method Summary

Method	Method Description	Protocol	Laboratory
6010B	SEP Metals (ICP) - Total	SW846	TAL KNX
6010B SEP	SEP Metals (ICP)	SW846	TAL KNX
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
Moisture	Percent Moisture	EPA	TAL KNX
3010A	Preparation, Total Metals	SW846	TAL KNX
3050B	Preparation, Metals	SW846	TAL PIT
Acid/Sulfide	Sequential Extraction Procedure, Acid/Sulfide Fraction	TAL-KNOX	TAL KNX
Carbonate	Sequential Extraction Procedure, Carbonate Fraction	TAL-KNOX	TAL KNX
Exchangeable	Sequential Extraction Procedure, Exchangeable Fraction	TAL-KNOX	TAL KNX
Metal Hydroxide	Sequential Extraction Procedure, Metal Hydroxide Fraction	TAL-KNOX	TAL KNX
Non-Crystalline	Sequential Extraction Procedure, Non-crystalline Materials	TAL-KNOX	TAL KNX
Organic-Bound	Sequential Extraction Procedure, Organic Bound Fraction	TAL-KNOX	TAL KNX
Residual	Sequential Extraction Procedure, Residual Fraction	TAL-KNOX	TAL KNX
Total	Preparation, Total Material	TAL-KNOX	TAL KNX

Protocol References:

EPA = US Environmental Protection Agency
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.
TAL-KNOX = TestAmerica Laboratories, Knoxville, Facility Standard Operating Procedure.

Laboratory References:

TAL KNX = TestAmerica Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000
TAL PIT = TestAmerica Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
140-13229-1	BH-03 (30-32)	Solid	10/27/18 08:30	11/01/18 12:00
140-13229-2	BH-03 (70-75)	Solid	10/27/18 12:15	11/01/18 12:00
140-13229-3	BH-03 (110-115)	Solid	10/27/18 16:20	11/01/18 12:00
140-13229-4	DUP-1	Solid	10/27/18 00:00	11/01/18 12:00
140-13229-5	BH-02 (41-45)	Solid	10/28/18 15:50	11/01/18 12:00
140-13229-6	BH-02 (72-75)	Solid	10/28/18 16:50	11/01/18 12:00
140-13229-7	BH-02 (70-72)	Solid	10/28/18 17:00	11/01/18 12:00
140-13229-8	BH-02 (125-130)	Solid	10/29/18 12:05	11/01/18 12:00
140-13229-9	BH-01 (26-31)	Solid	10/30/18 08:00	11/01/18 12:00
140-13229-10	BH-01 (75-80)	Solid	10/30/18 10:50	11/01/18 12:00
140-13229-11	BH-01 (130-135)	Solid	10/30/18 16:50	11/01/18 12:00

TestAmerica Knoxville
5815 Middlebrook Pike

Knoxville, TN 37921-5947
phone 865.291.3000 fax 865.584.4315

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Regulatory Program: ☐DW ☐NPDES ☐RCRA ☐Other:

TestAmerica Laboratories, Inc.

Jeffrey Ingram	**Project Manager: Walker Wasmund, Terry**	**Site Contact: Jeffrey Ingram**	**Date: 10/31/2018**	COC No: 140-5757-1985.1
Golder Associates Inc	**Tel/Fax:**	**Lab Contact: Walker Wasmund, Te**	**Carrier: Fedex**	______ of ______ COCs
13515 Barrett Parkway Drive Suite 260	**Analysis Turnaround Time**			Sampler: Jeffy Ingram
Ballwin MO, 63021	☐ CALENDAR DAYS ☐ WORKING DAYS			**For Lab Use Only:**
(314) 984-8800 Phone	TAT if different from Below ______			Walk-in Client:
(636) 724-9323 FAX	☐ 2 weeks			Lab Sampling:
Project Name: Soil and Speciation Testing	☐ 1 week			
Site: Rush Island Energy Center	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	6010_SEP-SEP metals-Fe, Al, As, B, Mo, Li
BH-03 (30-32)	10/27/2018	830	G	Soil	1			1
BH-03 (70-75)	10/27/2018	1215	G	Soil	1			
BH-03 (110-115)	10/27/2018	1620	G	Soil	1			
DUP-1	10/27/2018	NA	G	Soil	1			
BH-02 (41-45)	10/28/18	1550	G	Soil	1			
BH-02 (72-75)	10/28/18	1650	G	Soil	1			
BH-02 (70-72)	10/28/18	1700	G	Soil	1			
BH-02 (125-130)	10/29/18	1205	G	Soil	1			
BH-01 (26-31)	10/30/18	0800	G	Soil	1			
BH-01 (75-80)	10/30/18	1050	G	Soil	1			
BH-01 (130-35)	10/30/18	1650	G	Soil	1			

Sample Specific Notes:

CUSTODY SEALS INTACT
RECEIVED AT
RT 0.2/CT 0.3°C
BSD 11-1-18
1 COOLER FEDX#
783537030786 PO

140-13229 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐Non-Hazard ☐Flammable ☐Skin Irritant ☐Poison B ☐Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐Return to Client ☑Disposal by Lab ☐Archive for______ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:	Cooler Temp. (°C): Obs'd:______ Corr'd:______		Therm ID No.:______
Relinquished by: Jeff Ingram	Company: Golder	Date/Time: 10/31/18 1630	Received by:	Company: TA KNX	Date/Time: 11-1-18 12:00
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.18, dated 9/5/2018

TestAmerica Knoxville
5815 Middlebrook Pike

Knoxville, TN 37921-5947
phone 865.291.3000 fax 865.584.4315

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Regulatory Program: ☐DW ☐NPDES ☐RCRA ☐Other:

TestAmerica Laboratories, Inc.

Jeffrey Ingram
Golder Associates Inc
13515 Barrett Parkway Drive Suite 260
Ballwin MO, 63021
(314) 984-8800 Phone
(636) 724-9323 FAX
Project Name: Soil and Speciation Testing
Site: Rush Island Energy Center
P O #

Project Manager: Walker Wasmund, Terry
Tel/Fax:

Analysis Turnaround Time
☐ CALENDAR DAYS ☐ WORKING DAYS
TAT if different from Below ______
☐ 2 weeks
☐ 1 week
☐ 2 days
☐ 1 day

Site Contact: Jeffrey Ingram
Lab Contact: Walker Wasmund, Te
Date: 10/31/2018
Carrier: Fedex

COC No: 140-5757-1985.1
______ of ______ COCs
Sampler: Jeffry Ingram
For Lab Use Only:
Walk-in Client:
Lab Sampling:
Job / SDG No.:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	6020- 6020-TOTAL Fe, Al, As, Pb, Mo, Li	Sample Specific Notes:
BH-03 (30-32)	10/27/2018	830	G	Soil	1			✓	
BH-03 (70-75)	10/27/2018	1215	G	Soil	1				
BH-03 (110-115)	10/27/2018	1620	G	Soil	1				
DUP-1	10/27/2018	NA	G	Soil	1				
BH-02 (41-45)	10/28/18	1550	G	Soil	1				
BH-02 (72-75)	10/28/18	1650	G	Soil	1				
BH-02 (70-72)	10/28/18	1700	G	Soil	1				
BH-02 (125-130)	10/29/18	1205	G	Soil	1				
BH-01 (26-31)	10/30/18	0800	G	Soil	1				
BH-01 (75-80)	10/30/18	1050	G	Soil	1				
BH-01 (130-35)	10/30/18	1650	G	Soil	1				

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.
☐Non-Hazard ☐Flammable ☐Skin Irritant ☐Poison B ☐Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐Return to Client ☑Disposal by Lab ☐Archive for ______ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No
Custody Seal No.:
Cooler Temp. (°C): Obs'd: ______ Corr'd: ______ Therm ID No.: ______

Relinquished by:	Company: Golder	Date/Time: 10/31/18 1600	Received by:	Company: TA KNX	Date/Time: 11-1-18 12:00
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.18, dated 9/5/2018

Loc: 140
13229

TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Log In Number:

Review Items	Yes	No	NA	**If No, what was the problem?**
1. Are the shipping containers intact?	✓			☐ **Containers, Broken**
2. Were ambient air containers received intact?			✓	☐ Checked in lab
3. The coolers/containers custody seal if present, is it intact?	✓			☐ Yes ☐ NA
4. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C) Thermometer ID : SC68 Correction factor: +0.1°c	✓			☐ **Cooler Out of Temp, Client Contacted, Proceed/Cancel** ☐ **Cooler Out of Temp, Same Day Receipt**
5. Were all of the sample containers received intact?	✓			☐ **Containers, Broken**
6. Were samples received in appropriate containers?	✓			☐ **Containers, Improper; Client Contacted; Proceed/Cancel**
7. Do sample container labels match COC? (IDs, Dates, Times)	✓	✓		☑ **COC & Samples Do Not Match** ☐ **COC Incorrect/Incomplete** ☐ **COC Not Received**
8. Were all of the samples listed on the COC received?	✓			☐ **Sample Received, Not on COC** ☐ **Sample on COC, Not Received**
9. Is the date/time of sample collection noted?	✓			☐ **COC; No Date/Time; Client Contacted**
10. Was the sampler identified on the COC?	✓			☐ **Sampler Not Listed on COC**
11. Is the client and project name/# identified?	✓			☐ **COC Incorrect/Incomplete**
12. Are tests/parameters listed for each sample?	✓			☐ **COC No tests on COC**
13. Is the matrix of the samples noted?	✓			☐ **COC Incorrect/Incomplete**
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ **COC Incorrect/Incomplete**
15. Were samples received within holding time?	✓			☐ **Holding Time - Receipt**
16. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ **pH Adjusted, pH Included (See box 16A)** ☐ **Incorrect Preservative**
17. Were VOA samples received without headspace?			✓	☐ **Headspace (VOA only)**
18. Did you check for residual chlorine, if necessary? (e.g. 1613B, 1668) Chlorine test strip lot number:			✓	☐ **Residual Chlorine**
19. For 1613B water samples is pH<9?			✓	☐ If no, lab will adjust
20. For rad samples was sample activity info. Provided?			✓	☐ Project missing info

Comments/Actions Taken

7, BH-01 (130-35) LABEL LIST BH-01 (130-135)
WILL LOG PER LABEL

Labeling Verified by: **Date:**

pH test strip lot number:

	Box 16A: pH Preservation	Box 18A: Residual Chlorine
Preservative:		
Lot Number:		
Exp Date:		
Analyst:		
Date:		
Time:		

Project #: 14004916 PM Instructions: NA

Sample Receiving Associate: Date: 11-1-18

QA026R30.doc, 080916

TestAmerica Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

140-13229 Chain of Custody

TestAmerica
LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)

Sampler:
Lab PM: Walker Wasmund, Terr
No: 463129.1
Client Contact: Shipping/Receiving
Phone:
E-Mail: terry.wasmund@testamericainc.com
Missouri
Page 1 of 2
Company: TestAmerica Laboratories, Inc.
Accreditations Required (See note):
Job #: 140-13229-1
Address: 301 Alpha Drive, RIDC Park,
Due Date Requested: 11/30/2018
City: Pittsburgh
TAT Requested (days):
State, Zip: PA, 15238
Phone: 412-963-7058(Tel) 412-963-2468(Fax)
PO #:
Email:
WO #:
Project Name: Rush Island Energy Center - Soil & Speci
Project #: 14004916
Site:
SSOW#:

Preservation Codes:

- A - HCL
- B - NaOH
- C - Zn Acetate
- D - Nitric Acid
- E - NaHSO4
- F - MeOH
- G - Amchlor
- H - Ascorbic Acid
- I - Ice
- J - DI Water
- K - EDTA
- L - EDA
- M - Hexane
- N - None
- O - AsNaO2
- P - Na2O4S
- Q - Na2SO3
- R - Na2S2O3
- S - H2SO4
- T - TSP Dodecahydrate
- U - Acetone
- V - MCAA
- W - pH 4-5
- Z - other (specify)

Other:

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6020A/3050B (MOD) TAL Metals by ICP/MS	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
BH-03 (30-32) (140-13229-1)	10/27/18	08:30 Central		Solid			X	1	
BH-03 (70-75) (140-13229-2)	10/27/18	12:15 Central		Solid			X	1	
BH-03 (110-115) (140-13229-3)	10/27/18	16:20 Central		Solid			X	1	
DUP-1 (140-13229-4)	10/27/18	Central		Solid			X	1	
BH-02 (41-45) (140-13229-5)	10/28/18	15:50 Central		Solid			X	1	
BH-02 (72-75) (140-13229-6)	10/28/18	16:50 Central		Solid			X	1	
BH-02 (70-72) (140-13229-7)	10/28/18	17:00 Central		Solid			X	1	
BH-02 (125-130) (140-13229-8)	10/29/18	12:05 Central		Solid			X	1	
BH-01 (26-31) (140-13229-9)	10/30/18	08:00 Central		Solid			X	1	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)
Primary Deliverable Rank: 2
Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Castro	11-19-18 1545	TALDen		11/20/18 950	TAPitt

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks:

Ver: 09/20/2016

TestAmerica Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)

Sampler:

Lab PM: Walker Wasmund, Terry

Carrier Tracking No(s):

COC No: 280-463129.2

Client Contact: Shipping/Receiving

Phone:

E-Mail: terry.wasmund@testamericainc.com

State of Origin: Missouri

Page: Page 2 of 2

Company: TestAmerica Laboratories, Inc.

Accreditations Required (See note):

Job #: 140-13229-1

Address: 301 Alpha Drive, RIDC Park,

Due Date Requested: 11/30/2018

City: Pittsburgh

TAT Requested (days):

State, Zip: PA, 15238

Phone: 412-963-7058(Tel) 412-963-2468(Fax)

PO #:

Email:

WO #:

Project Name: Rush Island Energy Center - Soil & Speci

Project #: 14004916

Site:

SSOW#:

Preservation Codes:

- A - HCL
- B - NaOH
- C - Zn Acetate
- D - Nitric Acid
- E - NaHSO4
- F - MeOH
- G - Amchlor
- H - Ascorbic Acid
- I - Ice
- J - DI Water
- K - EDTA
- L - EDA
- M - Hexane
- N - None
- O - AsNaO2
- P - Na2O4S
- Q - Na2SO3
- R - Na2S2O3
- S - H2SO4
- T - TSP Dodecahydrate
- U - Acetone
- V - MCAA
- W - pH 4-5
- Z - other (specify)

Other:

Analysis Requested

Sample Identification - Client ID (Lab ID)	**Sample Date**	**Sample Time**	**Sample Type (C=comp, G=grab)**	**Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)**	**Field Filtered Sample (Yes or No)**	**Perform MS/MSD (Yes or No)**	**6020A/3050B (MOD) TAL Metals by ICP/MS**	**Total Number of containers**	**Special Instructions/Note:**
			Preservation Code:						
BH-01 (75-80) (140-13229-10)	10/30/18	10:50 Central		Solid			X	1	
BH-01 (130-135) (140-13229-11)	10/30/18	16:50 Central		Solid			X	1	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. I

Possible Hazard Identification

Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ________ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:

Date:

Time:

Method of Shipment:

Relinquished by: Laura Castro	Date/Time: 11-19-18 1545	Company TALDen	Received by:	Date/Time: 11/20/18 950	Company MPitt
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No

Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 09/20/2016

TestAmerica Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921
Phone (865) 291-3000 Fax (865) 584-4315

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)
Sampler:
Lab PM: Walker Wasmund, Terry
Carrier Tracking No(s):
COC No: 140-4558.1
Client Contact: Shipping/Receiving
Phone:
E-Mail: terry.wasmund@testamericainc.com
State of Origin: Missouri
Page: Page 1 of 2
Company: TestAmerica Laboratories, Inc.
Accreditations Required (See note):
Job #: 140-13229-1
Address: 4955 Yarrow Street,
Due Date Requested: 11/6/2018
City: Arvada
TAT Requested (days):
State, Zip: CO, 80002
Phone: 303-736-0100(Tel) 303-431-7171(Fax)
PO #:
Email:
WO #:
Project Name: Rush Island Energy Center - Soil & Speci
Project #: 14004916
Site:
SSOW#:

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6020/3050B (MOD) Pick a reference price	~~Moisture~~ ARD 11-5-18	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
BH-03 (30-32) (140-13229-1)	10/27/18	08:30 Central		Solid			X		1	
BH-03 (70-75) (140-13229-2)	10/27/18	12:15 Central		Solid			X	~~X~~	1	
BH-03 (110-115) (140-13229-3)	10/27/18	16:20 Central		Solid			X	~~X~~	1	
DUP-1 (140-13229-4)	10/27/18	Central		Solid			X	~~X~~	1	
BH-02 (41-45) (140-13229-5)	10/28/18	15:50 Central		Solid			X	~~X~~	1	
BH-02 (72-75) (140-13229-6)	10/28/18	16:50 Central		Solid			X	~~X~~	1	
BH-02 (70-72) (140-13229-7)	10/28/18	17:00 Central		Solid			X	~~X~~	1	
BH-02 (125-130) (140-13229-8)	10/29/18	12:05 Central		Solid			X	~~X~~	1	
BH-01 (26-31) (140-13229-9)	10/30/18	08:00 Central		Solid			X	~~X~~	1	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

Possible Hazard Identification
Unconfirmed
Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*
Deliverable Requested: I, II, III, IV, Other (specify)
Primary Deliverable Rank: 2
Special Instructions/QC Requirements:
Empty Kit Relinquished by:
Date:
Time:
Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	11-5-18 10:50	TA KNX		11/6/18 0815	TA DEN
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks:

Ver: 09/20/2016

Login Sample Receipt Checklist

Client: Golder Associates Inc.

Job Number: 140-13229-1

Login Number: 13229
List Number: 4
Creator: Say, Thomas C

List Source: TestAmerica Pittsburgh
List Creation: 11/20/18 01:55 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

GOLDER

MEMORANDUM

DATE January 21, 2019

Project No. 1531406

TO Project File
Golder Associates

CC

FROM Tommy Goodwin

EMAIL tgoodwin@golder.com

DATA VALIDATION SUMMARY: AMEREN – RUSH ISLAND ENERGY CENTER – SOIL BOREHOLE SAMPLING – DATA PACKAGE 140-13229

The following is a summary of instances where quality control criteria in the functional guidelines were not met and data qualification was required:

- When analytes exceeded the recovery criteria for MS/MSD of a sample, the sample result was not qualified on MS/MSD data alone.
- When a compound was detected in a sample result between the MDL and the PQL the results were recorded at the detection value and qualified as estimates (J).
- When a compound was detected in a blank (i.e. method, field, rinsate), and the sample results were greater than the MDL and less than the PQL the results were recorded at the PQL value and qualified as non-detects (U). When a compound was detected in a blank (i.e. method, field, rinsate), and the sample results were greater than the PQL and less than ten times the blank results the results were recorded at the result value and qualified as estimates (J).
- When a sample or field duplicate RPD was not met, associated samples were qualified as estimates (J). If the results were less than the MDL or detected in a blank below the PQL the results were qualified as non-detects and estimates (UJ).

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
Project Name: Ameren - RIEC - BHS - SEP
Reviewer: T Goodwin

Project Manager: J Ingram
Project Number: 1531406
Validation Date: 1/21/19

Laboratory: Test America
SDG #: 140-13229
Analytical Method (type and no.): 6010B SEP ; 6010B , EPA 6020A
Matrix: ☐ Air ☐ Soil/Sed. ☒ Water ☐ Waste ☐
Sample Names BH-03(30-32), BH-03(70-75), BH-03(110-115), DUP-1, BH-02(41-45), BH-02(72-75), BH-02(70-72), BH-02(125-130), BH-01(26-31), BH-01(75-80), BH-01(130-135)

NOTE: Please provide calculation in Comment areas or on the back (if on the back please indicate in comment areas).

Field Information	**YES**	**NO**	**NA**	**COMMENTS**
a) Sampling dates noted?	☒	☐	☐	10/27-30/18
b) Sampling team indicated?	☒	☐	☐	JKI
c) Sample location noted?	☒	☐	☐	
d) Sample depth indicated (Soils)?	☑	☐	~~☒~~ TG	
e) Sample type indicated (grab/composite)?	☒	☐	☐	Composite
f) Field QC noted?	☒	☐	☐	
g) Field parameters collected (note types)?	~~☒~~ TG	☑	☐	
h) Field Calibration within control limits?	☒	☐	☐	
i) Notations of unacceptable field conditions/performances from field logs or field notes?	☐	☒	☐	
j) Does the laboratory narrative indicate deficiencies?	☑	☐	~~☒~~ TG	

Note Deficiencies:

Chain-of-Custody (COC)	**YES**	**NO**	**NA**	**COMMENTS**
a) Was the COC properly completed?	☒	☐	☐	
b) Was the COC signed by both field and laboratory personnel?	☒	☐	☐	
c) Were samples received in good condition?	☒	☐	☐	

General (reference QAPP or Method)	**YES**	**NO**	**NA**	**COMMENTS**
a) Were hold times met for sample pretreatment?	☐	☐	☒	
b) Were hold times met for sample analysis?	☑	☐	☐	
c) Were the correct preservatives used?	☒	☐	☐	
d) Was the correct method used?	☒	☐	☐	
e) Were appropriate reporting limits achieved?	☒	☐	☐	
f) Were any sample dilutions noted?	☑	☐	☐	
g) Were any matrix problems noted?	☐	☑	☐	

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	**YES**	**NO**	**NA**	**COMMENTS**
a) Were analytes detected in the method blank(s)?	☑	☐	☐	{4} As (0.473), {5} Li (4.52), {7} Fe (5.08)
b) Were analytes detected in the field blank(s)?	☐	☐	☑	
c) Were analytes detected in the equipment blank(s)?	☐	☐	☒	
d) Were analytes detected in the trip blank(s)?	☐	☐	☒	

Laboratory Control Sample (LCS)	**YES**	**NO**	**NA**	**COMMENTS**
a) Was a LCS analyzed once per SDG?	☒	☐	☐	
b) Were the proper analytes included in the LCS?	☒	☐	☐	
c) Was the LCS accuracy criteria met?	☐	☑	☐	All verified by SEP steps by TA

Duplicates	**YES**	**NO**	**NA**	**COMMENTS**
a) Were field duplicates collected (note original and duplicate sample names)?	☑	☐	☐	Dup-1@ BH-03 (110-115) FB-1@ N/A
b) Were field dup. precision criteria met (note RPD)?	☐	☑	☐	See Notes
c) Were lab duplicates analyzed (note original and duplicate samples)?	~~☒~~ TA	☑	☐	
d) Were lab dup. precision criteria met (note RPD)?	☐	☐	☑	

Blind Standards	**YES**	**NO**	**NA**	**COMMENTS**
a) Was a blind standard used (indicate name, analytes included and concentrations)?	☐	☐	☒	
b) Was the %D within control limits?	☐	☐	☒	

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	**YES**	**NO**	**NA**	**COMMENTS**
a) Was MS accuracy criteria met?	☐	☐	☑	
Recovery could not be calculated since sample contained high concentration of analyte?	☐	☐	☒	
b) Was MSD accuracy criteria met?	☐	☐	☑	
Recovery could not be calculated since sample contained high concentration of analyte?	☐	☐	☒	
c) Were MS/MSD precision criteria met?	☐	☐	☑	

Comments/Notes:

DUP-1: {2} Al (35), Fe (28)

{3} Fe (28), Mo (64)

{4} Al (24), As (36), Fe (36), Fe (21), Mo (50)

{5} Li (29)

{6} Pb (28)

{7} Al (20), Fe (45), Mo (200)

{Σ1-7} Mo (42)

{Total} As (35), Mo (29)

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Data Qualification:

Sample Name	Constituent(s)	Result	Qualifier	Reason
BH-03(30-32)-#4	Arsenic (As)	1.9	J	Detected in Method Blank (MB); 10×MB > Result > RL
⊥ -#5	Lithium (Li)	43	U	; RL > Result > MDL
BH-03(70-75)-#4	As	0.65	J	; 10×MB > Result > RL
⊥ -#5	Li	45	U	; RL > Result > MDL
BH-03(110-115)-#4	As	0.66	J	; 10×MB > Result > RL
-#5	Li	44	U	⊥ ; RL > Result > MDL
-#3	Iron (Fe)	440	J	RPD exceeded limits; Result > MDL
⊥	Molybdenum (Mo)	0.67	J	
#4	Aluminum (Al)	290	J	
	Fe	1300	J	
⊥	Mo	0.41	J	
#6	Lead (Pb)	0.57	J	
#7	Al	33000	J	
	Fe	4900	J	
⊥	Mo	0.19	J	
#Σ1-7	Mo	1.3	J	
#Tot	As	4.3	J	
⊥	Mo	1.8	J	
DUP-1 -#3	Fe	580	J	
⊥	Mo	1.8	J	
#4	Al	370	J	
	Fe	1600	J	
⊥	Mo	0.68	J	
#6	Pb	0.43	J	
#7	Al	27000	J	⊥
	Fe	3100	J	
⊥	Mo	0.098	UJ	; MDL > Result
#Σ1-7	Mo	2.0	J	; Result > MDL
#Tot	As	3.0	J	
⊥	Mo	2.4	J	⊥
#4	As	0.95	J	MB; 10×MB > Result > RL
#5 ⊥	Li	45	U	⊥ ; RL > Result > MDL

Signature: Continue on Page 4 Date: —

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Data Qualification:

Sample Name	Constituent(s)	Result	Qualifier	Reason
BH-02(41-45)-#4	As	1.2	J	MB; 10xMB > Result > RL
⊥ -#5	Li	45	U	; RL > Result > MDL
BH-02(72-75)-#4	As	0.80	J	; 10xMB > Result > RL
⊥ -#5	Li	43	U	; RL > Result > MDL
BH-02(70-72)-#4	As	1.4	J	; 10xMB > Result > RL
⊥ -#5	Li	49	U	; RL > Result > MDL
BH-02(125-130)-#4	As	0.76	J	; 10xMB > Result > RL
⊥ #5	Li	45	U	; RL > Result > MDL
BH-01(26-31)-#4	As	0.98	J	; 10xMB > Result > RL
⊥ -#5	Li	45	U	; RL > Result > MDL
BH-01(75-80)-#4	As	0.64	J	; 10xMB > Result > RL
BH-01(130-135)-#4	As	0.70	J	⊥
⊥ -#5	Li	47	U	; RL > Result > MDL

Signature:

Date: 1/21/19

target analytes are poorly recovered by certain of the fluids used. Four of the fluids show extreme percent recovery data for one or more target analytes:

a) Step 2—1M Sodium acetate/Acetic acid at pH 5
b) Step 3—0.2M ammonium oxalate (pH 3)
c) Step 4—1M hydroxylamine hydrochloride solution in 25% v/v acetic acid
d) Step 5—5% Sodium Hypochlorite at pH 9.5

We expect to refine the ranges using a more detailed statistical analysis in the near future, but at present we can present the following percent recovery ranges in which one may expect the laboratory control sample results to be found.

Sequential Extraction Procedure
Expected Recoveries for Each Step(1)

Target Analyte	Sequential Extraction Step Percent Recovery Range (%)							
	Step 1	**Step 2**	**Step 3**	**Step 4**	**Step 5**	**Step 6**	**Step 7**	**Totals**
Arsenic	75 - 125	***50 - 100***	75 - 125	75 - 125	***60 - 100***	75 - 125	75 - 125	75 - 125
Aluminum	75 - 125	***0 - 20***	75 - 125	75 - 125	***0 - 20***	75 - 125	75 - 125	75 - 125
Antimony	75 - 125	***65 - 120***	75 - 125	75 - 125	75 - 125	75 - 125	75 - 125	75 - 125
Barium	75 - 125	***35 - 75***	75 - 125	75 - 125	***45 - 85***	75 - 125	75 - 125	75 - 125
Beryllium	75 - 125	***40 - 80***	75 - 125	75 - 125	***45 - 85***	75 - 125	75 - 125	75 - 125
Cadmium	75 - 125	75 - 125	***40 - 80***	75 - 125	75 - 125	75 - 125	75 - 125	75 - 125
Chromium	75 - 125	***60 - 100***	75 - 125	75 - 125	75 - 125	75 - 125	75 - 125	75 - 125
Cobalt	75 - 125	75 - 125	75 - 125	75 - 125	***25 - 65***	75 - 125	75 - 125	75 - 125
Iron	75 - 125	***0 - 20***	75 - 125	75 - 125	***0 - 20***	75 - 125	75 - 125	75 - 125
Lead	75 - 125	75 - 125	***0 - 20***	75 - 125	***30 - 70***	75 - 125	75 - 125	75 - 125
Selenium	75 - 125	***55 - 95***	75 - 125	***0 - 20***	75 - 125	75 - 125	75 - 125	75 - 125
Thallium	75 - 125	75 - 125	75 - 125	75 - 125	***0 - 25***	75 - 125	75 - 125	75 - 125
Lithium	75 - 125	75 - 125	75 - 125	75 - 125	***100 - 200(2)***	75 - 125	75 - 125	75 - 125
Molybdenum	75 - 125	75 - 125	75 - 125	75 - 125	75 - 125	75 - 125	75 - 125	75 - 125

(1) Ranges are based on a limited data set.
(2) Elevated recovery is derived from extraction fluid based matrix interference.

This should clarify the use of the data we have provided.

Respectfully,

Don Wasmund

Donald C. Wasmund
Operations Manager

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

5815 Middlebrook Pike
Knoxville, TN 37921
Tel (865)291-3052

APPENDIX C

Groundwater Modeling Updates Technical Memorandum

Technical Memorandum

October 31, 2024

To: Ameren Missouri

Project Number: 23008-24GWM

From: Rocksmith Geoengineering, LLC

Email:jeff.ingram@rocksmithgeo.com

RE: **Groundwater and Geochemical Modeling Summary Updates for the Rush Island Energy Center Monitored Natural Attenuation (MNA) and Corrective Measures Evaluations**

1.0 INTRODUCTION

Rocksmith Geoengineering, LLC (Rocksmith) is pleased to submit this Technical Memorandum summarizing updated groundwater modeling and investigation results for Ameren's Rush Island Energy Center (RIEC). In January 2019 Golder Associates Inc (Golder, now WSP USA Inc (WSP)) submitted a detailed modeling Technical Memorandum entitled "Groundwater and Geochemical Modeling Summary for Ameren Rush Island Energy Center Corrective Measures Assessment". Since the preparation of this initial Technical Memorandum, the following work has been completed related to the RIEC Groundwater Model:

- A March 2019 modeling summary update including different closure scenarios and flow around vs into the RCPA. Technical Memorandum was entitled "Groundwater and Geochemical Modeling Summary Updates for the Rush Island Energy Center Corrective Measures Assessment."
- The groundwater model was used by XDD Environmental, LLC (XDD, now Loureiro Engineering Associates, Inc. (Loureiro)) to design the well locations, pumping rates, and screening elevations for the RIEC treatment system.
- In January 2020, the groundwater model was updated including the refining of the grid in the RCPA area, and inclusion of additional boreholes to further refine the RCPA Geometry. The updated model was used to predict the effects of floods on the geomembrane cap to design vents and rock ballast for Haley and Aldrich, Inc (Haley and Aldrich) as a part of the RCPA Closure efforts.
- In 2024, additional timesteps were added to the groundwater model. These groundwater flow timesteps were used by WSP in their 3D PHAST groundwater/geochemical model for MNA evaluation. The results from this evaluation are summarized in this Technical Memorandum.

2.0 REFINING THE GRID AND GEOMETRY OF THE RCPA

As discussed in Section 1.0, in 2020 the grid size was refined from 100 x 100-foot cells down to 25 x 25-foot cells in the RCPA area as displayed on **Figure 1**. Additionally, the geometry of the bottom depth of the CCR was further refined based on the installation of several piezometers by Geotechnology, LLC (Geotechnology, now

Universal Engineering Sciences, LLC (UES)). The updated model was then used to predict the response time and water elevation in the RCPA during potential flooding and ash conductivity scenarios.

3.0 GROUNDWATER MODEL UPDATES FOR MNA EVALUATION

For the MNA Evaluation the following updates were made to the groundwater model:

1) The groundwater treatment system was added into the groundwater model which consisted of 28 injection and 28 extraction wells. From February 2021 to February 2022, only the pilot study wells (4 injection and extraction wells) were modeled. After February 2022 all 28 injection/extraction monitoring wells were modeled with pumping/injecting at approximately 1.2 gallons per minute for each well based on system records.
2) The RCPA was divided into 8 different recharge zones based on historical uses of the RCPA. The zones, as displayed on **Figure 2** were based on discussion with Ameren personal and historical aerial images. Descriptions on how the RCPA was managed is provided in **Table 1**.

4.0 FLOW CALIBRATION WITH UPDATED GROUNDWATER MODEL

Using the updated geometry as discussed in Section 2.0 and data collected since the 2019 modeling efforts, the model was re-calibrated for groundwater flow. Manual and automated parameter estimations were used to derive reasonable hydraulic conductivities and natural recharge rates that produce groundwater elevations close to the observed data. Three steady-state groundwater flow models were used to check the model calibrations, which included the following (**Figures 3-5**):

- **April 9, 2014 – Active RCPA conditions:** A flow model calibration was carried out for April 9, 2014, for which 53 groundwater elevation targets both within and outside of the RCPA (at various depths) were available for calibration. The results are summarized in **Figure 3**. The average head residual was -1.32 feet and the normalized root mean square was 9.4%. The infiltration rate used for the RCPA during active conditions was 0.078 feet/day (341.9 in/year).
- **January 9, 2020 – during closure of the RCPA:** A flow model calibration was carried out for January 9, 2020, for which 26 groundwater elevation targets outside of the RCPA (at various depths) were available for calibration. The results are summarized in **Figure 4**. The average head residual of -0.02 feet and the normalized root mean square was 22.9%. Infiltration rate used for the RCPA during closing conditions was 0.00228 feet/day (9.99 in/year).
- **October 31, 2022 – After Closure and with Active Groundwater Treatment:** A flow model calibration was carried out for October 31, 2022, for which 30 groundwater elevation targets outside of the RCPA (at various depths) were available for calibration. The results are summarized in **Figure 5**. The average head residual of 0.37 feet and the normalized root mean square was 14.5%. Infiltration rate used for the RCPA during closing conditions was 0.0000229 feet/day (0.1 in/year).

With the low head residuals across the different closure scenarios, the groundwater flow calibration was acceptable for the current modeling purposes.

5.0 UPDATED TIMESTEPS USED FOR THE MNA MODELING

Groundwater flow parameters were exported from the Groundwater Vistas software to be incorporated into the USGS PHAST modeling software for constituent fate and transport modeling. In order to simulate the changing conditions present at the site, the following timesteps were modelled in Groundwater Vistas and exported for use in the PHAST model.

Table 1: Updated Stress Periods and CCR Recharge Values for MNA Modeling

Stress Period	Start Date	End Date	Days	Description	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
					Recharge Rate (Feet/Day)							
1	1/1/1976	12/31/1976	365	Steady state initial setup. RCPA is one large pond receiving bituminous coal ash.	0.03	0.03	0.03	0.03	0.03	0.035	0.04	0.04
2	1/1/1977	12/31/1995	6938	RCPA is one large pond receiving bituminous coal ash.	0.03	0.03	0.03	0.03	0.03	0.035	0.04	0.04
3	1/1/1996	12/31/1999	1460	RCPA still one large pond. Switch to Powder River Basin (PRB) coal source for PHAST Model.	0.03	0.03	0.03	0.03	0.03	0.035	0.04	0.04
4	1/1/2000	12/31/2008	3287	Berm Built in center of RCPA. Managed as northern area with southern polishing pond.	0.03	0.03	0.03	0.03	0.03	0.035	0.04	0.04
5	1/1/2009	12/31/2013	1825	Sluicing wetting head manages ash to north (small rectangular decanting areas), polishing pond to south.	0.03	0.03	0.03	0.03	0.03	0.035	0.04	0.04
6	1/1/2014	9/20/2019	2088	Same as Above except proposed UWL area constructed on western side.	0.03	0.03	0.03	0.03	0.03	0.035	0.04	0.04
7	9/21/2019	12/15/2020	451	Closure of the RCPA - Movement of some CCR to the south to fill in former polishing pond. Rainfall infiltration only.	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
8	12/16/2020	2/1/2021	47	Closed CCR Unit - No treatment	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05
9	2/2/2021	2/1/2022	364	Closed CCR Unit - Pilot study treatment	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05
10	2/2/2022	5/1/2024	819	Close CCR Unit with active treatment system to present date	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05
11	5/2/2024	5/2/2054	10957.5	Future treatment and closed CCR Unit	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05
12	5/3/2054	5/3/2084	10957.5	30 Years of Rebound	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05	2E-05

For each timestep of the groundwater model, the Mississippi River stage of 366 feet above mean sea level at the gauging station was used. This value is used as it is the steady-state equivalent river stage as described in Golder 2019a.

6.0 LIMITATIONS

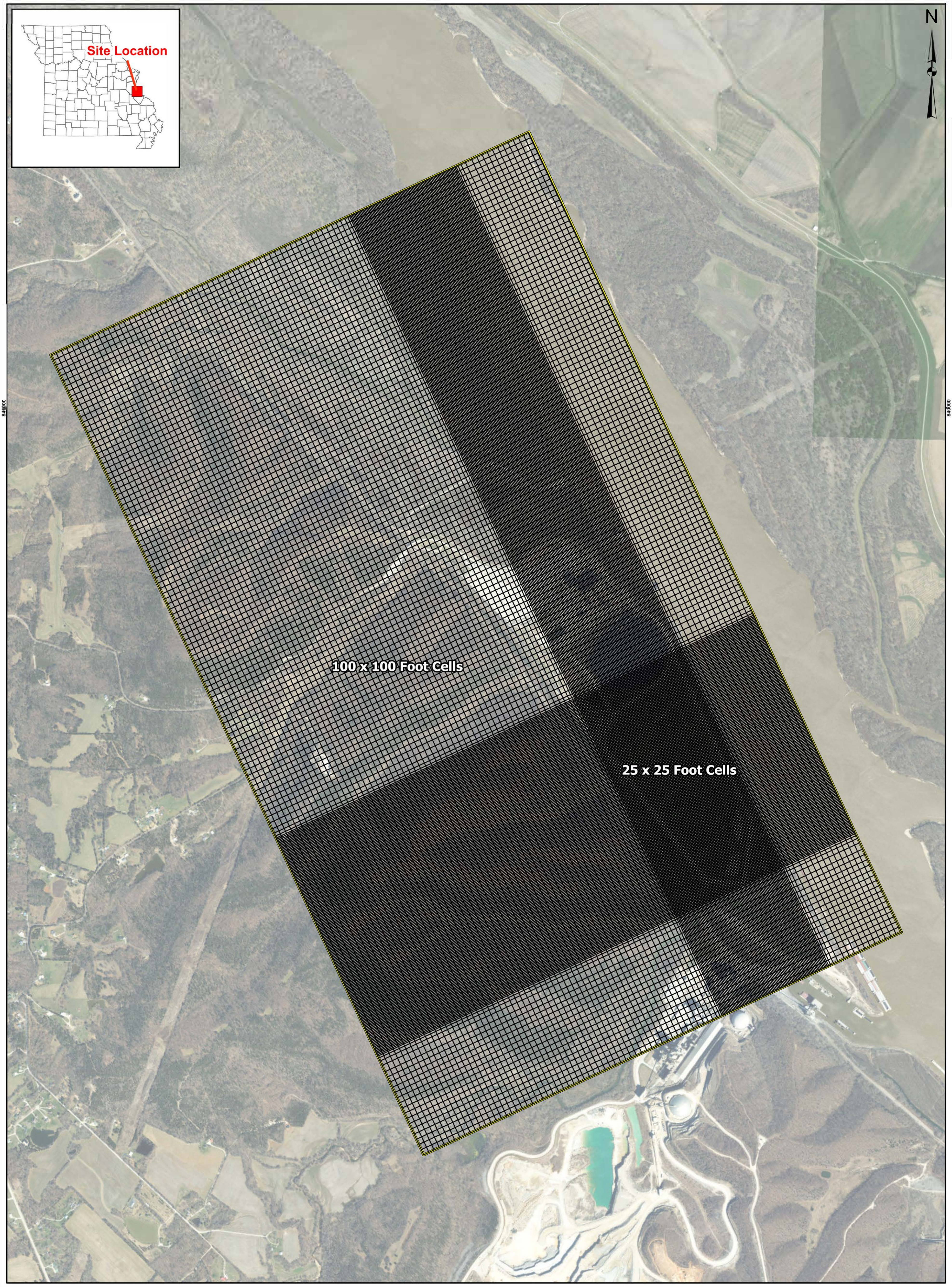
The modeling analyses presented in this report are a simplification of reality and the model-predicted results should be used with this understanding. The limitations associated with analyses such as these are detailed below.

Hydrogeologic investigations and groundwater modeling are dynamic and inexact sciences. They are dynamic in the sense that the state of any hydrological system is changing with time, and in the sense that the science is continually developing new techniques to evaluate these systems. They are inexact in the sense that groundwater systems are complicated beyond human capability to evaluate them comprehensively in detail, and we invariably do not have sufficient data to do so. A groundwater model uses the laws of science and mathematics to draw together the available data into a mathematical or computer-based representation of the essential features of an existing hydrogeologic system. While the model itself obviously lacks the detailed reality of the existing hydrogeologic system, the behavior of a valid groundwater model reasonably approximates that of the real system. The validity and accuracy of the model depends on the amount of data available relative to the degree of complexity of the geologic formations, the site geochemistry, the fate and transport of the dissolved compounds, and on the quality and degree of accuracy of the data entered. Therefore, every groundwater model is a simplification of reality and the model described in this report is not an exception.

The professional groundwater and geochemical modeling services performed as described in this report were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the quality and quality of available data, the time limits and financial and physical constraints applicable to the services. Unless otherwise specified, the results of previous or simultaneous work provided by sources other than Rocksmith and quoted and/or used herein are considered as having been obtained according to recognized and accepted professional rules and practices, and therefore deemed valid. This model provides a predictive scientific tool to evaluate the impacts on a real groundwater system of specified hydrological stresses and/or to compare various scenarios in a decision-making process. However, and despite the professional care taken during the construction of the model and in conducting the simulations, its accuracy is bound to the normal uncertainty associated to groundwater modeling and no warranty, express or implied, is made.

Figures

PATH: C:\Users\jsi6f\Rocksmith Geoengineering LLC\23007 - Ameren GW - Documents\300 - Technical Work\3.2-RIEC\3.2.7 - RIEC GWM\3 - Construction\GIS\Figure 1 - Updated Grid.aprx PRINTED ON: AT 1:13:36 PM



Legend

Groundwater Model Grid

▭ Groundwater Model Boundary

NOTES

1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.

REFERENCES

1.) AMEREN MISSOURI RUSH ISLAND ENERGY CENTER, RUSH ISLAND PROPERTY CONTROL MAP, JANUARY 2012.
2) COORDINATE SYSTEM: NAD 1983 STATE PLANE MISSOURI EAST FIPS 2401 FEET.

0 1,000 2,000 3,000 4,000
Feet

RUSH ISLAND ENERGY CENTER UPDATED GROUNDWATER MODEL GRID

PROJECT
CCR GROUNDWATER MONITORING PROGRAM

CLIENT
AMEREN MISSOURI
RUSH ISLAND ENERGY CENTER

DESIGN	GTM	YYYY-MM-DD	2024-10-09
PREPARED	JSI	PROJECT No.	23008-24MNA
REVIEW	JTR	**FIGURE 1**	
APPROVED	MNH		

PATH: C:\Users\jsi6f\Rocksmith Geoengineering LLC\23007 - Ameren GW - Documents\300 - Technical Work\3.2-RIEC\3.2.7 - RIEC GWM\3 - Construction\GIS\Figure 2 - Recharge Zones.aprx PRINTED ON: AT 4:44:33 PM

Legend

RCPA Recharge Zones

- ▨ Recharge Zone 1
- ▨ Recharge Zone 2
- ▨ Recharge Zone 3
- ▨ Recharge Zone 4
- ▨ Recharge Zone 5
- ▨ Recharge Zone 6
- ▨ Recharge Zone 7
- ▨ Recharge Zone 8

NOTES

1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.

REFERENCES

1.) AMEREN MISSOURI RUSH ISLAND ENERGY CENTER, RUSH ISLAND PROPERTY CONTROL MAP, JANUARY 2012.
2) COORDINATE SYSTEM: NAD 1983 STATE PLANE MISSOURI EAST FIPS 2401 FEET.

0 250 500 750 1,000
Feet

RUSH ISLAND UPDATED RECHARGE ZONES WITHIN THE RCPA

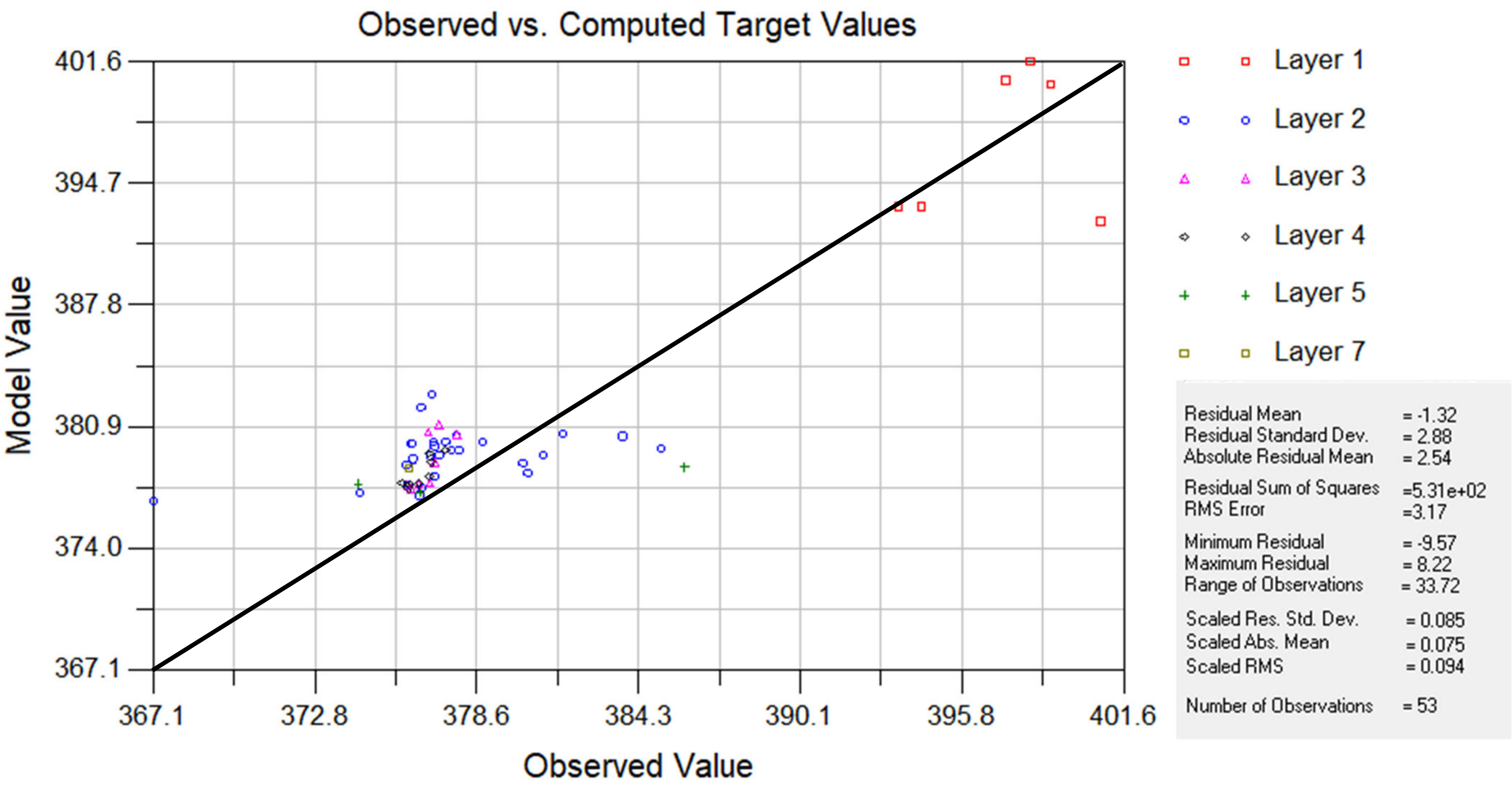
PROJECT
CCR GROUNDWATER MONITORING PROGRAM

CLIENT
AMEREN MISSOURI
RUSH ISLAND ENERGY CENTER

DESIGN	JSI	YYYY-MM-DD	2024-10-09
PREPARED	JSI	PROJECT No.	23008-24MNA
REVIEW	JTR	FIGURE 2	
APPROVED	MNH		

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 1 in



Residual Mean = -1.32
Residual Standard Dev. = 2.88
Absolute Residual Mean = 2.54
Residual Sum of Squares =5.31e+02
RMS Error =3.17
Minimum Residual = -9.57
Maximum Residual = 8.22
Range of Observations = 33.72
Scaled Res. Std. Dev. = 0.085
Scaled Abs. Mean = 0.075
Scaled RMS = 0.094
Number of Observations = 53

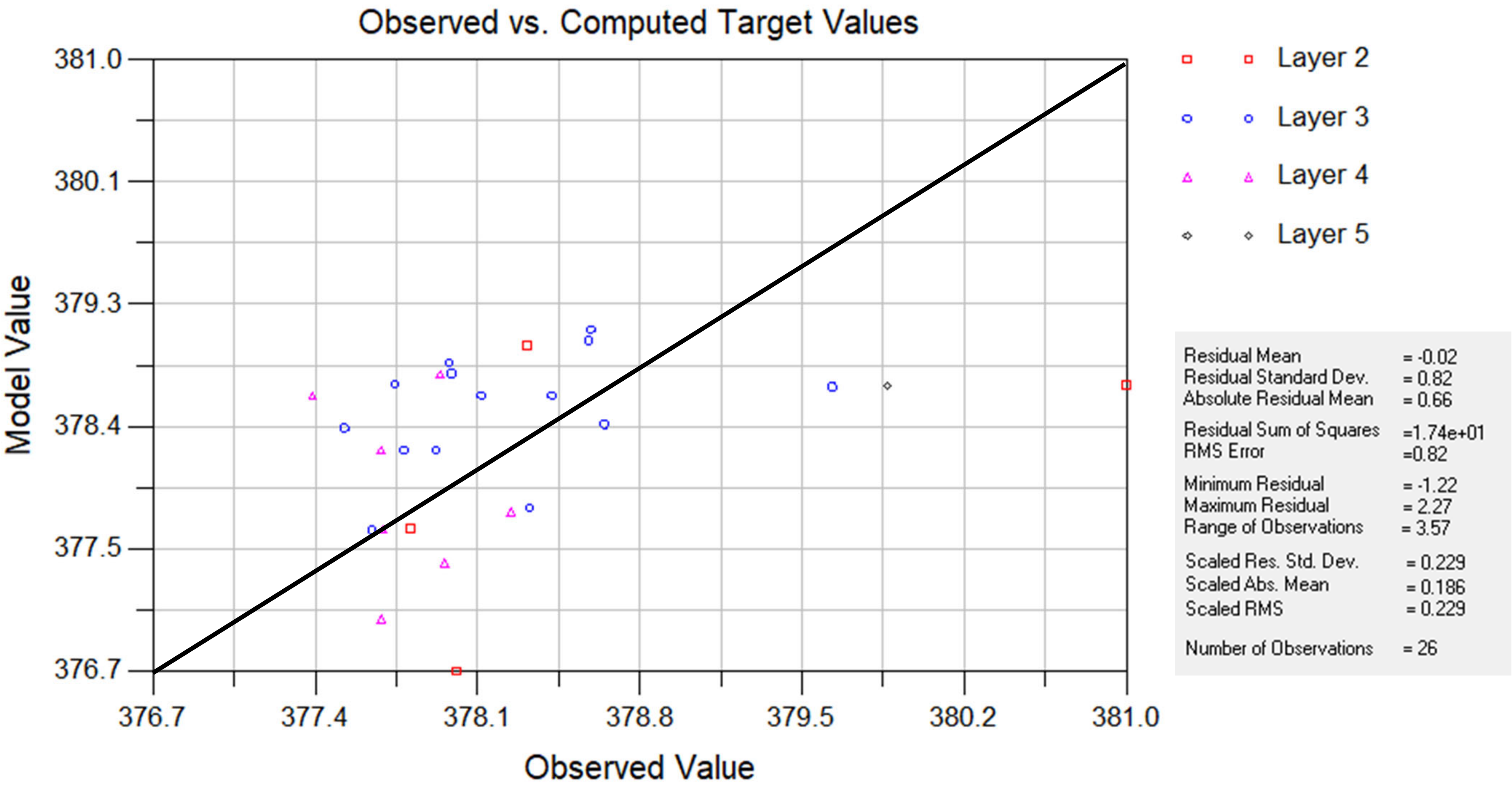
CLIENT/PROJECT
AMEREN MISSOURI
RUSH ISLAND ENERGY CENTER

Ameren

ROCKSMITH GEOENGINEERING

TITLE **Scatter Diagram for Predicted and Observed Hydraulic Heads – April 9, 2014**

DRAWN	CHECKED	REVIEWED	DATE	Rev No.	JOB NO.	FIGURE
JSI	JTR	MNH	2024-10-10	NA	23008-24MNA	**3**



Residual Mean = -0.02
Residual Standard Dev. = 0.82
Absolute Residual Mean = 0.66

Residual Sum of Squares =1.74e+01
RMS Error =0.82

Minimum Residual = -1.22
Maximum Residual = 2.27
Range of Observations = 3.57

Scaled Res. Std. Dev. = 0.229
Scaled Abs. Mean = 0.186
Scaled RMS = 0.229

Number of Observations = 26

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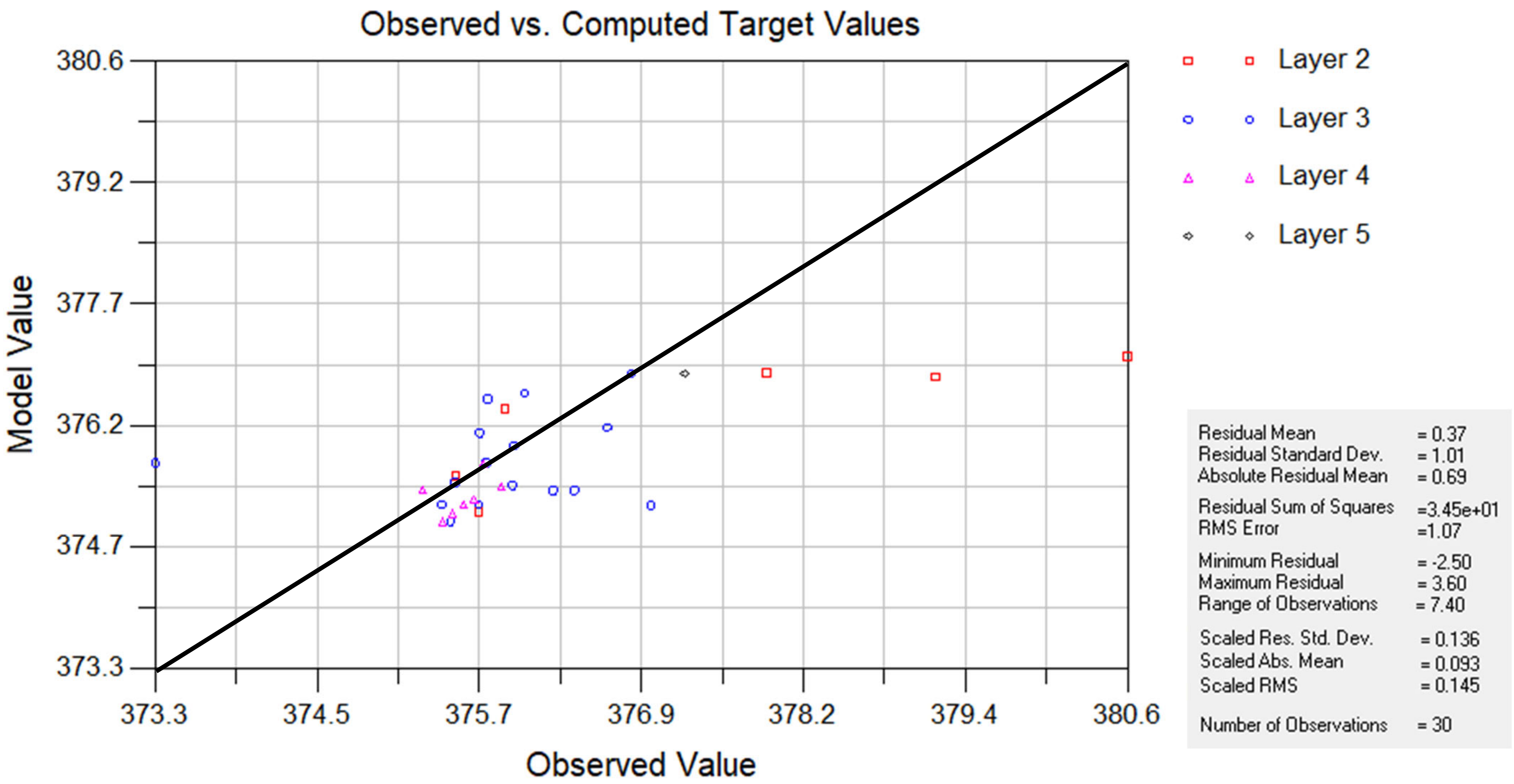
DRAWN	CHECKED	REVIEWED	DATE
JSI	JTR	MNH	2024-10-10

TITLE **Scatter Diagram for Predicted and Observed Hydraulic Heads – January 9, 2020**

Rev No.	JOB NO.	FIGURE
NA	23008-24MNA	**4**



Residual Mean	= 0.37
Residual Standard Dev.	= 1.01
Absolute Residual Mean	= 0.69
Residual Sum of Squares	=3.45e+01
RMS Error	=1.07
Minimum Residual	= -2.50
Maximum Residual	= 3.60
Range of Observations	= 7.40
Scaled Res. Std. Dev.	= 0.136
Scaled Abs. Mean	= 0.093
Scaled RMS	= 0.145
Number of Observations	= 30

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TITLE **Scatter Diagram for Predicted and Observed Hydraulic Heads – October 31, 2022**

DRAWN	CHECKED	REVIEWED	DATE	Rev No.	JOB NO.	FIGURE
JSI	JTR	MNH	2024-10-10	NA	23008-24MNA	**5**

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