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DRAFT REPORT

Monitored Natural Attenuation Evaluation

Labadie Energy Center

Franklin County Missouri, USA

Submitted to:

Ameren Missouri
1901 Chouteau Ave
St. Louis, Missouri 63103

Submitted by:

Golder Associates Inc.
13515 Barrett Parkway Drive, Suite 260, Ballwin, Missouri, USA 63021
+1 314 984-8800

Project Number: 153140603

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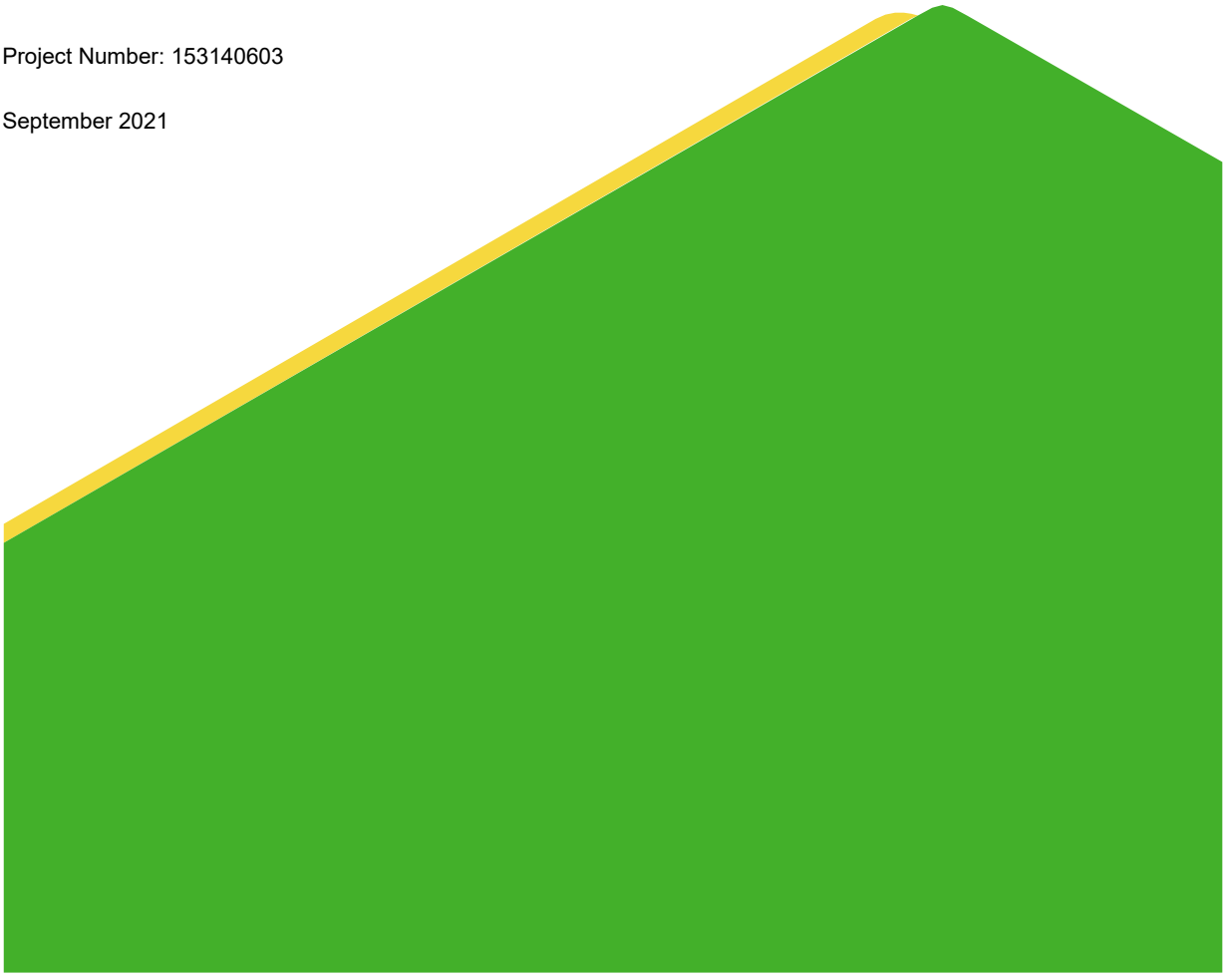

MNA Checklist

Elements of MNA Evaluation	Characterization	Applicable Section(s)
Pre-Tier 1 - Site Background Information		
Site Layout	Identify potential source(s)	2.0, 2.1, 3.1
	Identify potential exposure points/receptors	2.0, 2.1, 3.1
Site History	History and Inventory of contaminants released	1.0, 2.1
	Mode of contaminant release	1.0, 2.1
	Chemistry of CCR source and release	3.1, 3.2, 4.1, 4.2
Tier 1 - Demonstrate Active Contaminant Removal from Groundwater		
Hydrogeologic Elements	Potential migration pathways identified	2.1
	Nature and extent of contaminant plume	2.1, 3.1, 5.0, 6.3
	Basic groundwater flow direction and aquifer hydrostratigraphy	5.0, App. C
General Site Chemistry	General chemistry (groundwater, surface water, and/or aquifer solids) for preliminary evaluation of contaminant degradation	3.1, 3.2, 4.1, 4.2
	Trend evaluation of groundwater data	3.1, 3.2, 4.1
	Distribution of contaminants between aqueous and solid phases	4.1, 4.2
Tier 2 - Determine Mechanisms and Rate of Attenuation		
Define Contaminant/Aquifer Solid Interactions	Identify aquifer mineralogy, attenuation mechanisms, and microbiological processes (if applicable)	4.1, 4.2, 6.1, 6.2, 6.3
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)	3.1, 3.2, 4.1, 5.0
Detailed Hydrogeology	Groundwater flow regime, including direction, velocity, potentiometric surface, gradients, etc.	2.1, 5.0, App. C
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)	6.1, 6.2, 6.3
	Determination of mass of available solid phase reactant(s)	4.2, 6.2, 6.3
Stability of Attenuated Contaminated Mass	Laboratory testing of immobilized contaminant stability	4.2, 6.2
	Model analyses to characterize aquifer capacity and evaluation of immobilized contaminant stability	6.2, 6.3
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	

Note: Table based on summaries provided in United States Environmental Protection Agency (USEPA) *Monitored Natural Attenuation of Inorganic Contaminants in Ground Water* (USEPA 2007a, b), and Interstate Technology & Regulatory Council (ITRC) *A Decision Framework for Applying Monitoring Natural Attenuation Processes to Metals and Radionuclides in Groundwater* (ITRC 2010).

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1.0 INTRODUCTION

Based on the results of the corrective measures assessment conducted under 40 CFR § 257.91, groundwater (USEPA 2016) and Coal Combustion Residual (CCR) porewater and solid materials were characterized and evaluated to determine the effectiveness and help predict the attenuation rate of Monitored Natural Attenuation (MNA) as a component of remedial strategy for Ameren Missouri's (hereafter, "Ameren") LCPA bottom ash surface impoundment (hereafter, "LCPA" or "CCR Unit") located at Labadie Energy Center (LEC) in Franklin County, Missouri (hereafter, the "Site", "LEC" or "Labadie"). 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 of an MNA program, which involves the design of a performance monitoring program and the development of contingency plan, will be updated as needed, based on the findings of this evaluation if needed.

2.0 SITE BACKGROUND

The LEC is located approximately 35 miles west of downtown St. Louis in Franklin, County, Missouri (Figure 1). The Facility encompasses approximately 2,400 acres and is situated within the Missouri River Valley. The Facility is bounded to the north by the Missouri River, to the west by Labadie Creek, to the northeast and east by agricultural land and to the south by a railroad line and bedrock bluffs. Figure 2 shows the CCR Unit, along with site monitoring wells and the Missouri River.

The detection and assessment monitoring well network for the Site includes two background and nine compliance monitoring wells. There is also a corrective action monitoring well network for the LCPA, consisting of 22 monitoring wells. The well networks are summarized in Table 1 and shown on Figure 2.

Table 1: LCPA Monitoring Well Network

Monitoring Well Networks	Well ID
Detection and Assessment Background Monitoring Wells	BMW-1D, BMW-2D
Detection and Assessment (Compliance) Monitoring Wells	UMW-1D, UMW-2D, UMW-3D, UMW-4D, UMW-5D, UMW-6D, UMW-7D, UMW-8D, UMW-9D
Corrective Action Monitoring Wells	BMW-1S, BMW-2S, LMW-1S, LMW-2S, LMW-4S, LMW-7S, LMW-8S, MW-24, MW-26, S-1, AM-1S, AM-1D, TP-1D, TP-2M, TP-2D, TP-3M, TP-3D, TP-4D, MW-33(D), MW-34(D), MW-35(D), AMW-8

Historically, sampling and statistical analysis of the detection monitoring network has identified the following statistically significant increases (SSIs) of Appendix III constituents over background:

- **Boron** – UMW-3D, UMW-4D, UMW-5D, UMW-6D
- **Calcium** – UMW-1D, UMW-2D, UMW-3D, UMW-4D, UMW-5D, UMW-6D, UMW-7D, UMW-8D

- **Chloride** – UMW-2D, UMW-3D, UMW-4D, UMW-5D, UMW-6D, UMW-9D
- **Fluoride** – UMW-2D, UMW-4D,
- **pH** – UMW-3D, UMW-4D, UMW-5D, UMW-6D
- **Sulfate** - UMW-2D, UMW-3D, UMW-4D, UMW-5D, UMW-6D, UMW-7D, UMW-8D
- **Total Dissolved Solids** – UMW-1D, UMW-2D, UMW-3D, UMW-6D, UMW-7D, UMW-8D

Assessment monitoring in accordance with §257.95 was initiated on April 15th, 2018. Assessment monitoring identified statistically significant levels (SSLs) as follows:

- **Molybdenum** – UMW-3D, UMW-4D, UMW-5D, UMW-6D, and UMW-7D

On January 9, 2019, Ameren initiated its Corrective Measures Assessment (CMA) and completed and posted the CMA report on May 20, 2019. A public meeting was held on May 29, 2019 and responses to public comments were posted on Ameren's CCR website (https://www.ameren.com/company/environment-and-sustainability/managing-coal-combustion). On August 30, 2019, Ameren published its "Remedy Selection Report – 40 CFR §257.97 Rush Island, Labadie, Sioux, and Meramec CCR Basins" (Ameren 2019) that identified source control through installation of a low-permeability cover system and use of MNA as its chosen corrective action remedial plan.

Since the issuance of the Remedy Selection Report, Ameren has completed a pilot groundwater treatment investigation at the Rush Island Energy Center. The results of the pilot study successfully demonstrated reductions in concentrations of parameters typically associated with CCRs (including boron and molybdenum). Based on these results, Ameren is planning on installing a groundwater treatment system for the LEC on the downgradient side of the LCPA by the end of 2022. This MNA report has been prepared to further evaluate the effectiveness of MNA as a groundwater remedy at the LEC for molybdenum concentrations.

2.1 Summary of Site Hydrogeologic Conditions

A detailed discussion of the Site Hydrogeology is presented in the Groundwater Monitoring Plan (GMP, Golder 2017), the Corrective Action Groundwater Monitoring Plan (CAGMP, Golder 2020b) and the initial 2019 modeling report (Gredell 2019). In summary, geological and hydrogeological units exposed at the Site include two different geologic terrains: (1) floodplain deposits of the Missouri River Valley and (2) older sedimentary bedrock formations. The alluvial floodplain deposits are typically comprised of sands and gravels with lesser amounts of silts and clays, generally resulting in an overall fining-upward sequence. The bedrock formations are comprised of relatively flat-lying Ordovician-aged limestones, sandstones, and dolomites.

The alluvial deposits represent the primary aquifer at the Site and are influenced by the nearby Missouri River. Water flows into and out of the alluvial aquifer because of fluctuating river water levels that produce "bank recharge" and "bank discharge" conditions. Under typical aquifer conditions, groundwater in the alluvial aquifer flows towards the river and away from the bedrock bluffs, with a net flow direction generally to the north or northeast.

Horizontal and vertical groundwater flow within the uppermost aquifer have been locally influenced by operation of the LCPA surface impoundment prior to commencing closure. Prior to closure, ponding of water in the LCPA at elevations higher than the static water levels in the underlying alluvial aquifer groundwater created a localized mounding effect, resulting in localized downward gradients and localized radial groundwater flow outward from the impoundment. Since closure, these artificial downward gradients have been eliminated and alluvial aquifer flow has returned to more natural flow conditions.

3.0 TIER I EVALUATION

This evaluation was performed to further evaluate the mechanisms, rates, and stability of MNA as a remedy for groundwater impacts for the LCPA. To conduct this evaluation, a review of groundwater, CCR porewater, and soil samples that have been collected since 2011 was completed. Supplemental data collection and evaluation in support of MNA included:

- Groundwater characterization (including major cations and anions) to identify water types and temporal and geographical trends, where present.
- Mineralogical analysis of aquifer soil materials to identify and quantify the major mineral components.
- Chemical analysis of aquifer soil materials to quantify the total metal content and identify the environmentally available fraction of metals.
- Geochemical modeling to identify the major aqueous species and evaluate saturation indices of minerals relevant to attenuation of molybdenum.

The results generated by this supplemental assessment were used by Golder to complete the Tier I, Tier II, and Tier III evaluations in accordance with USEPA (2007a, b). The results of the Tier I, Tier II, and Tier III are summarized in the subsequent sections.

3.1 Groundwater and Porewater Sampling

Numerous groundwater samples have been collected at the Site as a part of CCR Rule and State Utility Waste Landfill (UWL) monitoring programs. For this evaluation, monitoring wells from the compliance and corrective action 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

Detection and Assessment (Compliance) Monitoring Network Wells	Corrective Action Monitoring Network Wells	CCR Unit Porewater Piezometers
BMW-1D*, BMW-2D*, UMW-1D, UMW-2D, UMW-3D, UMW-4D, UMW-5D, UMW-6D, UMW-7D, UMW-8D, UMW-9D	BMW-1S*, BMW-2S*, LMW-1S, LMW-2S, LMW-4S, LMW-7S, LMW-8S, MW-24, MW-26, S-1, AM-1S, AM-1D, TP-1D, TP-2M, TP-2D, TP-3M, TP-3D, TP-4D, MW-33(D), MW-34(D), MW-35(D), AMW-8	LCPA-1D, LCPA-1S, LCPA-2D, LCPA-2S, LCPA-3D, LCPA-3S

Note: * - Denotes background well.

3.1.1 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, development of partitioning coefficients (in conjunction with solid material analyses), 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 sorption 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 LCPA, LCPB, and LCL1 from 2017 to 2020.

3.2 Soil Sampling and Analysis

3.2.1 Sample Collection

In May 2021, nine soil samples were collected from three boreholes to evaluate geochemical properties of the alluvial aquifer materials at the Site. Samples were obtained from a boring (L-BH-01) at a background location as well as at L-BH-02 and L-BH-03 (Figure 2) located near the LCPA. 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 3.2.2.

Table 3: Boring Sample ID and Descriptions

Boring ID	Sample ID (Depth in Feet Below Ground Surface)	Geologic Material
L-BH-01 (Background)	L-BH-01S (23 – 30)	(SP) Poorly graded sand
	L-BH-01M (65 – 70)	(SP) Poorly graded sand
	L-BH-01D (100 – 114)	(SW) Well graded sand and gravel
L-BH-02 (Upgradient)	L-BH-02S (40 – 50)	(SW) Well graded sand
	L-BH-02M (67.5 – 70)	(SM) Silty sand
	L-BH-02D (80 – 87)	(SP) Poorly graded fine sand
L-BH-03 (Downgradient)	L-BH-03S (22.5 – 30)	(SP) Poorly graded fine sand
	L-BH-03M (70 – 80)	(SW) Well graded sand
	L-BH-03D (108 – 114)	(SW) Well graded sand and gravel

3.2.2 Soil Analyses

Multiple geochemical 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 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.

- **Total metals:** This test was used to quantify the chemical composition of aquifer materials. The total mass of metals, in combination with the results of sequential extraction testing, can be used to determine the provenance of metals and verify sequential extraction results. This extraction method is based on USEPA Method SW846 3050B, sometimes called an "aqua regia" or near total extraction. Target metals were analyzed using USEPA Method SW846 6010C "Inductively Coupled Plasma-Atomic Emission Spectrometry", Revision 3, November 2000.
- **Sequential extraction (SEP):** This test consists of a seven-step total metals extraction from solids as per Tessier et al. (1979) to identify the provenance of molybdenum (i.e., the operationally defined fraction that contains the metal)[1] 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. The metals content of the extracted samples was determined using USEPA Method SW846 6020B "Inductively Coupled Plasma-Mass Spectrometry", Revision 2, July 2014.
- **Cation exchange capacity (CEC):** The CEC represents the total number of negative charge sites in a given amount of solid at which reversible cation adsorption and desorption can occur (Hem 1985). Although CEC was determined, the results are not included in this report as the MNA only included evaluation of the attenuation of molybdenum, and molybdenum does not occur as a cationic species in groundwater.

4.0 GROUNDWATER, POREWATER, AND SOIL CHARACTERIZATION

4.1 Geochemical Evaluation

The water quality monitoring data used for the geochemical evaluation were obtained from Site monitoring wells and CCR Unit piezometers. The results discussed in this section apply to both the CCR rule monitoring wells and the Corrective Action Monitoring wells. Data used are provided in the Annual Reports produced by Golder from 2017 through 2020.

On September 28th, 2019, Ameren commenced Phase 1 of Corrective Action by initiating closure at the LCPA and completed Phase I with the installation of a geomembrane liner system by December 30th, 2020. As such, the discussion of water quality results addresses the periods before and after closure. The following is noted with respect to groundwater quality:

[1] Sequential extraction of metals from soil samples consisted of seven discrete steps for this investigation:

Step 1 - Exchangeable Fraction: This extraction includes trace elements that are reversibly adsorbed to overburden 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 aluminum.

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 overburden after the previous extractions will be distributed between silicates, phosphates, and refractory oxides.

- **pH:** The pH of groundwater samples collected from CCR monitoring network wells after closure (between January and June 2021) ranged from 6.8 to 9.4 (Figure 3a). Historically, the pH in the CCR monitoring well network has ranged from 6.2 to 9.6, with most values falling between 7.1 and 8.1. Pre-closure groundwater samples collected from the corrective action well network reported pH values ranging from 5.8 to 9.8. Samples collected from the corrective action network since the closure of the LCPA display pH values ranging from 6.6 to 9.4 (Figure 3b). In 2018, the pH of porewater ranged from 8.9 to 10.8 within the LCPA.

- **ORP (Redox):** The ORP of groundwater samples collected from CCR monitoring wells after closure ranged from -181 to +53 millivolts (mV) (Figure 4a). Historically, the ORP in the CCR monitoring well network has ranged from –242 to +159 mV, with most values falling between -136 and -44 mV. The corrective action monitoring wells redox values ranged from -183 to +94 mV after closure. Pre-closure redox values within the corrective action monitoring network were variable, ranging from -297 to +311 mV (Figure 4b). In 2018, the ORP of porewater ranged from -90 to +170 mV.

- **Total Dissolved Solids (TDS):** Groundwater TDS concentrations in the CCR monitoring well network were variable after the LCPA closure and ranged from 324 milligrams per liter (mg/L) to 1050 mg/L. The lowest TDS concentration (324 mg/L) was observed in CCR monitoring well L-UMW-4D (where there is an SSL of molybdenum) and the highest TDS concentration (1,050 mg/L) was reported from CCR monitoring well L-UMW-8D. Groundwater in CCR monitoring well L-UMW-8D, while having the highest TDS, does not have an SSL for molybdenum as of January 2021. In 2018, the TDS of porewater ranged from 528 to 642 mg/L.

- **Major ion chemistry:** A Piper plot was generated for groundwater and porewater samples to facilitate the identification of water types and source contributions (Figure 5a, 5b). All background water samples, and most CCR monitoring well network downgradient water samples were water type Ca-HCO_3. The remainder of the downgradient wells had a water type of Ca-SO_4 or Na-SO_4 and demonstrated a similar major ion relative abundance to porewater (water type Ca-SO_4). The overall geochemical characteristics of the corrective action network samples were similar, whereas most downgradient water samples were water type Ca-HCO_3. However, some of the downgradient wells reported a water type of Ca-SO_4 or Na-SO_4, similar to that of porewater.

- **Iron:** Total oxidized iron (Fe^{+3}) concentrations were variable within the CCR network after closure and ranged from 0.03 mg/L (L-UMW-5D) to 25.5 mg/L (L-UMW-8D) between February and April 2021. Reduced iron (Fe^{+2}) ranged from 0.05 to 1.1 mg/L during this period. Total iron concentrations in porewater ranged from 0.03 to 0.18 mg/L during 2018.

- **Molybdenum:** Historically, molybdenum concentrations in groundwater surrounding the LCPA CCR Unit have ranged from non-detect (<0.005 mg/L) to 0.67 mg/L (Figure 6a). Molybdenum concentrations have exceeded the Groundwater Protection Standard (GWPS) at monitoring wells L-UMW-3D, L-UMW-4D, L-UMW-5D, L-UMW-6D, and L-UMW-7D since March 2016. Based on a Mann-Kendall test, molybdenum concentrations at only L-UMW-5D show a statistically significant increasing trend. However, since the initial closure activities began (September 2019), molybdenum concentrations at well L-UMW-5D have declined by 33%, indicating the SSL of molybdenum at L-UMW-5D is decreasing. All other wells with an SSL of molybdenum also indicate a decreasing or stable trend.

  It is anticipated that molybdenum concentrations at L-UMW-5D will continue to decrease due to the completion of LCPA closure. The elevated pH (9.23) at L-UMW-5D is likely partially responsible for the elevated molybdenum concentrations in groundwater since alkaline conditions cause desorption of molybdenum from soil. It is expected that as circumneutral Site groundwater mixes with groundwater at

L-UMW-5D, a decrease in pH is likely to occur, resulting in a continued decline in molybdenum concentrations at L-UMW-5D due to mixing and increased sorption efficiency. Molybdenum in groundwater in the corrective action monitoring network was higher in some wells, up to 1.4 mg/L historically (Figure 6b) than present in the compliance network, however, all wells also show a stable or decreasing trend statistically and both closure and corrective actions are expected to improve groundwater quality at the wells. Molybdenum levels in the porewater samples ranged from 0.084 mg/L to 1.43 mg/L within the LCPA, with a mean molybdenum concentration of 0.26 mg/L. Molybdenum is expected to be predominately present in the form of the divalent anionic molybdate (MoO_4^{-2}) species under the pH and redox conditions present in groundwater (Figure 7a, b).

4.1.1 Mineralogical Controls in Groundwater and Porewater

The results of saturation index modeling for relevant minerals for groundwater and porewater at upgradient, downgradient, and corrective action wells are presented in Table 4. Mineral saturation can play an important role in attenuation of metals, either directly by their removal through mineral precipitation, or indirectly by providing sorptive surfaces or opportunities for co- precipitation.

- Iron-bearing minerals: Ferrihydrite was indicated to be at equilibrium with groundwater or oversaturated in all of the monitoring well and porewater samples, indicating a strong potential for ongoing precipitation of solid-phase iron oxides. Thus, it is assumed that iron (hydr)oxides are ubiquitous in the Site aquifer.
- Other minerals: All groundwater and porewater samples were simulated to be in equilibrium or oversaturated with respect to calcite ($CaCO_3$). Other carbonate minerals, i.e., rhodochrosite ($MnCO_3$) and siderite ($FeCO_3$), were oversaturated or in equilibrium in most groundwater and some porewater samples. Barite ($BaSO_4$) was simulated to be in equilibrium or oversaturated in all porewater samples and nearly all groundwater samples (except for UMW-9D).

In summary, several mineral phases likely control groundwater composition at some or all wells: barite, calcite, ferrihydrite, rhodochrosite, and siderite. In the case of ferrihydrite (or calcite to a lesser degree), the dissolved concentrations of molybdenum can be reduced through their ability to act as a substrate for adsorption/co-precipitation.

4.2 Compositional Analysis of Alluvial Aquifer Soil

4.2.1 Mineralogical Composition

Quantitative X-ray diffraction (XRD) with Rietveld refinement was used to identify and quantify minerals in nine soil samples collected during the drilling activities - three samples from three depths (shallow, middle, and deep) from each of the soil borings (L-BH-01, L-BH-02, and LB-BH-03), as described in Section 3.2. These samples were obtained to determine the mineralogical composition of the aquifer system and identify any minerals that would potentially influence attenuation of molybdenum. In contrast, the presence of certain minerals could also indicate a potential for naturally occurring release of molybdenum into groundwater, for instance due to oxidation of sulfide minerals.

The mineralogical analysis identified the aquifer materials to predominately consist of quartz, with varying amounts of the silicate minerals albite, muscovite, chlorite, and montmorillonite (Table 5). Laboratory analytical reports for the XRD samples, including the XRD patterns, are provided in Appendix A.

4.2.2 Chemical Composition and Sequential Extraction

Chemical analysis and sequential extractions were used to determine the chemical composition of the alluvial aquifer soils and the distribution of molybdenum over various operationally defined fractions. As described in

Section 3.2, this testing was conducted on soil samples from three borehole locations. Select results are presented in Table 6 and the laboratory data are included in Appendix B.

A description of the individual fractions determined by sequential extraction is presented in Footnote 1, Section 3.2.2. 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 in aquifers (Tessier et al. 1979). Total metal quantities from the sequential extraction are expressed as "SEP Total" in Table 6. The sum of the sequential extraction steps is also presented for comparison, but does not represent an analytically determined value.

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 34,800 to 64,000 mg/kg, and the environmentally available fraction ranged from 240 (L-BH-03M) to 1,369 mg/kg (L-BH-02M; Figure 8). Aluminum in the soil at the site is, therefore, largely (> 90%) present in the residual, or silicate-bound fraction. The environmentally available 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 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 nine core samples analyzed, varying from 3,900 (BH-03M) to 19,000 mg/kg (L-BH-02M). In all nine soil borings, the non-environmentally available (sulfide and residual) fractions accounted for the largest proportion of total iron (61 to 74%) and, as such, most of the iron is not environmentally available (Figure 9). The remainder of iron in the samples is present in either the amorphous or metal hydroxide fractions. 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 molybdenum under certain conditions.

Metals identified as an SSL

- Molybdenum: Total molybdenum in soil ranged from 0.21 to 3.2 mg/kg, of which up to 100% (L-BH-01D and L-BH-03D) was present in the environmentally available fraction (Figure 10). Environmentally available molybdenum was contained in the amorphous and metal hydroxide fractions. In three borings (L-BH-01S, L-BH-01M and L-BH-02D), of the small amount of molybdenum identified, all was present in the residual fraction. These results indicate that attenuation of molybdenum by amorphous and metal hydroxide minerals is occurring at the Site.

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

5.0 GROUNDWATER MODELING

In 2019, a groundwater model and draft report was prepared by Gredell Engineering, Inc (Gredell 2019), to provide a predictive analysis for groundwater flow at the LEC for the Corrective Measures Assessment. In 2021, this groundwater model was updated by XDD Environmental, LLC (XDD), to provide predictive analysis for groundwater flow at the LEC for the design of a pump, treat, and re-injection system for LCPA Corrective

Action. For this evaluation, Golder updated the XDD model to evaluate the fate and transport of key metals under different corrective action scenarios and a Technical Memorandum summarizing the groundwater model 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 historical aquifer tests conducted at the site.
- Historical groundwater elevation measurements.

Details of the flow model development and results are presented in Appendix C. The results of the model were used to for the geochemical evaluation as discussed in Section 6.

6.0 GEOCHEMICAL ANALYSIS AND MODELING

6.1 Empirical Attenuation Rates

To evaluate the attenuation of molybdenum in groundwater at the Site and to assess the rate of attenuation, Golder 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:

$$Ln(Ct) = kt + Ln(C0) \qquad \text{(Equation 1)}$$

where C0 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:

$$k = (Ln(Ct) - Ln(C0))/t \quad \text{(Equation 2)}$$

Groundwater water quality data from the background and downgradient wells collected between March 2016 and April 2021 were used to determine the mean first-order decay rate for each constituent of interest. A first-order decay rate was also calculated using data collected from April 2020 to April 2021 to evaluate the effect of changing conditions at the Unit due to capping and closure. 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, Golder calculated the approximate number of years that it would take for molybdenum concentrations higher than their respective GWPS to decline below these values and these results are provided in Section 6.3.

6.2 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 3.6 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 1998d1998c, 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 15; Bethke et al. 2021) 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., 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.

A Kd value (partitioning coefficient) was calculated using the average groundwater molybdenum concentration across the site and the results of sequential extraction of molybdenum from soils (Section 4.2.2; Steps 1-5), using equation 3.

$$Kd\ (mL/g) = \text{Mass of Adsorbate Sorbed} / \text{Mass of Adsorbate in Solution} \quad \text{(Equation 3)}$$

The resulting Kd ranged from 1 (or non-detect molybdenum adsorbed) to 38 mL/g for the site. The results of the Kd calculation are in agreement with published Kd values of 0 to 40 mL/g for materials that contain <10% clay, organic matter, or metal iron and aluminum oxyhydroxides at a pH range of >9 or between 5 to 9 (Stenge and Peterson 1989). The Kd approach was used in combination with groundwater modeling to develop a fate and transport model for determination of the attenuation rate of molybdenum at the site in response to a combination of closure, natural attenuation, and corrective actions.

6.2.1 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 4.2.2. 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 sorption, the Appelo and Postma methodology further assumes the mass of ferrihydrite (m_{Hfo}) in grams (g) available equals the product of the [Fe] and the molecular weight of ferrihydrite (m_{wHfo} = 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 to conduct 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, Golder 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 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 molybdenum, a stepwise increase in molybdenum concentrations was simulated, similar in concept to a titration. This was accomplished using the mean concentration of 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 sorption 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 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	1220	1997	6200	187	399	1290
	mol X	2.2E-02	3.6E-02	1.1E-01	6.9E-03	1.5E-02	4.8E-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	---		

Parameter	Unit	Ferrihydrite			Gibbsite		
Surface Sites	mol weak	4.4E-03	7.2E-03	2.2E-02	2.8E-03	6.1E-03	2E-02
	mol strong	1.1E-04	1.8E-04	5.6E-04	---		
Mass of Ferrihydrite or Gibbsite	grams	1.94	3.18	9.86	0.54	1.15	3.73

Note: Gibbsite only has one site type

6.2.2 Mineral Precipitation and Co-precipitation

The potential for mineral precipitation was assessed in PHREEQC using a saturation index (SI) calculated according to Equation 4.

$$SI = \log (IAP/Ksp) \quad \text{(Equation 4)}$$

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 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). Molybdenum may also be attenuated during the formation of ferrihydrite in addition to following its formation (Tebo et al. 2004).

6.2.3 Long-Term Stability of Attenuated Constituents

Three sensitivity analyses were performed to assess the long-term stability of attenuated molybdenum under variable pH, redox, and ionic strength conditions. 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 the constituents of interest (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 3,700 mg/L were evaluated, which is approximately five to six times higher than the highest TDS concentration observed in groundwater at the CCR Unit.

6.2.4 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 sampling events conducted between January and April 2021. Samples from this period were selected for the geochemical modeling because all wells within the compliance and corrective action 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 molybdenum made use of all available sampling events between March 2016 and April 2021.
- **Porewater chemistry:** Porewater samples collected from L-LCPA-1D, L-LCPA-1S, L-LCPA-2D, LC-LCPA-2S, L-LCPA-3D, and L-LCPA-3S in February 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 equal to half the reporting 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 10% were considered valid. Compositions with charge balance errors greater than 10% were flagged as potentially less reliable, but still included in the geochemical modeling effort.

6.3 Results

6.3.1 Empirical Attenuation Rate

The results of the point decay analysis (Section 6.1) for groundwater at background and downgradient wells between March 2016 and April 2021 are provided in Tables 8. Results are presented as mean, site-wide attenuation rates.

This evaluation demonstrates that, in the compliance monitoring network, a net decrease in the concentration of molybdenum at downgradient monitoring wells has been occurring, as indicated by negative point decay constants. A second point decay analysis for data collected between April 2020 and April 2021 was conducted to represent molybdenum concentration trends throughout and following recent Site closure activities. In this dataset, molybdenum concentrations reported a stronger decreasing trend (i.e., a more negative point decay constant), shortening the expected time to compliance.

Table 8: Empirical Attenuation Rate of Molybdenum in the Compliance Monitoring Network

Constituents	Units	Average Point Decay Rates		
		Background Wells	Compliance Monitoring Network Wells	Time to Compliance (years)
March 2016 to April 2021				
Molybdenum	yr^{-1}	-0.01	-0.04	40
April 2020 to April 2021				
Molybdenum	yr^{-1}	0.14	-0.16	10

The mean downgradient decay rates can be used to estimate the number of years it would take for elevated groundwater molybdenum concentrations to decrease to its GWPS for the compliance monitoring network. At the maximum concentration of molybdenum observed in downgradient wells in 2021 (0.48 mg/L), this would require approximately 10 years based on the site decay rate that has been observed since April 2020. This estimation is conservative, as it does not account for various attenuation processes (e.g., dilution, dispersion, or sorption).

6.3.2 Model Predicted Attenuation Rate

Attenuation rates for molybdenum in groundwater were modeled using fate and transport modeling techniques as discussed in section 5.0 and Appendix C. Groundwater concentrations were modeled to decrease in concentration in wells both adjacent to the LCPA (Detection and Assessment Network) and within the molybdenum plume (Corrective Action Network).

As displayed in Figure 11, monitoring wells within the detection and assessment (compliance) monitoring well network that are present at a SSL, including UMW-3D, UMW-4D, UMW-5D, UMW-6D, and UMW-7D are predicted to be below the GWPS within 2 – 13 years of the treatment system start of operation. The model calculated attenuation rate from these wells is approximately 10 to 162 micrograms (µg/L) per year, with an average decrease in concentration of approximately 80 µg/L per year.

Figure 12 displays the model predicted decrease in molybdenum concentrations in the corrective action well network that are currently at concentrations above the GWPS (LMW-8S, AM-1D, TP-2D, TP-2M, TP-3D, TP-3M, AMW-8, MW-33D, MW-34D, MW-35D). These monitoring wells are located outside of the treatment capture zone and are predicted to reach concentrations below the GWPS within 2 - 39 years. The model calculated attenuation rate from these wells is approximately 4.5 to 24.2 µg/L per year, with an average decrease in concentration of approximately 14 µg/L per year.

6.3.3 Capacity of Attenuation Mechanisms

Attenuation modeling was conducted in PHREEQC as a function of the amount of attenuating substrate present (minimum, mean and maximum from soil analyses). The modeling revealed a large range of attenuation capacities for molybdenum. Figures 13a and 13b display the predicted trajectories of aqueous molybdenum concentrations in the compliance monitoring and corrective action monitoring networks, respectively, before and after attenuation, as additional molybdenum is titrated into solution. The bold lines display the geometric means for all groundwater scenarios within each soil scenario and the grey area represents the range for the 5^{th} to 95^{th} percentile of all soil scenarios.

The predicted trajectories are compared against the GWPS and porewater concentrations. On the plots, the further the predicted trajectories are to the right of the diagonal 1:1 line, the larger the amount of molybdenum that is attenuated in soils and is no longer predicted to reside in the aqueous phase.

For the minimum adsorption cases, the trajectories run nearly parallel to the 1:1 line, indicating that sorption capacity is directly proportional to the concentration before adsorption as sites become filled. The modeling results suggest that adsorption has the capacity to reduce molybdenum concentrations below approximately 0.3 mg/L down to the GWPS of 0.1 mg/L in the compliance monitoring network. The corrective action monitoring network currently shows less capacity for additional molybdenum attenuation as evidenced by molybdenum concentrations in multiple wells that are currently above the GWPS. In this case, the capping and closure of LCPA is expected to result in a reduced contribution from porewater at a given well, which will increase aquifer capacity in the future. The increase in capacity is demonstrated by the fate and transport modeling that displays decreasing molybdenum concentrations in response to closure of the LCPA (Section 6.3.2).

6.3.4 Long-Term Stability of Attenuated Constituents

To determine the long-term stability of sequestered molybdenum, simulations were conducted varying three variables known to affect its attenuation: pH, redox, and TDS. The modeled variations in dissolved molybdenum concentration as a function of changes in pH, Eh, and TDS are shown in Figures 14, 15, and 16 respectively. The compliance monitoring and corrective action monitoring networks were evaluated independently and are denoted as “a” and “b”, respectively. Results are presented along with the GWPS value 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 molybdenum as a function of changes in pH, Eh and TDS can be summarized as follows:

- **Molybdenum:** Lower pH values (more acidic conditions) are generally more favorable for adsorption (Figure 14a and b). Under alkaline conditions (pH greater than 10), nearly all molybdenum is desorbed and present in the dissolved phase in concentrations exceeding the GWPS. It is expected that pH values across the Site will decrease post closure, benefiting molybdenum attenuation. Over the range of Eh values at the Site (Figure 15a and b), molybdenum sorption is stable. Even highly reducing and oxidizing conditions are predicted to have minimal impact on molybdenum concentrations, which remain below the GWPS. Molybdenum adsorption is moderately affected by increases in TDS concentrations (Figure 16a and b). Molybdenum is modeled to desorb at TDS concentrations comparable to the maximum observed porewater concentration (642 mg/L). However, these simulations do not account for decreases in porewater flux that will likely result from capping and closure measures, so it is not expected that TDS levels will increase after closure.

7.0 TIER I EVALUATION

The evaluation of natural attenuation of molybdenum was completed in accordance with recommended practices and guidance promulgated by the USEPA and the ITRC (USEPA 2007a, b; 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 sorption 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 molybdenum outside of the CCR Unit appear to be stable or decreasing. Molybdenum

at L-UMW-5D displays a statistically significant increasing trend since March 2016. However, since the initiation of closure (September 2019) and capping of LCPA (December 2020), the molybdenum concentration at well L-UMW-5D has decreased by 33%. The alkaline conditions (pH > 9) at well L-UMW-5D, which result in desorption of molybdenum from solids, also likely contribute to molybdenum levels above the GWPS at the Site. The pH in this well is expected to decrease due to the implementation of the engineering controls and, consequently, molybdenum concentrations are anticipated to decline as well. This should be further improved with the installation of the treatment system. In combination, these observations indicate that concentrations of molybdenum in the aquifer are stable or decreasing across the site.

- **Magnitude of Exceedances:** The highest molybdenum concentration (since monitoring began) in the compliance monitoring network was observed at downgradient well L-UMW-6D in March 2016 at 0.67 mg/L. However, results from the most recent sampling have indicated that the concentration in this well has decreased to 0.48 mg/L. Additionally, declines have been observed in four of five downgradient wells, with no new wells demonstrating a molybdenum GWPS exceedances since closure efforts began in September 2019. The corrective action monitoring network, while being located substantially farther from the CCR Units, has historically reported higher molybdenum levels, up to 1.4 mg/L in March 2016. But, similar to the compliance monitoring networks, a recent decline in molybdenum concentrations in nearly every well in the network has occurred since closure of the LCPA.
- **Porewater:** Historical records are not available for ash additions or porewater concentrations over the lifespan of the LCPA surface impoundment. However, based on 2018 porewater data, molybdenum concentrations in porewater ranged from 0.084 mg/L to 1.43 mg/L. This indicates variable concentrations of molybdenum in the CCR Unit. While the LCPA may have been a source for molybdenum in groundwater in the past, due to the leaching characteristics of CCR, and groundwater predominantly flowing around instead of into the LCPA after closure, it is currently not considered to be an active source of molybdenum, as demonstrated by decreasing site-wide molybdenum concentrations in the compliance monitoring network that is immediately adjacent to the LCPA.
- **Groundwater Chemistry:** The groundwater monitoring results and the findings of the geochemical modeling support the potential for natural attenuation of molybdenum. Groundwater was modeled to be in equilibrium with the mineral phase ferrihydrite for all monitoring wells included in this assessment. This is consistent with the results from the sequential extraction analysis that indicate amorphous and metal hydroxide fractions sequester molybdenum.
- **Confirmation of Attenuation/Immobilization:** Based on both mineralogical and chemical analysis, it is demonstrated that attenuation of molybdenum by aquifer materials is occurring. Iron and aluminum, capable of forming (hydr)oxide phases that facilitate metals attenuation (Dzombak and Morel 1990), was identified in all samples. This indicates that it is likely aquifer solids have been and are actively attenuating molybdenum. Additional attenuation is expected after closure due to a reduced contribution from porewater and an accompanying decrease in groundwater pH around the LCPA, which will only be further aided by the installation of a groundwater treatment system. As discussed previously, molybdenum attenuation by soils is enhanced under moderately acidic conditions.

Based on these findings, molybdenum is confirmed to be viable for an MNA remedy application due to the aquifer response observed from closure activities and is, therefore, deemed to meet the criteria for Tier I MNA in accordance with USEPA guidance (USEPA 2007a, b).

8.0 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) show that adsorption is attenuating molybdenum downgradient of the CCR Unit. This is concluded based on equilibration of site-specific groundwater compositions with the range of Hfo and Hao concentrations observed in SEP results of Site soils. The attenuation capacity of Hfo and Hao surface sites is partially dependent on the concentrations of molybdenum in groundwater. The titration modeling (Figure 13a and b) demonstrates the soil's capacity to attenuate molybdenum if concentrations of molybdenum were to increase above current levels. The compliance monitoring network (located immediately adjacent to the LCPA) shows significant additional attenuation capacity based on modeling. The corrective action network, which is more distant from the LCPA, currently shows less capacity for additional attenuation of molybdenum. However, additional capacity will likely be created as the porewater flux decreases due to closure activities and conditions become more acidic. In addition to metal oxyhydroxides, clay minerals and/or particulate organics can also act as a substrate for attenuation (Goldberg and Forster 1996), but these mechanisms were not directly addressed in the current evaluation.
- **Estimated Site Attenuation Rates:** Concentrations of molybdenum are decreasing at downgradient compliance monitoring network wells, resulting in negative calculated point decay rates. Using the mean empirical decay rate, the maximum 2021 concentrations of molybdenum observed in downgradient monitoring wells would take approximate 10 years to attenuate to below GWPS (based on the trend since April 2020) without further corrective measures. Modeled attenuation rates determined by fate and transport modeling, taking into account dilution, sorption, and possible changes in geochemical conditions, are estimated to be under the GWPS in the detection and assessment monitoring well network within 2-13 years after installation of the treatment system. Monitoring wells within the corrective action well network are estimated to be under the GWPS in 2 to 39 years, depending on well location.

Based on these findings, molybdenum is viable as an MNA remedy application in combination with closure activities and deemed to meet the criteria for Tier II MNA in accordance with USEPA guidance (USEPA 2007a, b).

9.0 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:** Predictive modeling has demonstrated that source water concentrations of molybdenum could increase to 0.3 mg/L and yet result in concentrations at downgradient monitoring wells of the compliance monitoring network below the molybdenum GWPS in a reasonable time frame. The time frame is defined here as "reasonable" when it is comparable to time frames associated with other active remediation options described in an assessment of corrective measures (Golder 2019; ITRC 2010). The 95th percentiles of modeled trajectories show that a majority of pH and redox conditions at site are favorable for attenuating molybdenum and will become more conducive to attenuation as the groundwater pH reverts to natural background levels post closure. In addition to aluminum oxides and iron oxyhydroxides, molybdenum is known to adsorb to manganese

oxides, clay minerals, and particulate organic matter, providing additional opportunity for sequestration. The same response, albeit delayed due to groundwater transport times, is expected to occur in the corrective action monitoring network as supported by fate and transport modeling.

- **Stability Modeling for Adsorbed Constituents:** Stability modeling indicates that over the ranges of pH, Eh, and TDS observed in groundwater at the Site, the adsorbed molybdenum is relatively stable and will likely remain attenuated. The modeling results further suggest that the adsorption of molybdenum can be reversed if conditions become sufficiently alkaline, but there is no historical basis to expect such an occurrence and, in fact, the opposite (decreasing pH at wells) is expected to continue post closure. Generally, site groundwater is circumneutral or alkaline and has remained stable across the sampling period which supports continued molybdenum attenuation or increased attenuation as pH decreases at some wells. Changes in redox conditions are modeled to have little to no impact on aqueous molybdenum concentrations and molybdenum attenuation efficiency. Modeling results also indicate that increasing TDS concentrations could result in a very slight increase in aqueous concentrations of molybdenum due to competition for sorption sites. However, this effect is predicted to be minor over the range of TDS concentrations observed at the Site and the risk will be lessened over time as closure causes a decrease in porewater flux and greater mixing of ambient groundwater in the aquifer.

Based on these findings, molybdenum is viable as an MNA remedy application in combination with closure activities and deemed to meet the criteria for Tier III MNA in accordance with USEPA guidance (USEPA 2007a, b).

10.0 CONCLUSIONS

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

- Physical and chemical attenuation is occurring, and concentrations are stable or declining across the site.
- Modeling indicates that molybdenum attenuation will be efficient and stable in the long term.
- Molybdenum concentrations in corrective action wells outside of the treatment capture zone are predicted by Golder's modeling to decrease below the GWPS within 2 - 39 years.
- Molybdenum meets the UESPA requirements (Tiers I, II, and III) to be viable as an MNA remedy application in combination with the capping and closure of the LCPA. This conclusion is further supported by fate and transport modeling that also considered the effects of the proposed groundwater treatment system, and the predicted future molybdenum concentrations at the site.

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Signature Page

Golder Associates Inc.

UNSIGNED DRAFT

P.J. Nolan, Ph.D.
Senior Project Geochemist

Rens Verburg, Ph.D., LG (WA)
Principal Geochemist

Jeffrey Ingram, R.G.
Senior Project Geologist

Mark Haddock, P.E., R.G.,
Principal and Practice Leader

TABLES

Table 4
Geochemical Modeling
Relevant Mineral Phases- Saturation Indices
Labadie Energy Center, Franklin County, MO

MINERAL PHASES - Saturation Indices		L-LCPA-1D	L-LCPA-1S	L-LCPA-2D	L-LCPA-2S	L-LCPA-3D	L-LCPA-3S	L-BMW-1D	L-BMW-2D	L-UMW-1D	L-UMW-2D	L-UMW-3D	L-UMW-4D	L-UMW-5D	L-UMW-6D	L-UMW-7D	L-UMW-8D	L-UMW-9D
Ferrihydrite	Fe(OH)3	**3.36**	**1.51**	**2.33**	**2.21**	**2.43**	**1.83**	**1.60**	**2.48**	**3.71**	**3.37**	**3.27**	**1.91**	**2.37**	**3.74**	**3.43**	**4.48**	**3.95**
Siderite	FeCO3	-4.51	-9.92	-5.56	-7.27	-6.47	-11.70	**0.49**	**0.62**	**0.96**	**0.43**	-2.26	-0.90	-3.90	-1.10	**0.68**	**0.45**	**0.92**
Melanterite	FeSO4: 7H2O	-10.63	-16.77	-11.98	-13.65	-13.12	-18.48	-5.45	-5.67	-5.91	-5.56	-8.40	-6.01	-10.38	-6.28	-4.82	-4.75	-7.09
Anglesite	PbSO4	-4.87	-7.71	-5.56	-5.45	-6.02	-6.81	-4.82	-5.03	-5.63	-4.39	-4.64	-3.82	-5.27	-3.92	-3.99	-3.76	-6.51
Rhodochrosite	MnCO3	-1.35	-0.90		**0.02**	-1.14		**-0.32**	**-0.35**	**-0.16**	**0.02**	**0.21**	**-0.42**	-0.79	**-0.13**	**0.43**	**-0.01**	**-0.30**
Birnessite	MnO2	-8.53	-4.08		-2.97	-8.00		-17.95	-16.91	-14.75	-14.69	-11.17	-16.88	-11.90	-12.60	-14.31	-12.18	-14.39
Manganite	MnOOH	-2.36	**1.62**		**1.20**	-1.30		-7.91	-7.20	-6.28	-5.94	-3.31	-6.58	-3.49	-4.06	-5.56	-4.76	-6.06
Gypsum	CaSO4:2H2O	-1.19	-1.14	-1.05	-1.26	-1.13	-1.21	-1.94	-1.93	-2.46	-1.44	-0.91	-1.12	-1.31	-0.93	-1.01	-0.99	-3.82
Calcite	CaCO3	**0.93**	**1.70**	**1.43**	**1.28**	**1.46**	**1.54**	**0.04**	**0.40**	**0.41**	**0.54**	**1.18**	**-0.04**	**1.13**	**0.27**	**0.51**	**0.23**	**0.21**
Magnesite	MgCO3	-0.94	-1.66	**-0.42**	**0.59**	-0.96	-1.33	-1.19	-0.93	-0.81	-0.76	-0.89	-1.61	-2.81	-1.64	-0.96	-0.96	-0.95
Barite	BaSO4	**0.63**	**0.60**	**0.89**	**0.97**	**0.63**	**0.53**	**1.00**	**0.46**	**0.07**	**0.61**	**1.03**	**1.03**	**0.71**	**1.16**	**0.66**	**1.10**	-1.18

MINERAL PHASES - Saturation Indices		L-BMW-1S	L-BMW-2S	L-LMW-1S	L-LMW-2S	L-LMW-4S	L-LMW-7S	L-LMW-8S	L-MW-24	L-MW-26	L-S-1	L-AM-1S	L-AM-1D	L-TP-1D	L-TP-2M	L-TP-2D	L-TP-3M	L-TP-3D
Ferrihydrite	Fe(OH)3	**3.99**	**1.42**	**1.60**	**2.15**	**2.64**	**1.46**	**2.61**	**0.64**	**1.01**	**2.02**	**1.45**	**1.56**	**1.22**	**1.62**	**2.50**	**2.99**	**4.11**
Siderite	FeCO3	**0.44**	-2.12	**0.31**	-5.54	**0.43**	**-0.11**	**0.24**	-2.37	-2.29	-1.27	**0.19**	**0.27**	**0.66**	**0.35**	**0.78**	**0.28**	**-0.42**
Melanterite	FeSO4: 7H2O	-5.22	-7.95	-5.44	-11.77	-4.72	-4.89	-4.44	-8.27	-8.46	-7.50	-6.29	-4.81	-6.02	-5.32	-4.83	-4.78	-5.26
Anglesite	PbSO4	-4.62	-4.60	-4.58	-5.13	-3.98	-3.44	-3.53	-4.79	-4.81	-5.00	-5.17	-3.61	-5.46	-4.31	-4.32	-3.77	-3.62
Rhodochrosite	MnCO3	**0.24**	-2.86	**0.04**	-1.50	**0.19**	**-0.23**	**0.14**	-2.27	**0.07**	**-0.36**	**0.18**	-0.53	**-0.44**	**-0.04**	**0.53**	**-0.02**	-0.91
Birnessite	MnO2	-12.20	-16.04		-10.04	-15.61		-15.44	-16.06	-13.32	-13.66	-17.01	-19.02	-19.37	-18.32	-16.79	-14.89	-12.94
Manganite	MnOOH	-4.95	-8.10		-2.78	-6.40		-6.26	-7.93	-5.34	-5.86	-7.41	-8.10	-8.65	-7.54	-6.49	-6.17	-5.22
Gypsum	CaSO4:2H2O	-1.49	-1.61	-1.68	-1.40	-1.17	-1.03	-0.61	-1.94	-2.01	-2.17	-2.23	-1.02	-2.34	-1.35	-1.29	-1.20	-0.97
Calcite	CaCO3	**0.20**	**0.25**	**0.10**	**0.81**	**0.00**	**-0.24**	**0.08**	**0.02**	**0.20**	**0.08**	**0.25**	**0.07**	**0.37**	**0.34**	**0.35**	**-0.14**	**-0.12**
Magnesite	MgCO3	-1.08	-1.18	-1.24	-2.61	-1.25	-1.48	-1.25	-1.25	-1.09	-1.32	-1.04	-1.43	-0.82	-1.08	-0.91	-1.43	-1.37
Barite	BaSO4	**0.75**	**0.66**	**0.29**	**0.37**	**1.02**	**1.28**	**1.32**	**0.24**	**0.16**	**0.22**	**0.25**	**0.88**	**0.69**	**0.80**	**0.88**	**1.18**	**0.99**

MINERAL PHASES - Saturation Indices		L-TP-4D	L-MW-33[D]	L-MW-34[D]	L-MW-35[D]	L-AMW-8
Ferrihydrite	Fe(OH)3	**4.02**	**3.38**	**3.46**	**1.29**	**3.88**
Siderite	FeCO3	-0.79	**-0.04**	**0.02**	**-0.04**	-0.56
Melanterite	FeSO4: 7H2O	-6.17	-5.06	-4.92	-4.59	-6.09
Anglesite	PbSO4	-3.99	-3.79		-3.42	-4.25
Rhodochrosite	MnCO3	**-0.46**	-0.76		-0.69	**-0.40**
Birnessite	MnO2	-11.14	-14.80		-18.85	-13.03
Manganite	MnOOH	-4.46	-6.14	-6.11	-8.15	-4.74
Gypsum	CaSO4:2H2O	-1.24	-1.25	-1.11	-0.73	-1.58
Calcite	CaCO3	**0.16**	**-0.23**	**-0.16**	**-0.16**	**-0.03**
Magnesite	MgCO3	-1.01	-1.48	-1.37	-1.40	-1.52
Barite	BaSO4	**1.33**	**0.91**	**0.97**	**0.91**	**0.66**

Notes:
Saturation indices >-0.5 identified by red bold type and grey shading
[(b)] pCO2(g) values presented at 10^value atm

Table 5
Monitored Natural Attenuation Evaluation
Summary of Rietveld Quantitative Analysis X-Ray Diffraction Results
Labadie Energy Center, Franklin County, MO

Mineral	Mineral Formula	Sample Location								
		L-BH-01S	L-BH-01M	L-BH-01D	L-BH-02S	L-BH-02M	L-BH-02D	L-BH-03S	L-BH-03M	L-BH-03D
		Sample Interval (FT BGS)								
		23-30	65-70	100-114	40-50	67.5-70	80-87	22.5-30	70-80	108-114
Actinolite	$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$	-	-	-	-	0.2	-	-	-	-
Albite	$NaAlSi_3O_8$	17.7	16.8	21.0	17.6	16.4	16.0	18.9	18.9	16.8
Chlorite	(Fe,(Mg,Mn)5,Al)(Si3Al)O10(OH)8	1.5	1.2	0.9	1.0	2.3	1.3	1.0	0.1	-
Calcite	CaCO3							1.2		
Diopside	$CaMgSi_2O_6$	-	-	-	2.3	2.2	2.2	-	2.2	2.1
Dolomite	$CaMg(CO_3)_2$	0.5	0.5	0.5	0.3	3.1	0.5	0.4	1.2	-
Heulandite	$CaAl_2Si_7O_{18}{\cdot}6H_2O$	-	-	-	-	1.8	-	-	-	-
Hornblende	$(Ca,Na)_2{}^{-}3(Mg,Fe,Al)_5Si_6(Si,Al)_2O_{22}(OH)_2$	-	0.6	0.7	-	-	1.0	-	1.4	-
Kutnohorite	$CaMn(CO_3)_2$	2.1	-	-	-	0.3	-	-	-	-
Magnetite	$CaMgSi_2O_6$	-	-	-	-	0.3	-	-	-	-
Microcline	$KAlSi_3O_8$	8.5	12.5	19.6	12.3	7.5	7.8	11.0	13.7	13.5
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2{\cdot}nH_2O$	-	-	-	-	6.5	-	-	-	-
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$	5.8	6.3	4.3	3.9	10.1	4.6	4.8	2.8	3.1
Quartz	SiO_2	63.9	62.1	53.0	62.6	49.1	66.2	62.6	59.7	64.5
Rhodochrosite	$MnCO_3$	-	-	-	-	0.2	0.4	-	-	-
TOTAL		100	100	100	100	100	100	100	100	100

Notes:
1.) Results provided in wt% - percent by weight of each mineral.
2.) ft bgs - feet below ground surface.
3.) Non-detect minerals within a sample are represented by "-".
4.) Zero values indicate that the mineral was included in the refinement, but the calculated concentration is below a measurable value.
5.) Samples were collected by Golder Associates between May 24, 2021 and May 26, 2021.

Table 6
Monitored Natural Attenuation Evaluation
SEP Analysis Summary
Labadie Energy Center, Franklin County, MO

Analyte	SEP Step	Sample Location								
		L-BH-01S	L-BH-01M	L-BH-01D	L-BH-02S	L-BH-02M	L-BH-02D	L-BH-03S	L-BH-03M	L-BH-03D
		Sample Interval (FT BGS)								
		(23-30)	(65-70)	(100-114)	(40-50)	(67.5-70)	(80-87)	(22.5-30)	(70-80)	(108-114)
Aluminum	SEP Step 1	< 52 U	< 46 U	< 45 U	< 51 U	< 54 U	< 49 U	< 50 U	< 44 U	< 47 U
Aluminum	SEP Step 2	6.6 J	6.5 J	6.0 J	9.1 J	17 J	11 J	< 37 U	< 33 U	10 J
Aluminum	SEP Step 3	36	32	16	43	190	47	31	17	39
Aluminum	SEP Step 4	410	350	220	430	1,100	360	410	170	270
Aluminum	SEP Step 5	130 J	84 J	31 J	91 J	62 J	74 J	100 J	53 J	61 J
Aluminum	SEP Step 6	740	590	450	700	3,100	720	720	500	410
Aluminum	SEP Step 7	41,000	31,000	43,000	41,000	36,000	37,000	43,000	35,000	24,000
Aluminum	SEP SUM	42,000	32,000	44,000	43,000	40,000	39,000	44,000	36,000	25,000
Aluminum	SEP Total	1,800	1,300	840	2,200	6,500	1,700	1,700	1,200	800
Aluminum	SEP Total	42,000	38,000	40,000	54,000	64,000	41,000	41,000	37,000	34,000
Antimony	SEP Step 1	< 16 U	< 14 U	< 14 U	< 15 U	< 16 U	< 15 U	< 15 U	< 13 U	< 14 U
Antimony	SEP Step 2	< 12 U	< 10 U	< 10 U	< 11 U	< 12 U	< 11 U	< 11 U	< 9.9 U	< 10 U
Antimony	SEP Step 3	< 3.9 U	< 3.5 U	< 3.4 U	< 3.8 U	< 4.0 U	< 3.7 U	< 3.7 U	< 3.3 U	< 3.5 U
Antimony	SEP Step 4	< 3.9 U	< 3.5 U	< 3.4 U	< 3.8 U	< 4.0 U	< 3.7 U	< 3.7 U	< 3.3 U	< 3.5 U
Antimony	SEP Step 5	< 59 U	< 52 U	< 51 U	< 57 U	< 60 U	< 55 U	< 56 U	< 49 U	< 52 U
Antimony	SEP Step 6	< 3.9 U	< 3.5 U	< 3.4 U	< 3.8 U	< 4.0 U	< 3.7 U	< 3.7 U	< 3.3 U	< 3.5 U
Antimony	SEP Step 7	0.43 J	0.39 J	0.16 J	< 3.8 U	1.1 J	0.45 J	0.46 J	0.49 J	0.25 J
Antimony	SEP SUM	0.43 J	0.39 J	0.16 J	< 3.0 U	1.1 J	0.45 J	0.46 J	0.49 J	0.25 J
Antimony	SEP Total	< 7.4 U	< 6.5 U	< 6.3 U	< 7.2 U	< 7.9 U	< 7.1 U	< 7.0 U	< 6.2 U	< 6.6 U
Antimony	SEP Total	0.47 J	0.41 J	0.34 J	0.63 J	1.1 J	0.41 J	0.35 J	0.42 J	0.48 J
Arsenic	SEP Step 1	< 2.6 U	< 2.3 U	< 2.3 U	< 2.6 U	< 2.7 U	< 2.4 U	< 2.5 U	< 2.2 U	< 2.3 U
Arsenic	SEP Step 2	< 2.0 U	< 1.7 U	< 1.7 U	< 1.9 U	< 2.0 U	< 1.8 U	< 1.9 U	< 1.6 U	< 1.7 U
Arsenic	SEP Step 3	1.6	0.48 J	< 0.57 U	0.93	3.4	0.47 J	0.44 J	< 0.55 U	< 0.58 U
Arsenic	SEP Step 4	1.1	0.64	0.31 J	0.92	1.4	0.50 J	0.80	0.34 J	0.61
Arsenic	SEP Step 5	< 9.8 U	< 8.7 U	< 8.5 U	< 9.6 U	< 10 U	< 9.2 U	< 9.3 U	< 8.2 U	< 8.7 U
Arsenic	SEP Step 6	0.80	0.88	0.54 J	1.0	1.0	0.86	0.75	0.67	1.1
Arsenic	SEP Step 7	1.9	0.79 J	1.1	1.6	2.0	1.5	1.8	< 1.1 U	< 1.2 U
Arsenic	SEP SUM	5.3	2.8	2.0	4.5	7.7	3.4	3.8	1.0	1.7
Arsenic	SEP Total	4.2	2.9	0.87 J	3.0	6.1	2.1 J	2.3	0.87 J	1.6 J
Arsenic	SEP Total	7.9 B	4.1 B	2.4 B	4.8 B	9.6 B	4.4 B	4.5 B	2.1 B	3.0 B
Calcium	SEP Step 1	740 J B	340 J B	270 J B	450 J B	2,200 B	320 J B	430 J B	210 J B	170 J B
Calcium	SEP Step 2	1,800	1,400	2,700	1,500	6,800	1,300	1,400	990	220 J
Calcium	SEP Step 3	6.4 J	5.0 J	5.9 J	5.5 J	7.3 J	5.2 J	5.8 J	5.8 J	4.8 J
Calcium	SEP Step 4	1,200	1,500	1,300	1,200	3,800	1,400	1,200	1,000	410
Calcium	SEP Step 5	480 J B	510 J B	990 J B	370 J B	3,600 J B	850 J B	360 J B	710 J B	98 J B
Calcium	SEP Step 6	150 J	380	690	200 J	1,300	250 J	160 J	390	110 J
Calcium	SEP Step 7	5,400	4,400	4,600	5,000	4,000	6,600	6,200	5,600	2,200
Calcium	SEP SUM	9,800	8,500	11,000	8,800	22,000	11,000	9,800	8,900	3,200
Calcium	SEP Total	3,900	4,200	4,800	3,800	14,000	3,800	3,400	15,000	2,000
Calcium	SEP Total	12,000	9,900	8,400	12,000	30,000	13,000	9,400	7,800	5,100

Notes:

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5.) UJ= The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit, the quantitation limit is considered estimated.

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

7.) J+= The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample and biased high.

8.) B= Compound was found in the blank and sample.

Table 6
Monitored Natural Attenuation Evaluation
SEP Analysis Summary
Labadie Energy Center, Franklin County, MO

Analyte	SEP Step	Sample Location								
		L-BH-01S	L-BH-01M	L-BH-01D	L-BH-02S	L-BH-02M	L-BH-02D	L-BH-03S	L-BH-03M	L-BH-03D
		Sample Interval (FT BGS)								
		(23-30)	(65-70)	(100-114)	(40-50)	(67.5-70)	(80-87)	(22.5-30)	(70-80)	(108-114)
Cobalt	SEP Step 1	< 13 U	< 12 U	< 11 U	< 13 U	< 13 U	< 12 U	< 12 U	< 11 U	< 12 U
Cobalt	SEP Step 2	0.46 J	< 8.7 U	< 8.5 U	0.30 J	1.2 J	< 9.2 U	< 9.3 U	< 8.2 U	0.42 J
Cobalt	SEP Step 3	0.91 J	0.51 J	0.21 J	0.54 J	1.0 J	0.39 J	0.49 J	0.14 J	0.74 J
Cobalt	SEP Step 4	1.3 J	0.94 J	1.3 J	1.0 J	1.3 J	0.63 J	0.89 J	1.2 J	1.6 J
Cobalt	SEP Step 5	< 49 U	< 43 U	< 43 U	< 48 U	< 50 U	< 46 U	< 46 U	< 41 U	< 44 U
Cobalt	SEP Step 6	0.62 J	0.65 J	0.71 J	0.72 J	1.2 J	0.53 J	0.56 J	0.80 J	1.4 J
Cobalt	SEP Step 7	0.44 J	< 2.9 U	< 2.8 U	0.28 J	1.2 J	0.30 J	0.20 J	< 2.7 U	< 2.9 U
Cobalt	SEP SUM	3.7	2.1 J	2.2 J	2.9	5.8	1.8 J	2.1 J	2.1 J	4.2
Cobalt	SEP Total	4.6 J	2.3 J	2.1 J	3.6 J	5.0 J	1.8 J	2.4 J	2.7 J	3.1 J
Cobalt	SEP Total	4.8	2.8 J	2.1 J	3.9	8.1	2.6 J	2.7 J	2.2 J	4.0
Iron	SEP Step 1	< 26 U	< 23 U	< 23 U	< 26 U	< 27 U	< 24 U	< 25 U	< 22 U	< 23 U
Iron	SEP Step 2	14 J	75	100	120	860	190	13 J	34	44
Iron	SEP Step 3	560	400	310	500	3,400	600	310	220	220
Iron	SEP Step 4	1,700	1,300	1,100	1,500	2,800	1,000	1,600	1,000	1,800
Iron	SEP Step 5	< 98 U	< 87 U	< 85 U	< 96 U	< 100 U	< 92 U	< 93 U	< 82 U	< 87 U
Iron	SEP Step 6	2,300	1,900	1,300	2,000	4,400	1,700	2,000	2,300	2,900
Iron	SEP Step 7	2,600	1,400	1,400	2,300	6,500	2,400	2,100	1,300	1,300
Iron	SEP SUM	7,200	5,100	4,200	6,400	18,000	5,900	6,000	4,900	6,300
Iron	SEP Total	4,500	3,400	2,100	4,800	10,000	3,400	4,200	3,500	3,900
Iron	SEP Total	7,400	5,700	6,100	8,000	19,000	6,800	6,200	3,900	6,300
Lithium	SEP Step 1	< 13 U	< 12 U	< 11 U	< 13 U	< 13 U	< 12 U	< 12 U	< 11 U	< 12 U
Lithium	SEP Step 2	< 9.8 U	< 8.7 U	< 8.5 U	< 9.6 U	< 10 U	< 9.2 U	< 9.3 U	< 8.2 U	< 8.7 U
Lithium	SEP Step 3	< 3.3 U	< 2.9 U	< 2.8 U	< 3.2 U	< 3.4 U	< 3.1 U	< 3.1 U	< 2.7 U	< 2.9 U
Lithium	SEP Step 4	0.80 J	0.68 J	0.36 J	0.81 J	2.8 J	0.71 J	0.75 J	0.28 J	0.33 J
Lithium	SEP Step 5	< 49 U	< 43 U	< 43 U	< 48 U	< 50 U	< 46 U	< 46 U	< 41 U	< 44 U
Lithium	SEP Step 6	0.97 J	0.72 J	0.58 J	0.80 J	3.4	0.89 J	0.84 J	0.63 J	0.47 J
Lithium	SEP Step 7	5.4	2.7 J	2.2 J	3.5	10	4.4	3.8	2.4 J	2.0 J
Lithium	SEP SUM	7.2	4.1	3.1	5.2	16	6.0	5.4	3.3	2.8
Lithium	SEP Total	2.3 J	1.7 J	1.6 J	2.7 J	8.0	2.0 J	2.0 J	2.1 J	0.94 J
Lithium	SEP Total	6.6	5.3	3.6	7.2	21	6.7	6.1	3.6	3.5
Manganese	SEP Step 1	0.55 J	1.4 J	3.4	0.65 J	7.3	0.91 J	0.67 J	2.8 J	3.7
Manganese	SEP Step 2	16	33	68	19	160	23	16	48	36
Manganese	SEP Step 3	4.6 B	15 B	48 B	5.1 B	53 B	15 B	8.5 B	16 B	8.6 B
Manganese	SEP Step 4	16	17	100	15	35	13	15	21	19
Manganese	SEP Step 5	< 15 U	2.1 J	5.2 J	< 14 U	9.9 J	< 14 U	< 14 U	3.2 J	< 13 U
Manganese	SEP Step 6	18	14	17	15	33	14	15	17	22
Manganese	SEP Step 7	39	25	38	42	67	47	34	35	14
Manganese	SEP SUM	94	110	280	96	370	110	89	140	100
Manganese	SEP Total	50	95	99	64	230	63	58	420	87
Manganese	SEP Total	100	140	250	140	410	150	96	160	160

Notes:

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

7.) J+= The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample and biased high.

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Monitored Natural Attenuation Evaluation
SEP Analysis Summary
Labadie Energy Center, Franklin County, MO

Analyte	SEP Step	Sample Location								
		L-BH-01S	L-BH-01M	L-BH-01D	L-BH-02S	L-BH-02M	L-BH-02D	L-BH-03S	L-BH-03M	L-BH-03D
		Sample Interval (FT BGS)								
		(23-30)	(65-70)	(100-114)	(40-50)	(67.5-70)	(80-87)	(22.5-30)	(70-80)	(108-114)
Molybdenum	SEP Step 1	< 10 U	< 9.3 U	< 9.1 U	< 10 U	< 11 U	< 9.8 U	< 9.9 U	< 8.8 U	< 9.3 U
Molybdenum	SEP Step 2	< 7.9 U	< 6.9 U	< 6.8 U	< 7.7 U	< 8.0 U	< 7.3 U	< 7.4 U	< 6.6 U	< 7.0 U
Molybdenum	SEP Step 3	< 2.6 U	< 2.3 U	0.14 J	< 2.6 U	0.25 J	< 2.4 U	< 2.5 U	< 2.2 U	0.15 J
Molybdenum	SEP Step 4	< 2.6 U	< 2.3 U	< 2.3 U	< 2.6 U	0.12 J	< 2.4 U	< 2.5 U	< 2.2 U	0.12 J
Molybdenum	SEP Step 5	< 39 U	< 35 U	< 34 U	< 38 U	< 40 U	< 37 U	< 37 U	< 33 U	< 35 U
Molybdenum	SEP Step 6	< 2.6 U	< 2.3 U	< 2.3 U	< 2.6 U	< 2.7 U	< 2.4 U	< 2.5 U	< 2.2 U	< 2.3 U
Molybdenum	SEP Step 7	0.12 J	0.11 J	< 2.3 U	< 2.6 U	0.22 J	0.10 J	< 2.5 U	< 2.2 U	< 2.3 U
Molybdenum	SEP SUM	0.12 J	0.11 J	0.14 J	< 2.0 U	0.59 J	0.10 J	< 2.0 U	< 2.0 U	0.26 J
Molybdenum	SEP Total	< 4.9 U	0.16 J	0.60 J	< 4.8 U	0.35 J	< 4.7 U	< 4.7 U	0.15 J	0.29 J
Molybdenum	SEP Total	0.26 J	0.26 J	3.2	0.21 J	0.82 J	0.29 J	0.23 J	0.33 J	1.3 J
Potassium	SEP Step 1	< 1,300 U	< 1,200 U	< 1,100 U	< 1,300 U	< 1,300 U	< 1,200 U	< 1,200 U	< 1,100 U	< 1,200 U
Potassium	SEP Step 2	110 J	93 J	90 J	120 J	180 J	100 J	110 J	< 820 U	99 J
Potassium	SEP Step 3	< 330 U	< 290 U	< 280 U	< 320 U	75 J	< 310 U	< 310 U	< 270 U	< 290 U
Potassium	SEP Step 4	39 J	36 J	< 280 U	50 J	120 J	42 J	43 J	< 270 U	< 290 U
Potassium	SEP Step 5	3,300 J B	2,900 J B	2,900 J B	3,200 J B	3,200 J B	3,100 J B	3,200 J B	2,800 J B	3,000 J B
Potassium	SEP Step 6	240 J	180 J	130 J	240 J	940	250 J	230 J	120 J	130 J
Potassium	SEP Step 7	26,000	18,000	26,000	26,000	17,000	19,000	24,000	21,000	18,000
Potassium	SEP SUM	30,000	22,000	30,000	29,000	22,000	22,000	27,000	24,000	21,000
Potassium	SEP Total	390 J	280 J	200 J	450 J	1,600	380 J	380 J	230 J	190 J
Potassium	SEP Total	19,000	18,000	27,000	29,000	25,000	18,000	21,000	25,000	22,000
Selenium	SEP Step 1	< 2.6 U	< 2.3 U	< 2.3 U	< 2.6 U	< 2.7 U	< 2.4 U	< 2.5 U	< 2.2 U	< 2.3 U
Selenium	SEP Step 2	< 2.0 U	< 1.7 U	< 1.7 U	< 1.9 U	< 2.0 U	< 1.8 U	< 1.9 U	< 1.6 U	< 1.7 U
Selenium	SEP Step 3	< 0.65 U	< 0.58 U	< 0.57 U	< 0.64 U	< 0.67 U	< 0.61 U	< 0.62 U	< 0.55 U	< 0.58 U
Selenium	SEP Step 4	< 0.65 U	< 0.58 U	< 0.57 U	< 0.64 U	< 0.67 U	< 0.61 U	< 0.62 U	< 0.55 U	< 0.58 U
Selenium	SEP Step 5	< 9.8 U	< 8.7 U	< 8.5 U	< 9.6 U	< 10 U	< 9.2 U	< 9.3 U	< 8.2 U	< 8.7 U
Selenium	SEP Step 6	< 0.65 U	< 0.58 U	< 0.57 U	< 0.64 U	< 0.67 U	< 0.61 U	< 0.62 U	< 0.55 U	< 0.58 U
Selenium	SEP Step 7	< 0.65 U	< 1.2 U	< 0.57 U	< 0.64 U	0.28 J	< 1.2 U	< 0.62 U	< 1.1 U	< 1.2 U
Selenium	SEP SUM	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	0.28 J	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Selenium	SEP Total	< 1.8 U	< 1.6 U	< 1.6 U	< 1.8 U	< 2.0 U	< 1.8 U	< 1.7 U	< 1.5 U	< 1.7 U
Selenium	SEP Total	0.54 J	< 0.58 U	0.38 J	< 0.64 U	< 0.67 U	< 0.61 U	< 0.62 U	< 0.55 U	< 0.58 U
Sodium	SEP Step 1	< 1,300 U	< 1,200 U	< 1,100 U	< 1,300 U	< 1,300 U	< 1,200 U	< 1,200 U	< 1,100 U	< 1,200 U
Sodium	SEP Step 3	7,100	5,800	6,000	6,700	11,000	6,700	6,700	5,800	6,200
Sodium	SEP Step 4	420	330	360	380	1,200	390	370	330	360
Sodium	SEP Step 6	23,000	18,000	20,000	21,000	34,000	23,000	21,000	17,000	18,000
Sodium	SEP Step 7	8,900	8,800	18,000	8,800	10,000	9,500	8,700	7,600	6,400
Sodium	SEP SUM	40,000	33,000	45,000	37,000	56,000	40,000	37,000	31,000	31,000
Sodium	SEP Total	51 J	46 J	39 J	71 J	160 J	71 J	59 J	60 J	57 J
Sodium	SEP Total	12,000	11,000	12,000	17,000	11,000	11,000	11,000	12,000	11,000

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FIGURES

LEGEND

- River Flow Direction
- Location of Importance

0 5 Miles

NOTE(S)

1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2.) MNA - MONITORED NATURAL ATTENUATION.

REFERENCE(S)

1.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2,401 FEET.

CLIENT
AMEREN MISSOURI
LCPA SURFACE IMPOUNDMENT, LABADIE ENERGY CENTER

PROJECT
TIER I - TIER III MNA GEOCHEMICAL EVALUATION

TITLE
SITE LOCATION MAP

CONSULTANT

YYYY-MM-DD	2021-09-24
DESIGNED	JSI
PREPARED	BTT
REVIEWED	JS
APPROVED	MNH

PROJECT NO.	CONTROL	REV.	FIGURE
153140603	1240	0.0	1

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

1 in
0

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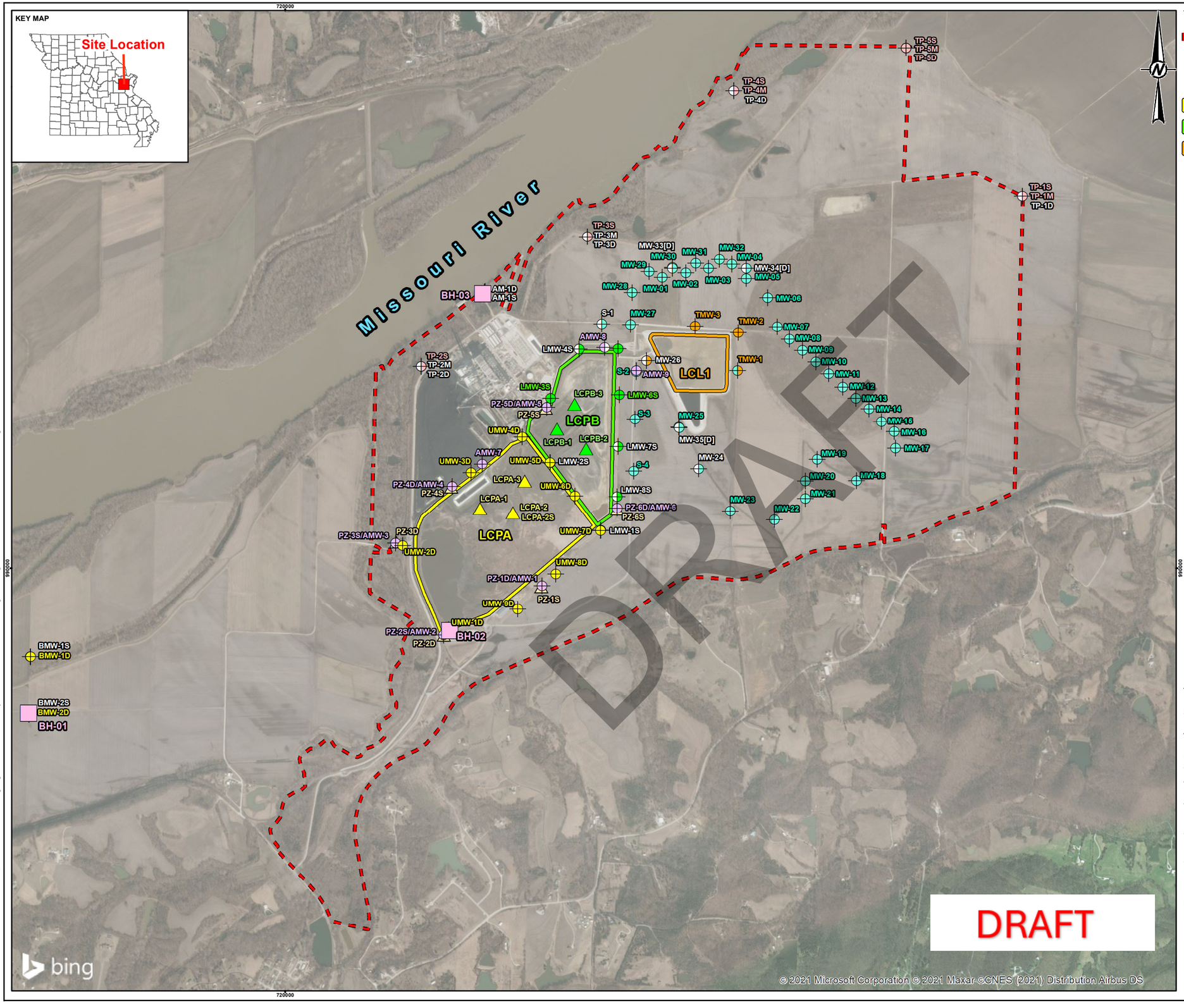

LEGEND

- Approximate Property Boundary
- MNA Borehole Locations

Labadie Energy Center CCR Units

- LCPA - Bottom Ash Surface Impoundment
- LCPB - Fly Ash Surface Impoundment
- LCL1 - Utility Waste Landfill Cell 1

Groundwater and Porewater Sampling Locations

- LCPA Monitoring Well
- LCPB Monitoring Well
- LCPB and Corrective Action Monitoring Well
- LCL1 Monitoring Well
- State UWL, LCL1, and Corrective Action Monitoring Well
- NPDES Monitoring Well
- NPDES and Corrective Action Monitoring Well
- State UWL Monitoring Well
- State UWL and Corrective Action Monitoring Well
- Nature and Extent Monitoring Well
- Nature and Extent and Corrective Action Monitoring Well
- State UWL and LCL1 Monitoring Well
- LCPA Direct-push Porewater Sample
- LCPB Direct-push Porewater Sample
- Abandoned NPDES Monitoring Well

0 1,000 2,000 3,000 4,000
Feet

NOTE(S)
1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2.) MNA - MONITORED NATURAL ATTENUATION.

REFERENCE(S)
1.) ZAHNER AND ASSOCIATES, INC. 2016. LOT CONSOLIDATION PLAT OF "LABADIE ENERGY CENTER" - PREPARED FOR AMEREN MISSOURI. REVISED JUNE 15, 2016.
2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2,401 FEET.

CLIENT
AMEREN MISSOURI
LCPA SURFACE IMPOUNDMENT, LABADIE ENERGY CENTER

PROJECT
TIER I - TIER III MNA GEOCHEMICAL EVALUATION

TITLE
MNA BORING AND EXISTING GROUNDWATER AND POREWATER SAMPLING LOCATIONS

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-09-22
DESIGNED	JSI
PREPARED	EMS/BTT
REVIEWED	JS
APPROVED	MNH

PROJECT NO.	CONTROL	REV.	FIGURE
153140603	1240	1.0	2

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

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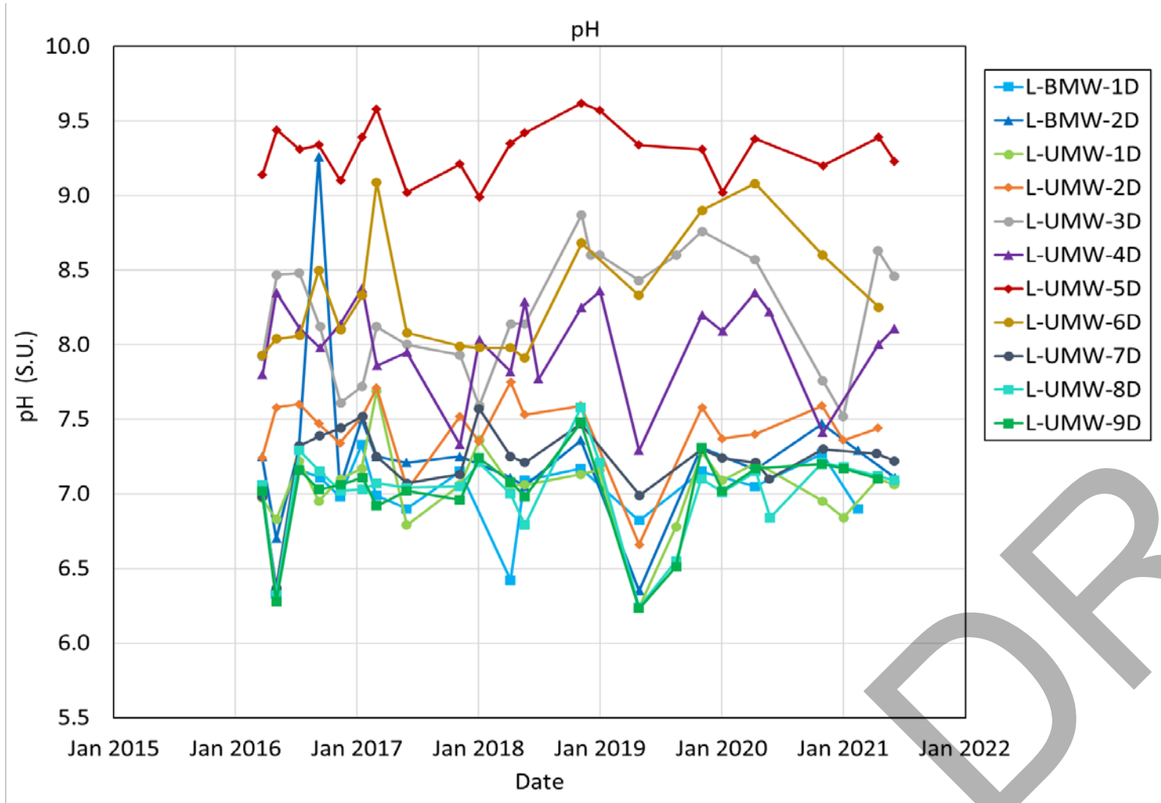
(a)



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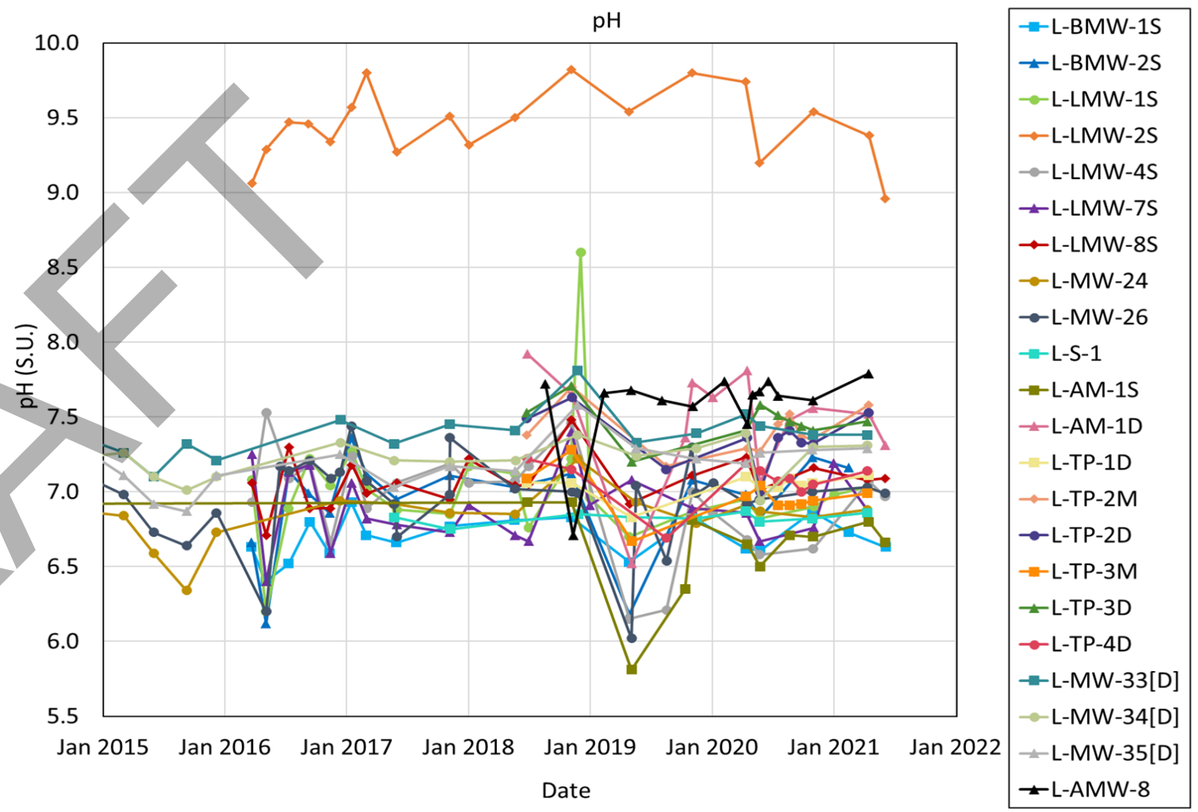


CLIENT
AMEREN MISSOURI
LCPA SURFACE IMPOUNDMENT, LABADIE ENERGY CENTER

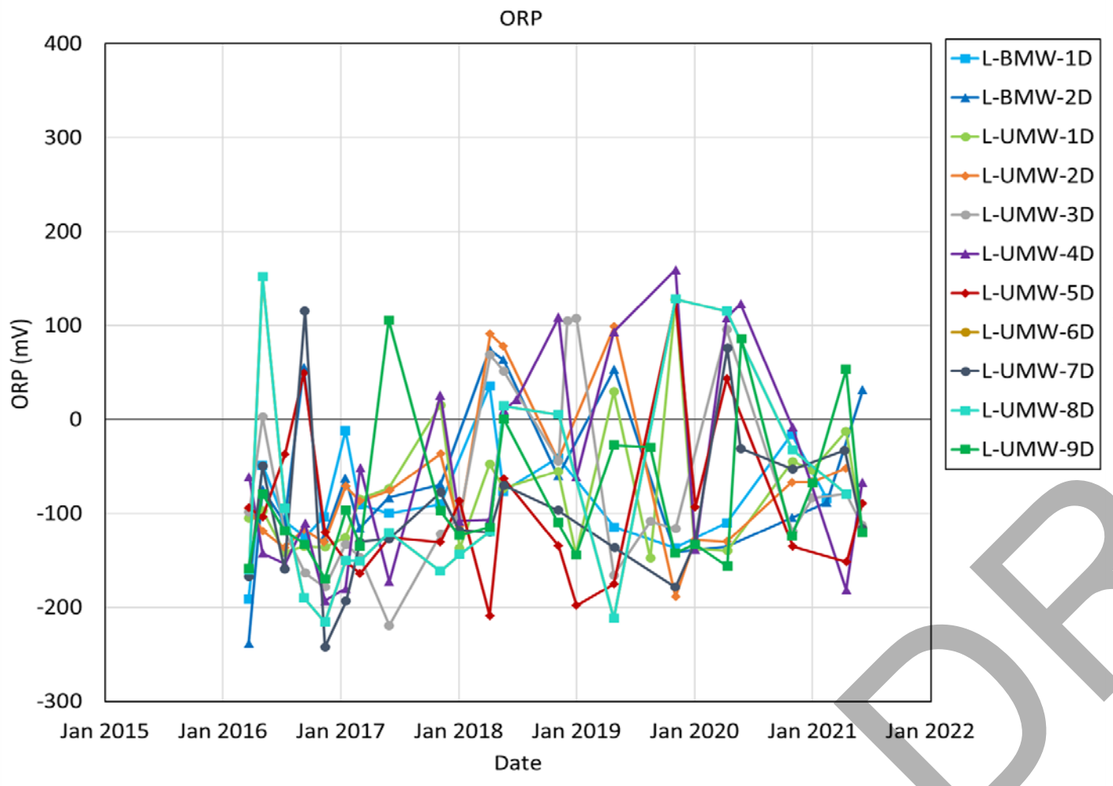
CONSULTANT
GOLDER
MEMBER OF WSP

PROJECT
TIER I – TIER III MNA GEOCHEMICAL EVALUATION

TITLE
Historical pH Values of Groundwater in (a) Compliance Monitoring and (b) Corrective Action Wells

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	3

(a)



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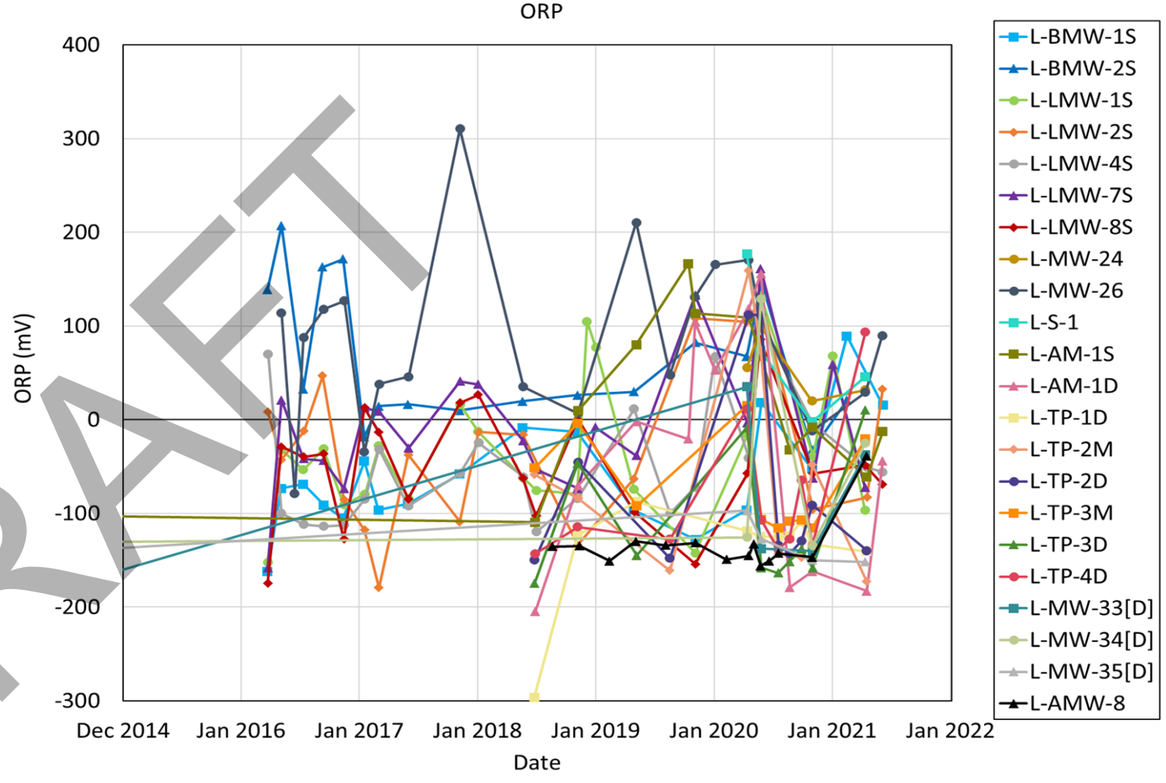

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LCPA SURFACE IMPOUNDMENT, LABADIE ENERGY CENTER

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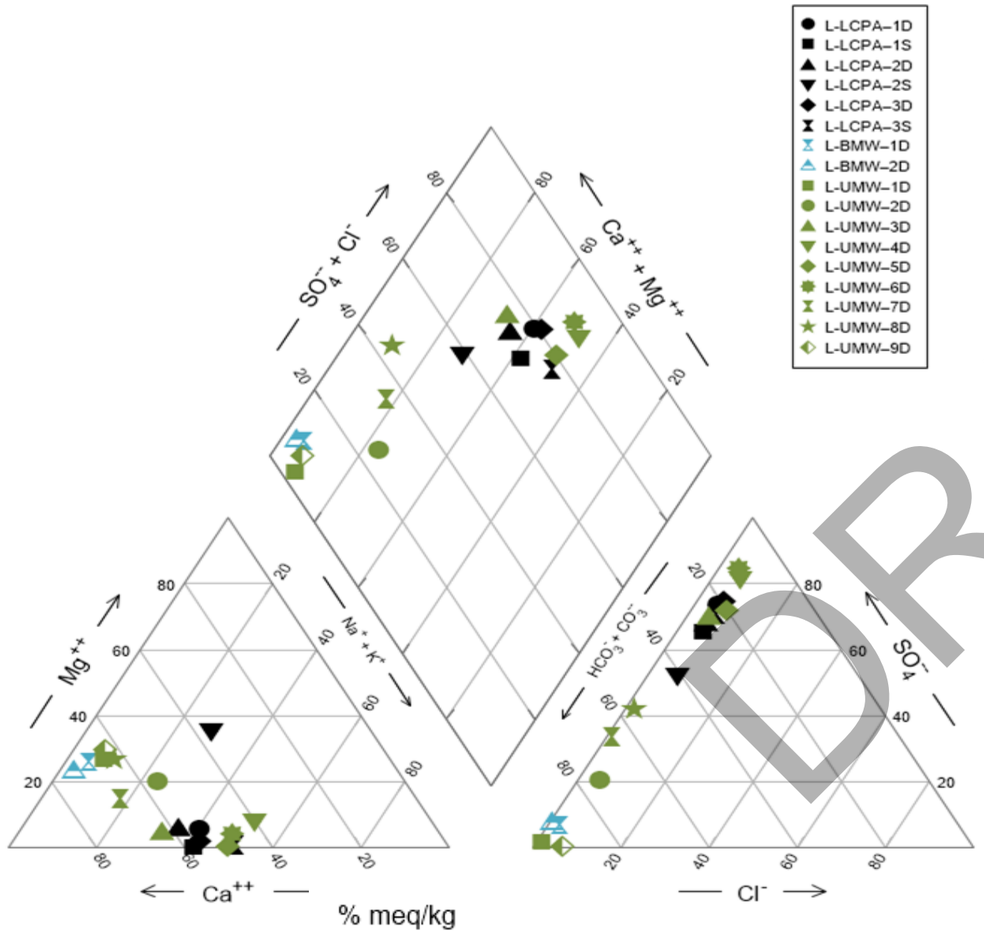
GOLDER
MEMBER OF WSP

PROJECT
TIER I – TIER III MNA GEOCHEMICAL EVALUATION

TITLE
Historical Redox Values of Groundwater in (a) Compliance Monitoring and (b) Corrective Action Wells

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	4

(a)



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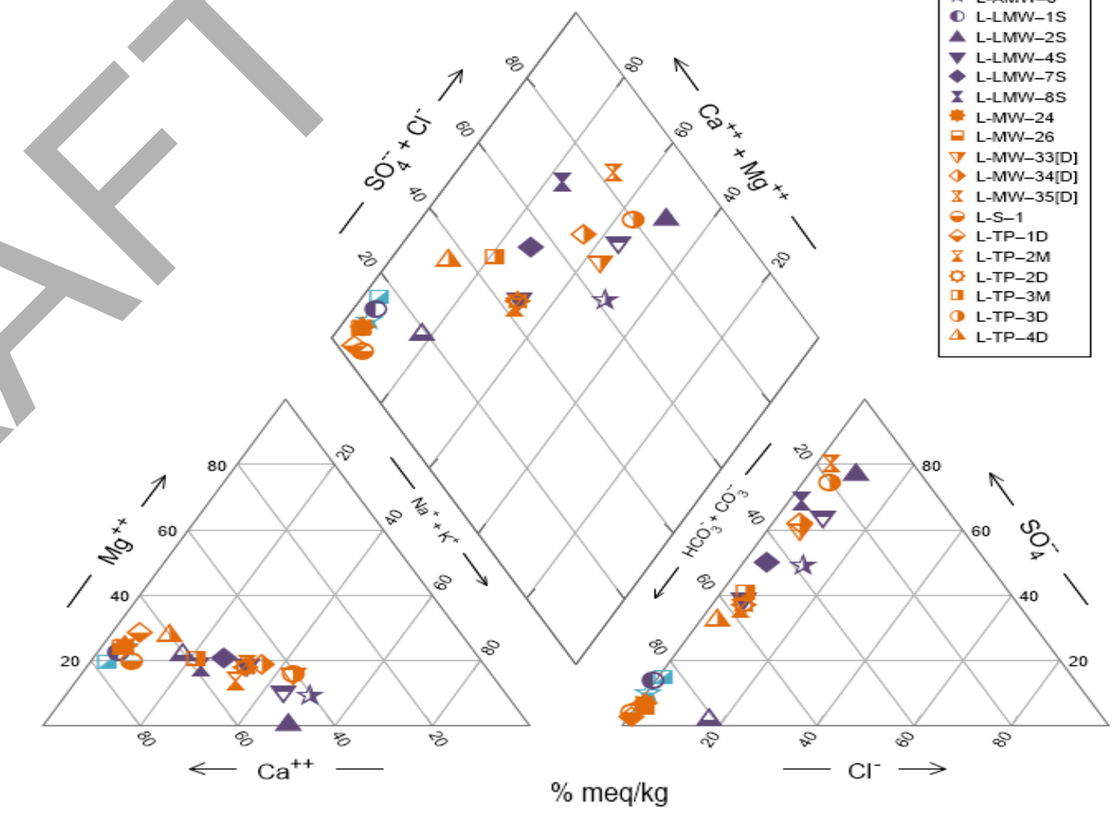

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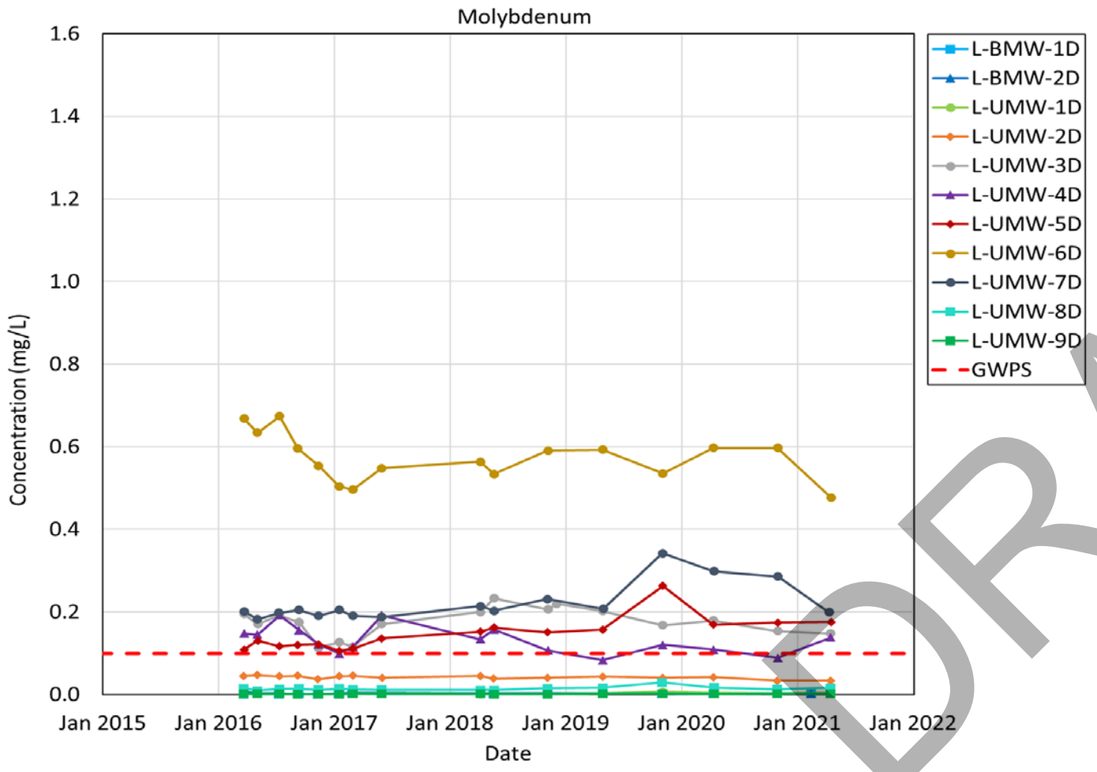
TITLE
Trilinear Diagrams - Groundwater Characterization of (a) Compliance Monitoring and (b) Corrective Action Wells

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	5

(a)



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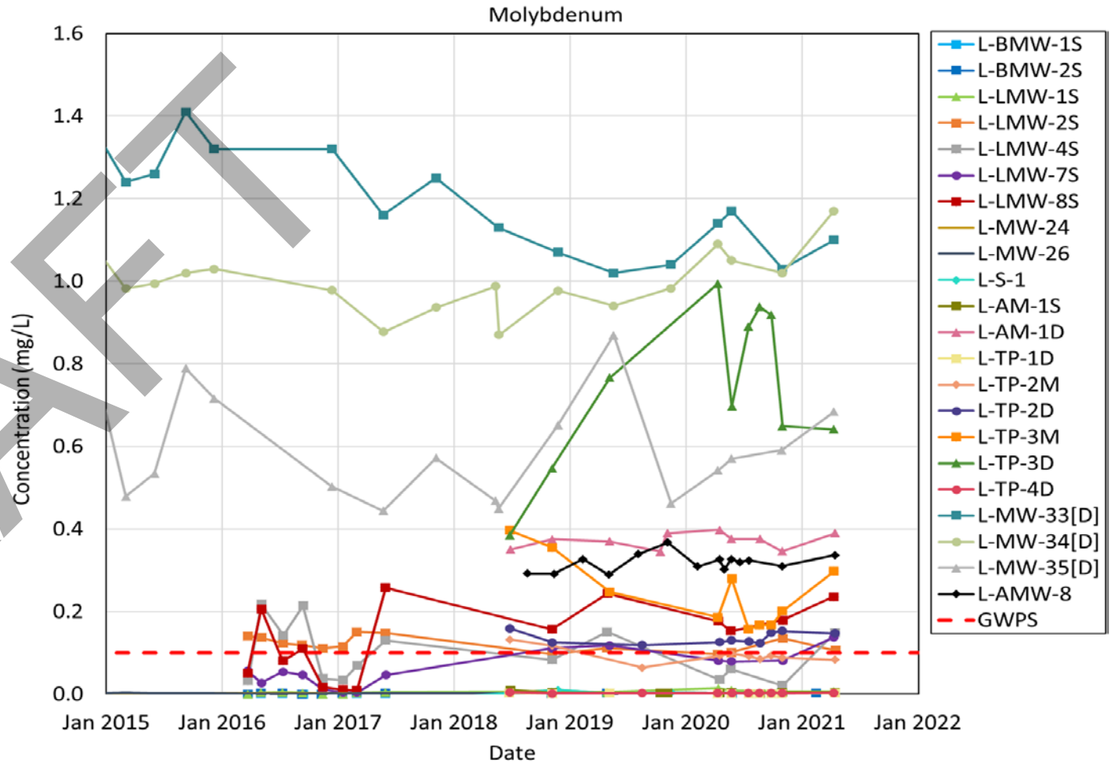

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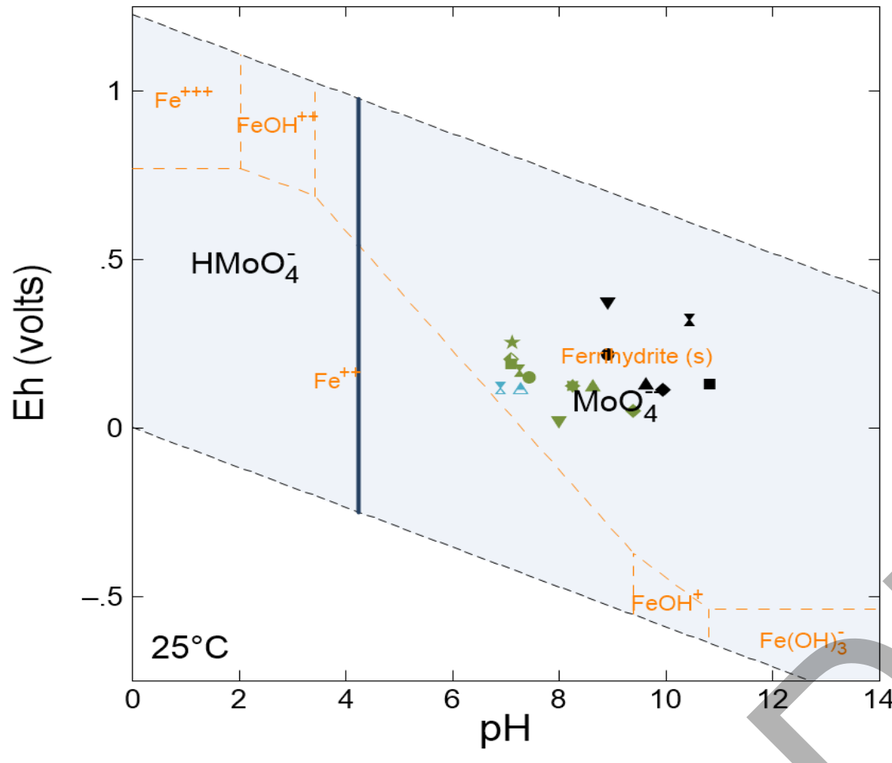
PROJECT
TIER I – TIER III MNA GEOCHEMICAL EVALUATION

TITLE
Historical Molybdenum Concentrations of Groundwater in (a) Compliance Monitoring and (b) Corrective Action Wells

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	6

(a)



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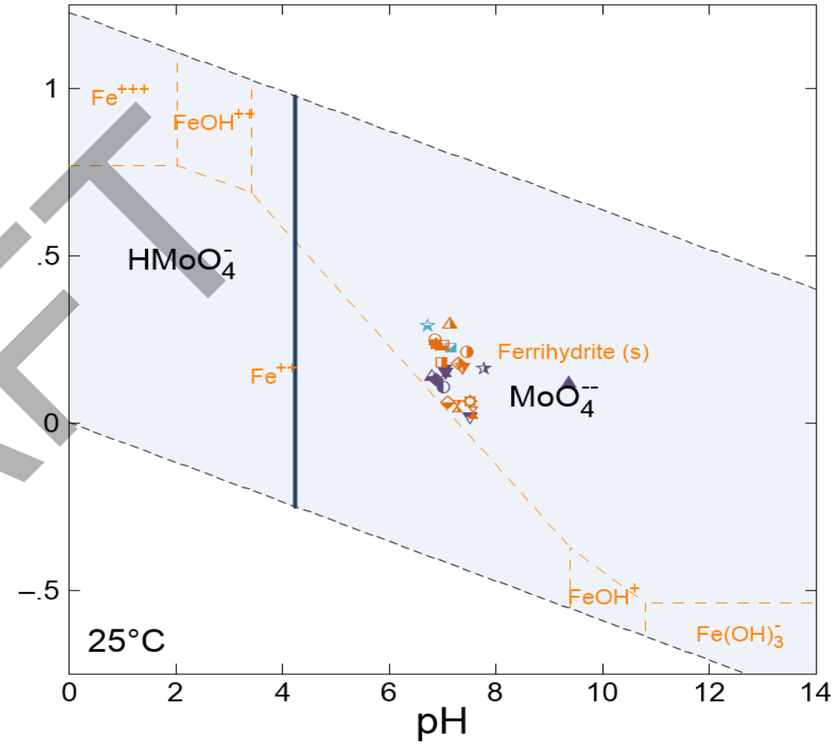

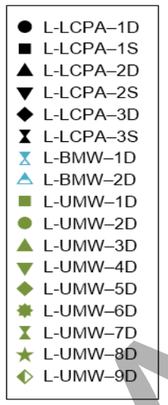

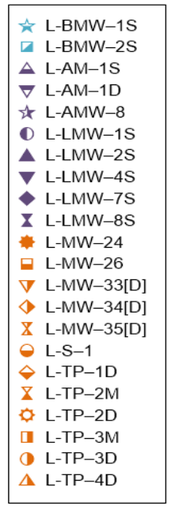

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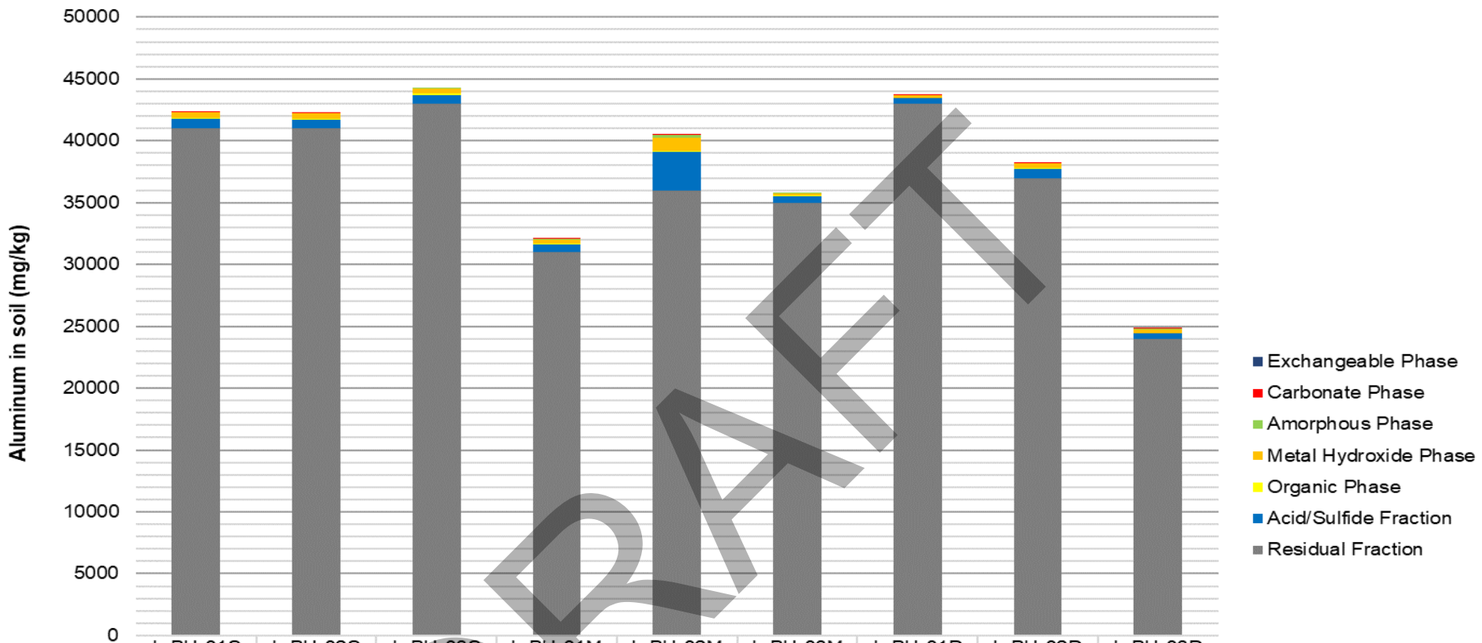
PROJECT
TIER I – TIER III MNA GEOCHEMICAL EVALUATION

TITLE
Speciation of Molybdenum in Groundwater at (a) Compliance Monitoring and (b) Corrective Action Wells

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	7



	L-BH-01S (23-30)	L-BH-02S (40-50)	L-BH-03S (22.5-30)	L-BH-01M (65-70)	L-BH-02M (67.5-70)	L-BH-03M (70-80)	L-BH-01D (100-114)	L-BH-02D (80-87)	L-BH-03D (108-114)
Exchangeable Phase	0	0	0	0	0	0	0	0	0
Carbonate Phase	6.6	9.1	0	6.5	17	0	6	11	10
Amorphous Phase	36	43	31	32	190	17	16	47	39
Metal Hydroxide Phase	410	430	410	350	1100	170	220	360	270
Organic Phase	130	91	100	84	62	53	31	74	61
Acid/Sulfide Fraction	740	700	720	590	3100	500	450	720	410
Residual Fraction	41000	41000	43000	31000	36000	35000	43000	37000	24000

Borehole and depth below ground surface

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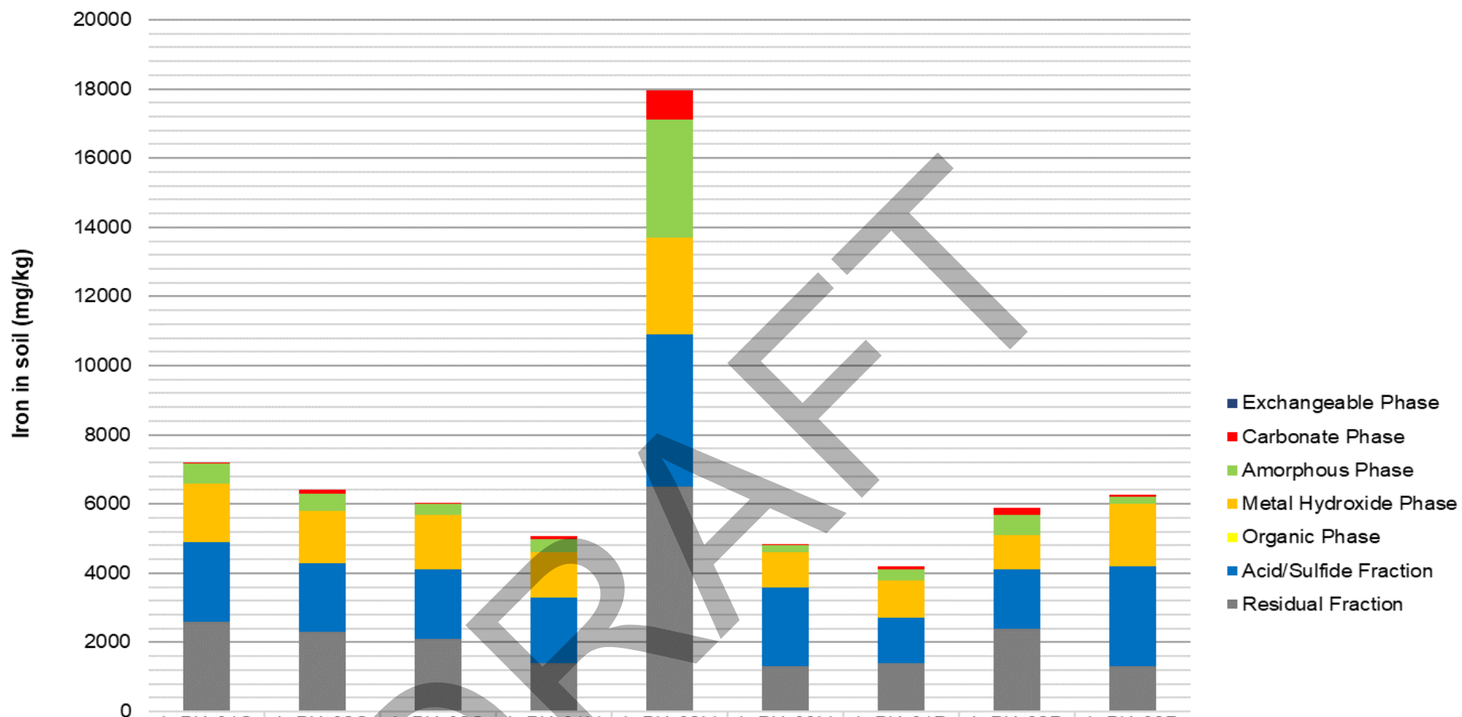
PROJECT
TIER I – TIER III MNA GEOCHEMICAL EVALUATION

TITLE
Sequential Extraction of Aluminum from Soil Borings

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	8



	L-BH-01S (23-30)	L-BH-02S (40-50)	L-BH-03S (22.5-30)	L-BH-01M (65-70)	L-BH-02M (67.5-70)	L-BH-03M (70-80)	L-BH-01D (100-114)	L-BH-02D (80-87)	L-BH-03D (108-114)
Exchangeable Phase	0	0	0	0	0	0	0	0	0
Carbonate Phase	14	120	13	75	860	34	100	190	44
Amorphous Phase	560	500	310	400	3400	220	310	600	220
Metal Hydroxide Phase	1700	1500	1600	1300	2800	1000	1100	1000	1800
Organic Phase	0	0	0	0	0	0	0	0	0
Acid/Sulfide Fraction	2300	2000	2000	1900	4400	2300	1300	1700	2900
Residual Fraction	2600	2300	2100	1400	6500	1300	1400	2400	1300

Borehole and depth below ground surface

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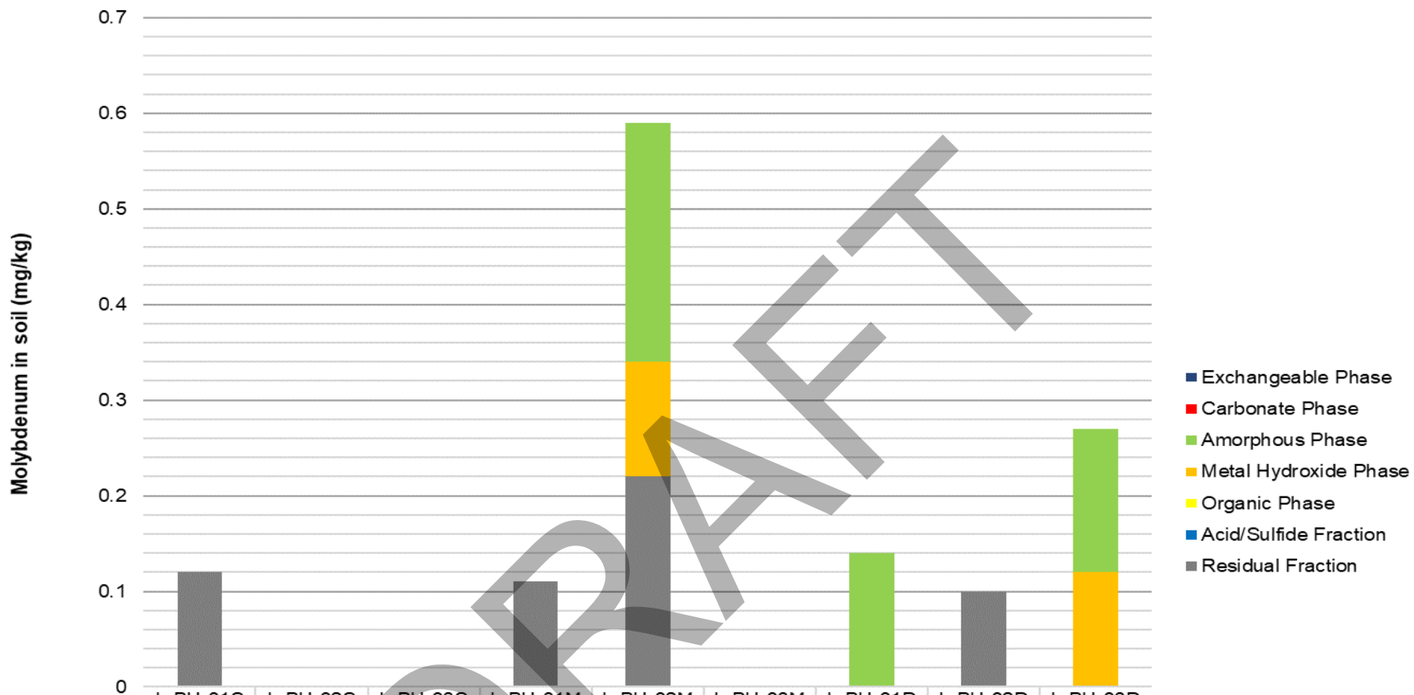
PROJECT
TIER I – TIER III MNA GEOCHEMICAL EVALUATION

TITLE
Sequential Extraction of Iron from Soil Borings

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	9



	L-BH-01S	L-BH-02S	L-BH-03S	L-BH-01M	L-BH-02M	L-BH-03M	L-BH-01D	L-BH-02D	L-BH-03D
Exchangeable Phase	0	0	0	0	0	0	0	0	0
Carbonate Phase	0	0	0	0	0	0	0	0	0
Amorphous Phase	0	0	0	0	0.25	0	0.14	0	0.15
Metal Hydroxide Phase	0	0	0	0	0.12	0	0	0	0.12
Organic Phase	0	0	0	0	0	0	0	0	0
Acid/Sulfide Fraction	0	0	0	0	0	0	0	0	0
Residual Fraction	0.12	0	0	0.11	0.22	0	0	0.1	0

Borehole and depth below ground surface

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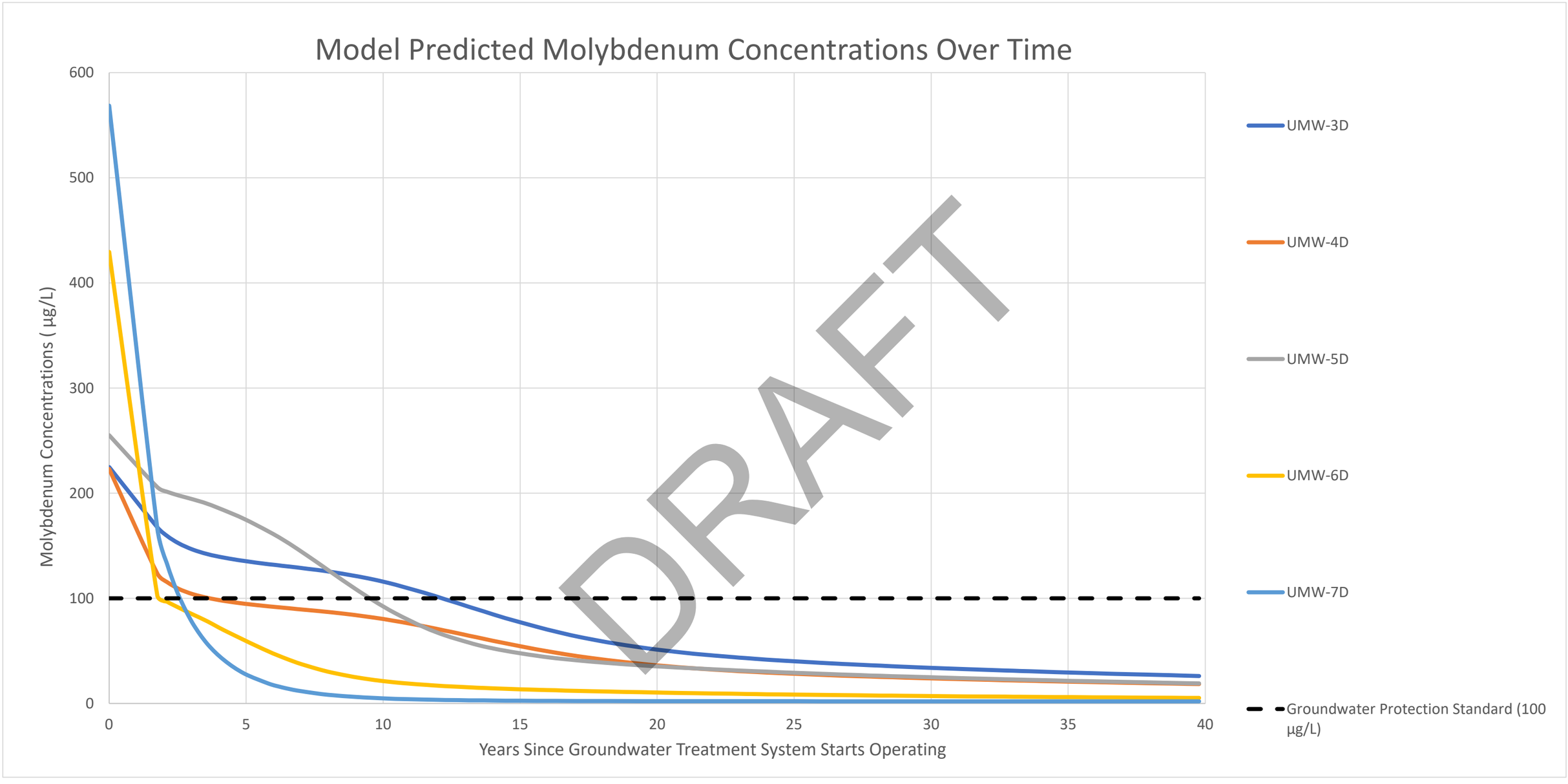
PROJECT
TIER I – TIER III MNA GEOCHEMICAL EVALUATION

TITLE
Sequential Extraction of Molybdenum from Soil Borings

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	10



Notes:
1) µg/L - Micrograms per liter.

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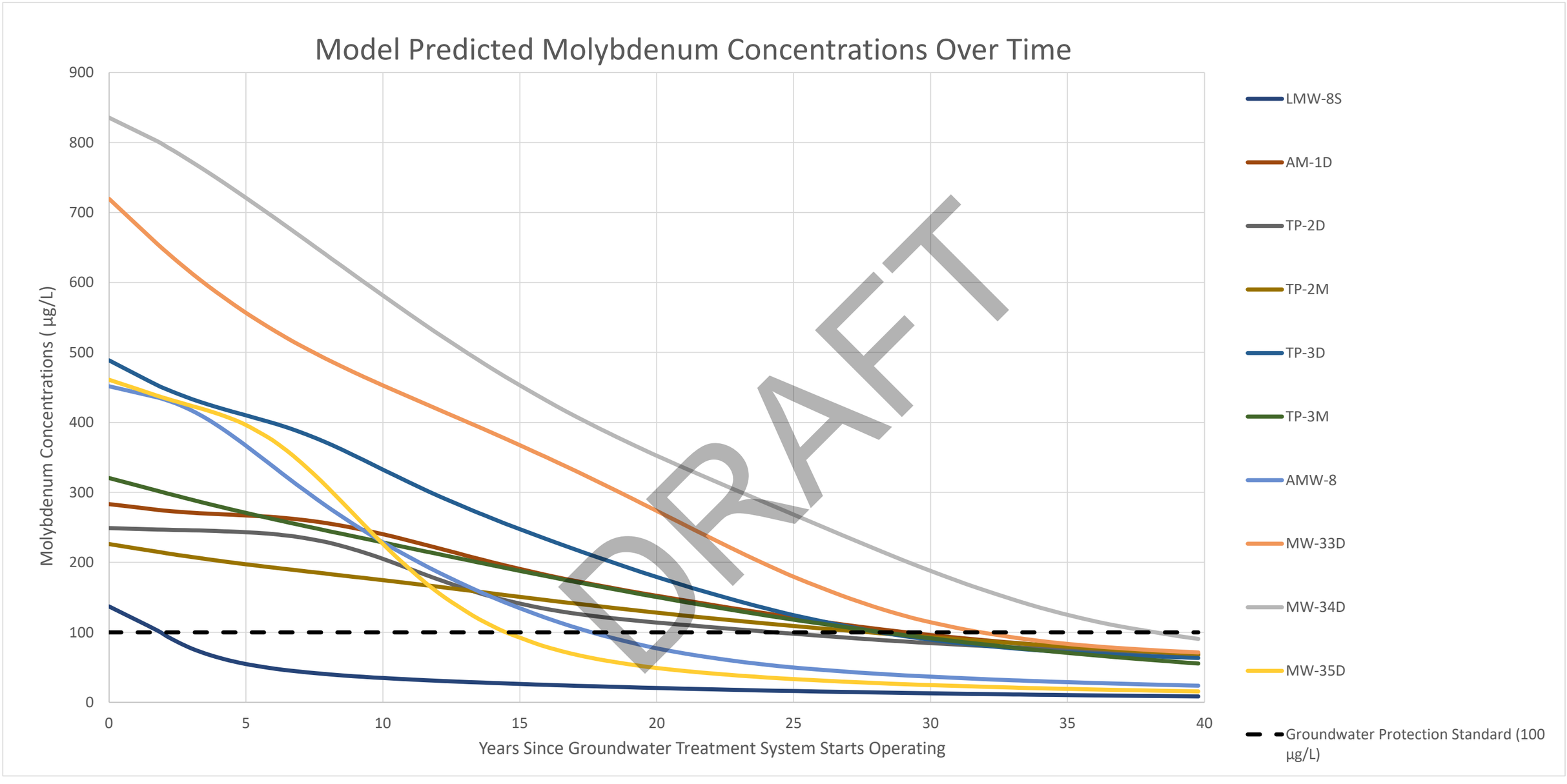
PROJECT
TIER I – TIER III MNA GEOCHEMICAL EVALUATION

TITLE
Model Predicted Molybdenum Concentrations Over Time Detection and Assessment Monitoring Well Network

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	11



Notes:
1) µg/L - Micrograms per liter.

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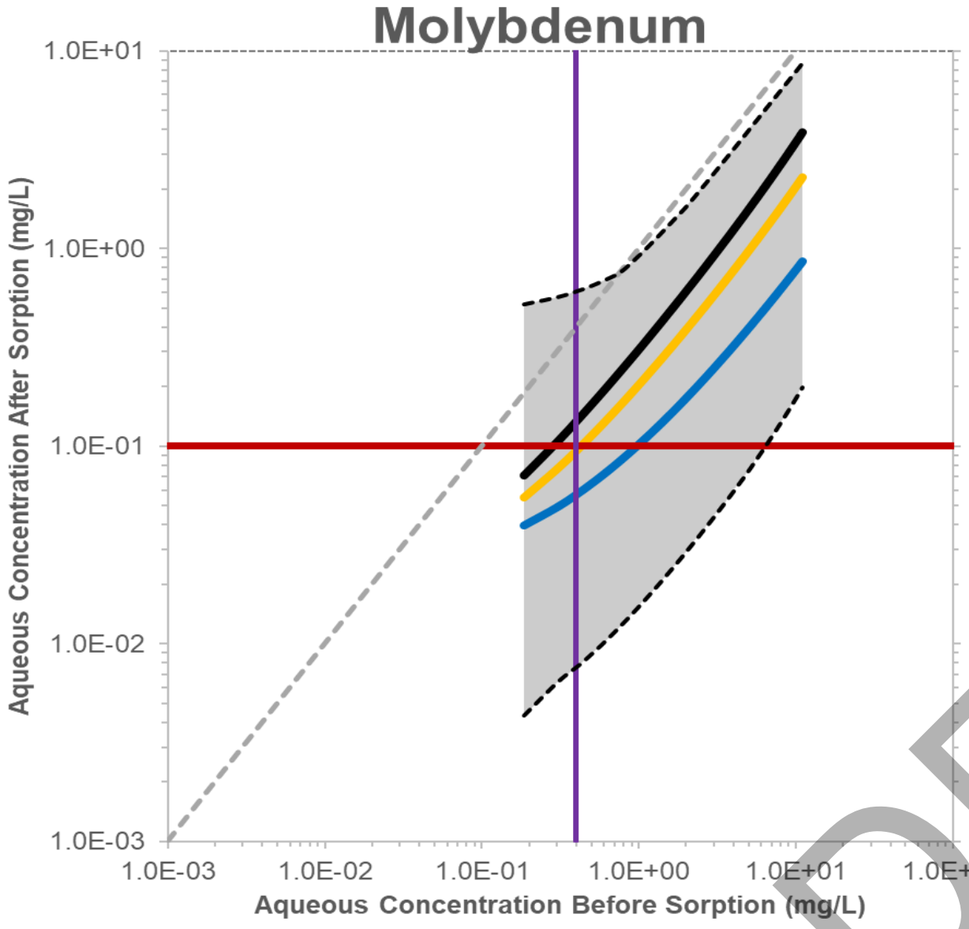
PROJECT
TIER I – TIER III MNA GEOCHEMICAL EVALUATION

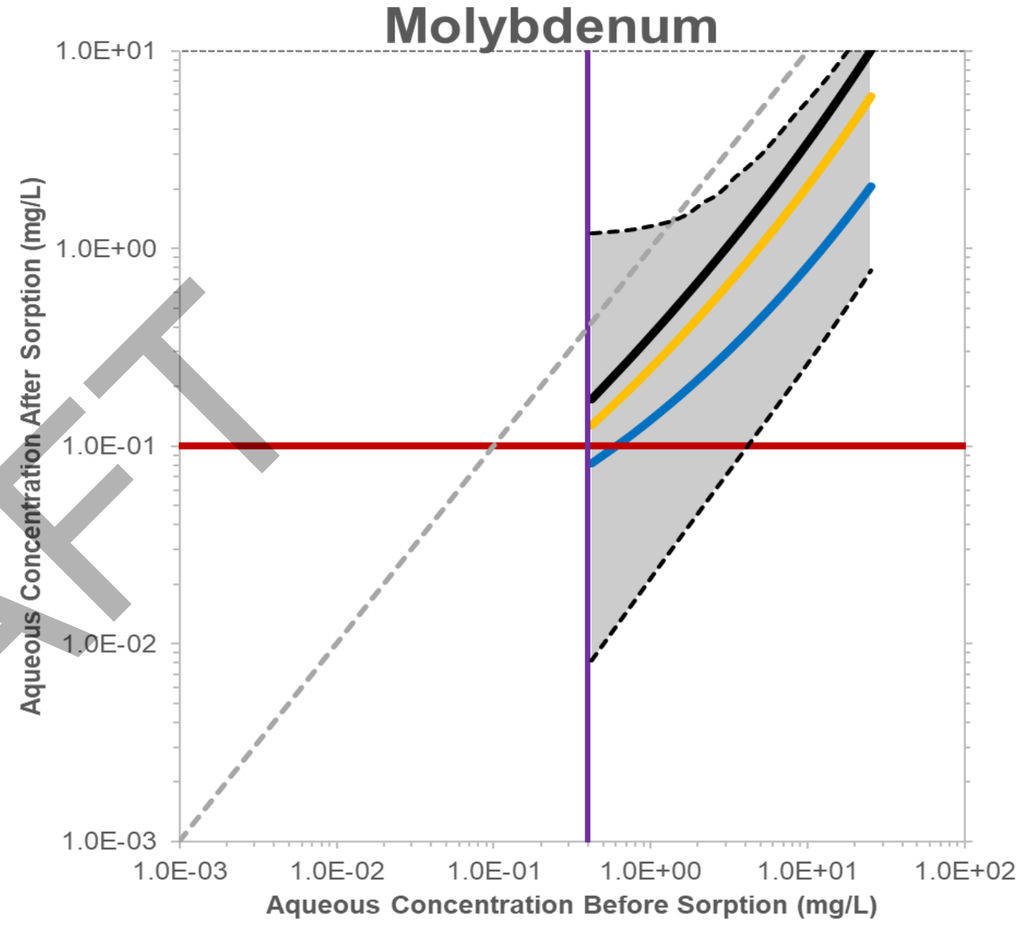
TITLE
Model Predicted Molybdenum Concentrations Over Time
Corrective Action Monitoring Well Network

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	12

(a)



(b)



- Minimum Hfo and Hao (Geometric mean of all simulations)
- Mean Hfo and Hao (Geometric mean of all simulations)
- Maximum Hfo and Hao (Geometric mean of all simulations)
- Groundwater Protection Standard
- Porewater Concentration
- 1:1 Line
- 95th percentile of all simulations
- 5th percentile of all simulations

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PROJECT
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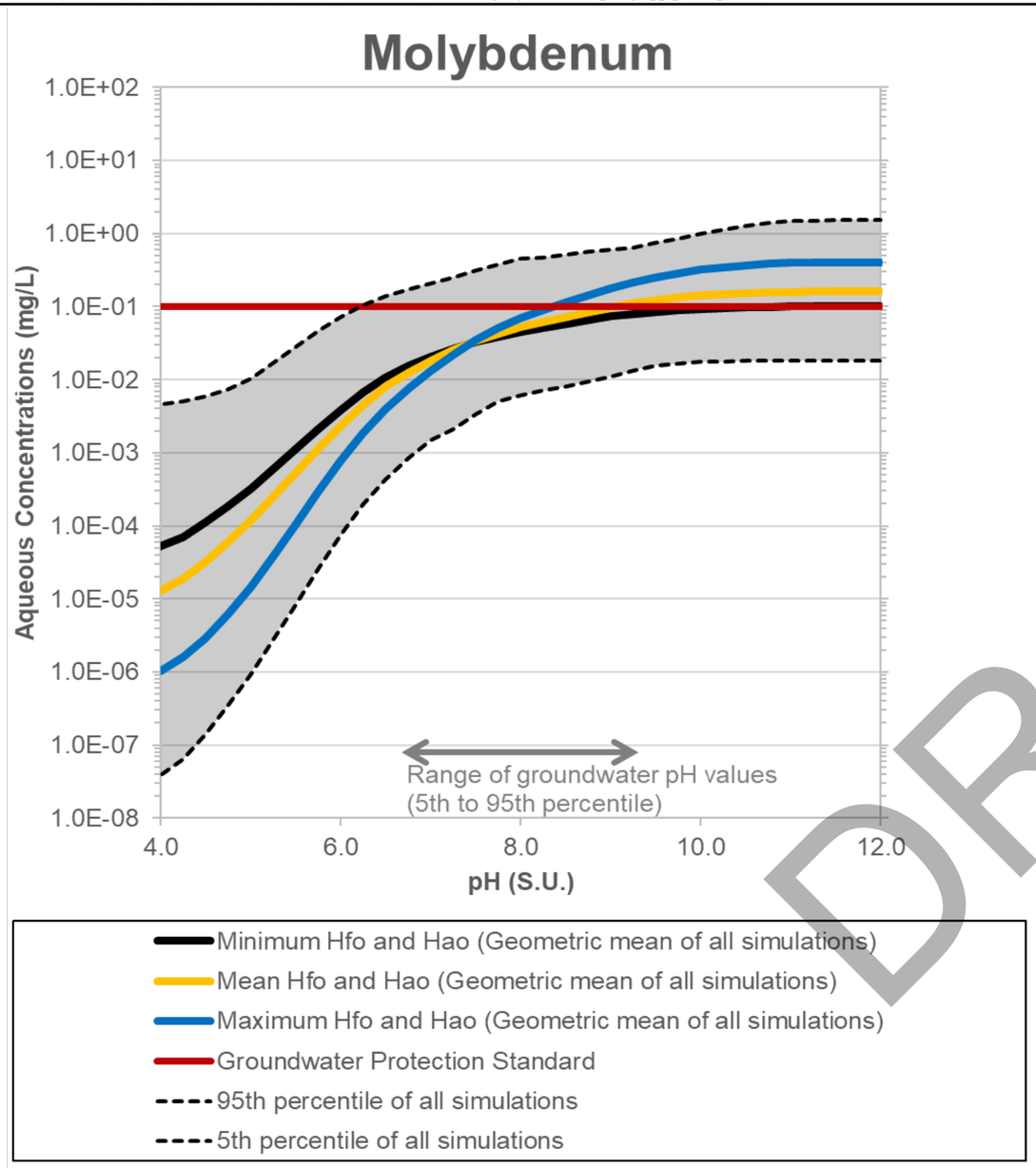
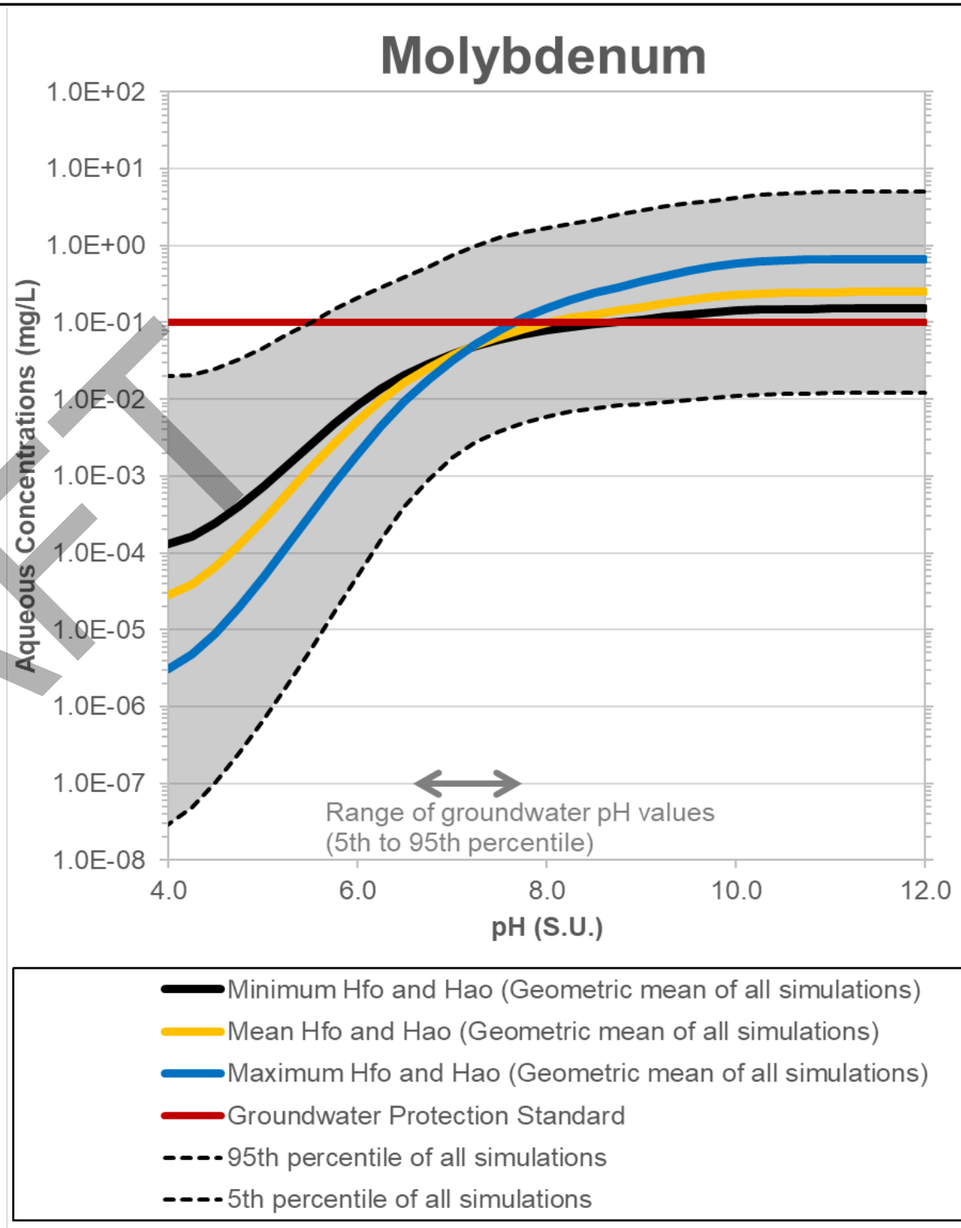
TITLE
Attenuation Capacity Model for Molybdenum in (a) Compliance Monitoring and (b) Corrective Action Wells

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	13

(a)



(b)



- Minimum Hfo and Hao (Geometric mean of all simulations)
- Mean Hfo and Hao (Geometric mean of all simulations)
- Maximum Hfo and Hao (Geometric mean of all simulations)
- Groundwater Protection Standard
- 95th percentile of all simulations
- 5th percentile of all simulations

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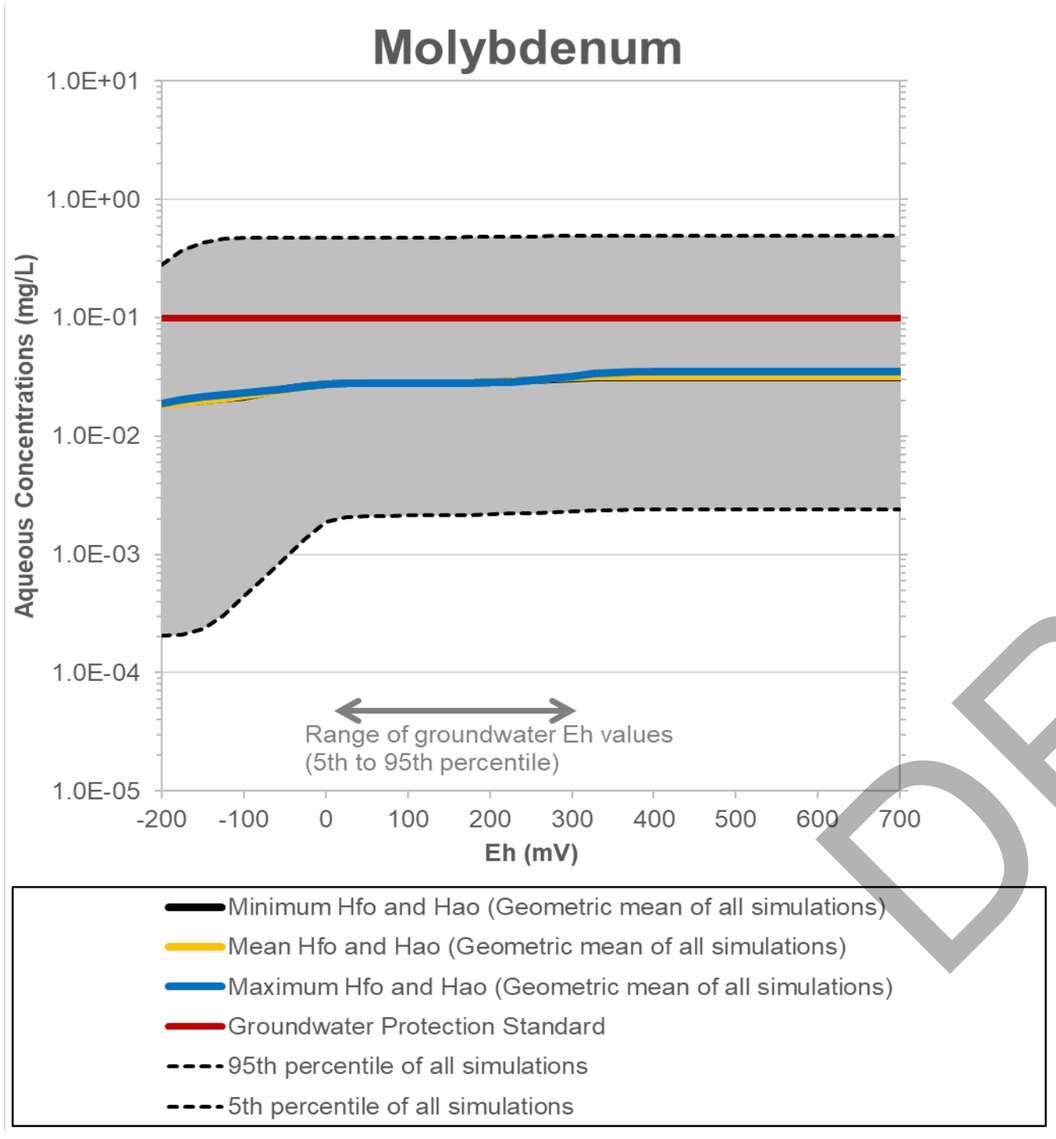
PROJECT
TIER I – TIER III MNA GEOCHEMICAL EVALUATION

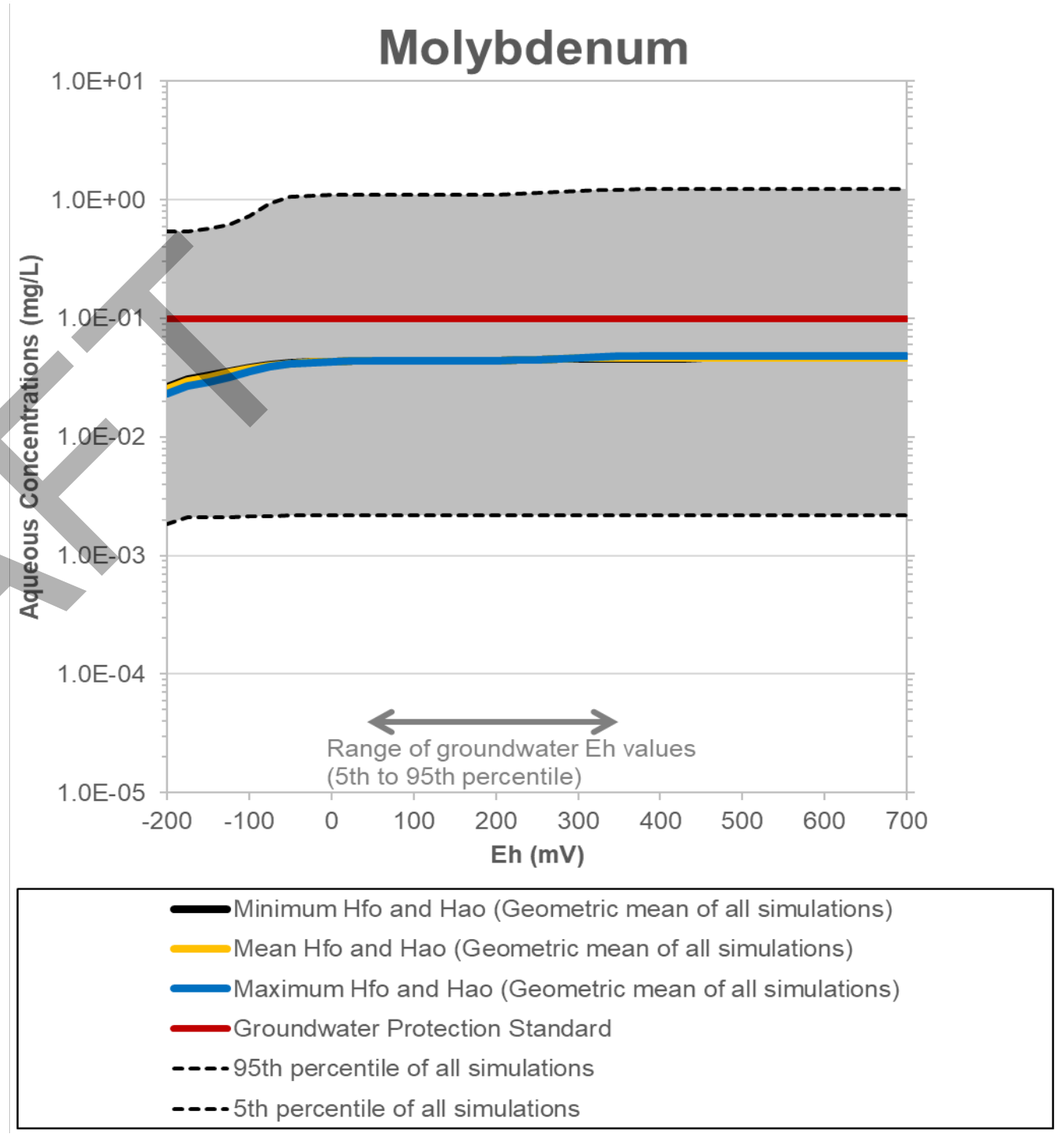
TITLE
Stability of Adsorbed Molybdenum in Response to pH in (a) Compliance Monitoring and (b) Corrective Action Wells

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	14

(a)



(b)



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TIER I – TIER III MNA GEOCHEMICAL EVALUATION

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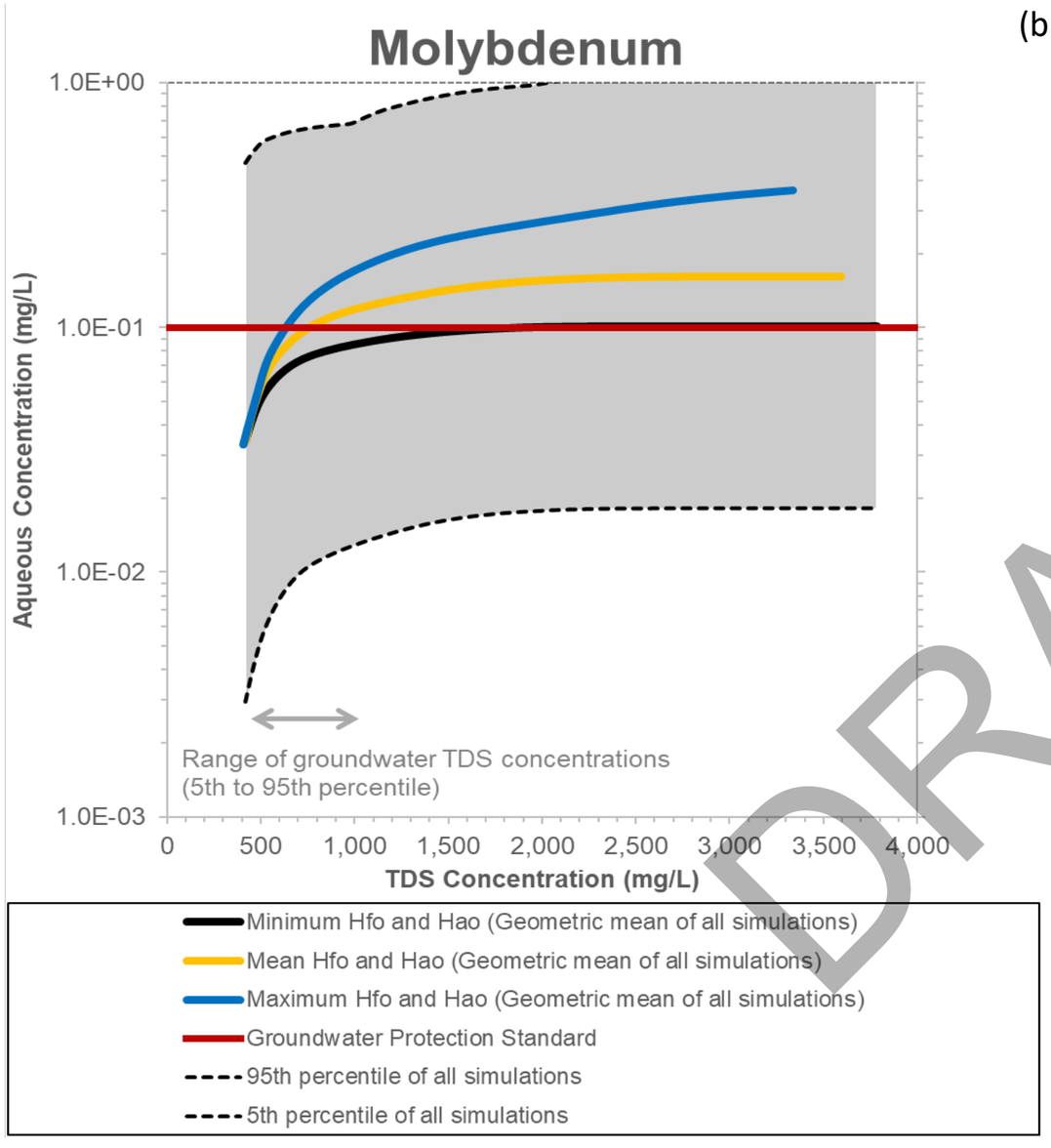
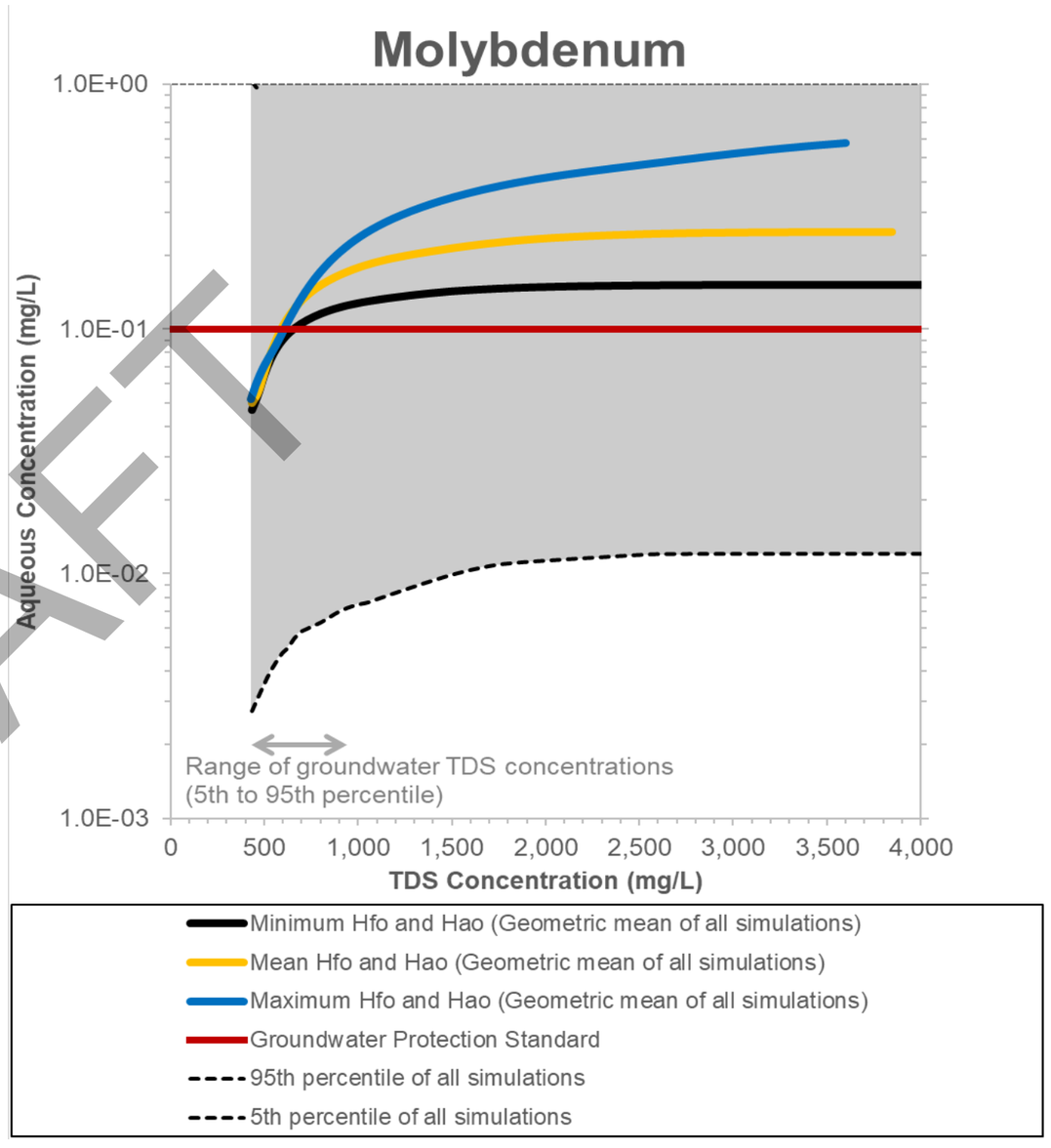
TITLE
Stability of Adsorbed Molybdenum in Response to Eh in (a) Compliance Monitoring and (b) Corrective Action Wells

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	15

(a)



(b)



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PROJECT
TIER I – TIER III MNA GEOCHEMICAL EVALUATION

TITLE
Stability of Adsorbed Molybdenum in Response to TDS in (a) Compliance Monitoring and (b) Corrective Action Wells

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	16

APPENDIX A

Mineralogical Analysis Laboratory Report

Quantitative X-Ray Diffraction by Rietveld Refinement

Report Prepared for:	*Golder Associates USA*
Project Number/ LIMS No.	*18502-03/ MI7019-MAY21*
Sample Receipt:	*May 28, 2021*
Sample Analysis:	*June 9, 2021*
Reporting Date:	*July 15, 2021*

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 :	PDF2/PDF4 powder diffraction databases issued by the International Center for Diffraction Data (ICDD). DiffracPlus Eva and Topas software.
Detection Limit :	0.5-2%. Strongly dependent on crystallinity.

Contents:

1) Method Summary
2) Quantitative XRD Results
3) XRD Pattern(s)

Ben Eaton, B.Sc.
Junior Mineralogist

Huyun Zhou, Ph.D., P.Geo.
Senior Mineralogist

SGS Minerals
a division of SGS Canada Inc.
3260 Production Way, Burnaby, British Columbia, Canada V5A 4W4
Tel: (604) 638-2349 Fax: (604) 444-5486 www.sgs.com www.sgs.com/met
Member of the SGS Group (SGS SA)

Method Summary

Mineral Identification and Interpretation:

Mineral identification and interpretation involves matching the diffraction pattern of an unknown material to patterns of single-phase reference materials. The reference patterns are compiled by the Joint Committee on Powder Diffraction Standards - International Center for Diffraction Data (JCPDS-ICDD) database and released on software as Powder Diffraction Files (PDF).

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:

Quantitative Rietveld Analysis is performed by using Topas 4.2 (Bruker AXS), a graphics based profile analysis program built around a non-linear least squares fitting system, to 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 until it matches the obtained experimental patterns.

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 0.05wt%. Minerals not identified by the analyst are not included in refinement calculations for specific samples and are indicated with a dash.

SGS Minerals
a division of SGS Canada Inc.
3260 Production Way, Burnaby, British Columbia, Canada V5A 4W4
Tel: (604) 638-2349 Fax: (604) 444-5486 www.sgs.com www.sgs.com/met
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Summary of Rietveld Quantitative Analysis X-Ray Diffraction Results

Mineral/Compound	L-BH-03S MAY7019-01 (wt %)	L-BH-03M MAY7019-02 (wt %)	L-BH-03D MAY7019-03 (wt %)	L-BH-02S MAY7019-04 (wt %)	L-BH-02M MAY7019-05 (wt %)	L-BH-02D MAY7019-06 (wt %)	L-BH-01S MAY7019-07 (wt %)	L-BH-01M MAY7019-08 (wt %)	L-BH-01D MAY7019-09 (wt %)
Actinolite	-	-	-	-	0.2	-	-	-	-
Albite	18.9	18.9	16.8	17.6	16.4	16.0	17.7	16.8	21.0
Chlorite	1.0	0.1	-	1.0	2.3	1.3	1.5	1.2	0.9
Calcite	1.2								
Diopside	-	2.2	2.1	2.3	2.2	2.2	-	-	-
Dolomite	0.4	1.2	-	0.3	3.1	0.5	0.5	0.5	0.5
Heulandite	-	-	-	-	1.8	-	-	-	-
Hornblende	-	1.4	-	-	-	1.0	-	0.6	0.7
Kutnohorite	-	-	-	-	0.3	-	2.1	-	-
Magnetite	-	-	-	-	0.3	-	-	-	-
Microcline	11.0	13.7	13.5	12.3	7.5	7.8	8.5	12.5	19.6
Montmorillonite	-	-	-	-	6.5	-	-	-	-
Muscovite	4.8	2.8	3.1	3.9	10.1	4.6	5.8	6.3	4.3
Quartz	62.6	59.7	64.5	62.6	49.1	66.2	63.9	62.1	53.0
Rhodochrosite	-	-	-	-	0.2	0.4	-	-	-
TOTAL	100	100	100	100	100	100	100	100	100

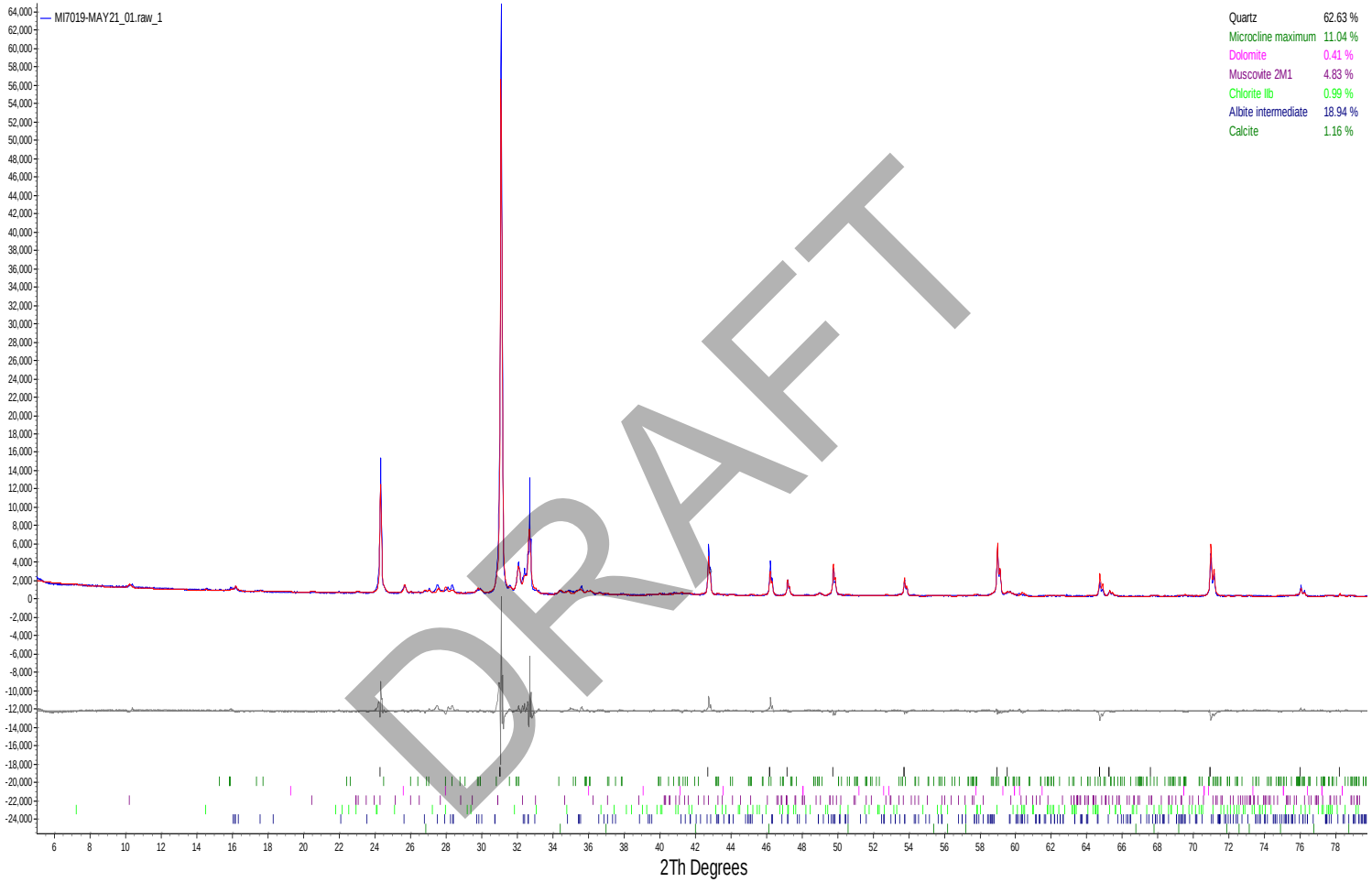
Zero values indicate that the mineral was included in the refinement, but the calculated concentration is below a measurable value.

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

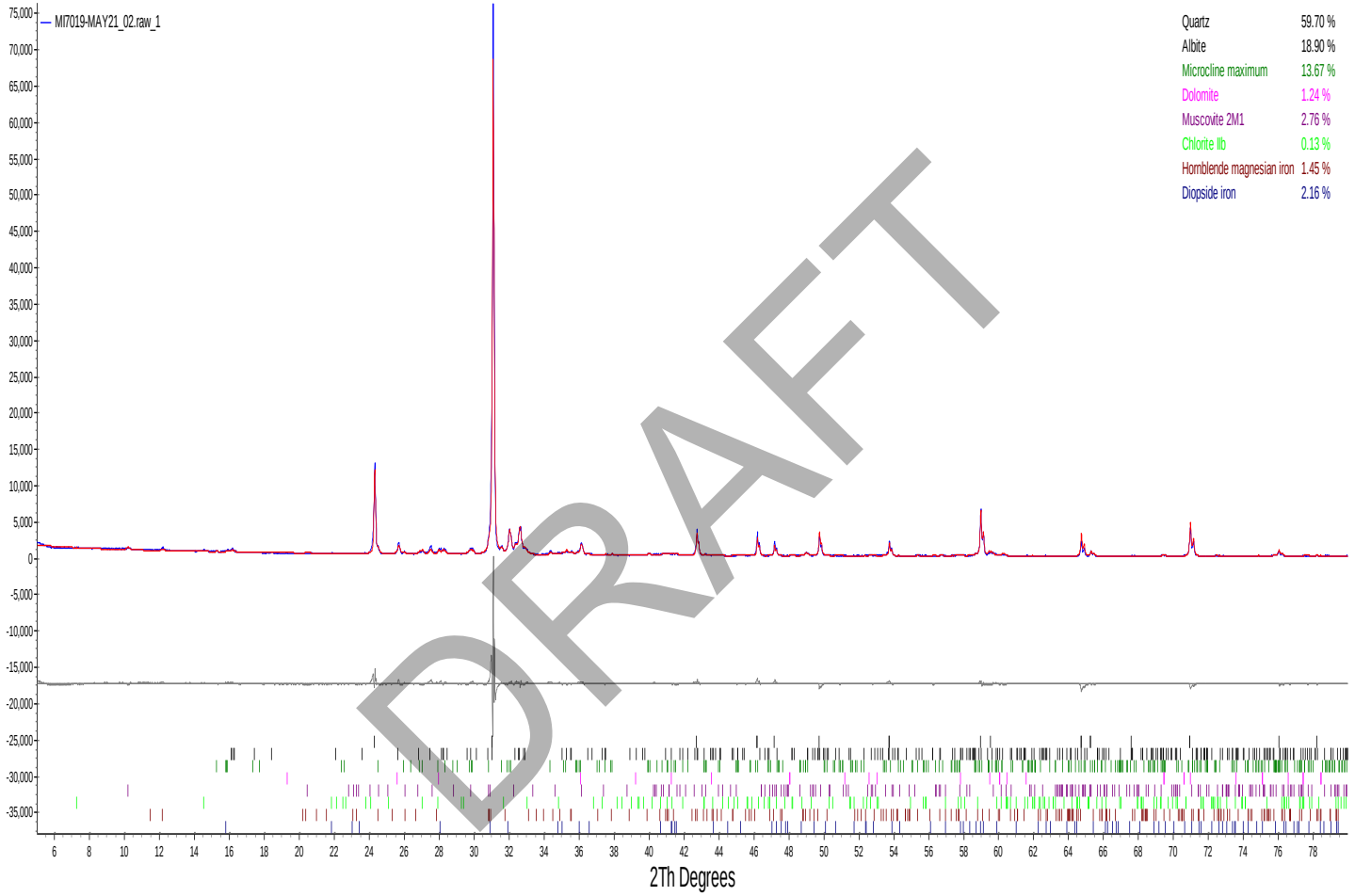
The weight percent quantities indicated have been normalized to a sum of 100%. The quantity of amorphous material has not been determined.

Mineral/Compound	Formula
Actinolite	$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$
Albite	$NaAlSi_3O_8$
Calcite	$CaCO_3$
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$
Diopside	$CaMgSi_2O_6$
Dolomite	$CaMg(CO_3)_2$
Heulandite	$CaAl_2Si_7O_{18}\cdot 6H_2O$
Hornblende	$(Ca,Na)_2 3(Mg,Fe,Al)_5Si_6(Si,Al)_2O_{22}(OH)_2$
Kutnohorite	$CaMn(CO_3)_2$
Magnetite	$CaMgSi_2O_6$
Microcline	$KAlSi_3O_8$
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2\cdot nH_2O$
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$
Quartz	SiO_2
Rhodochrosite	$MnCO_3$

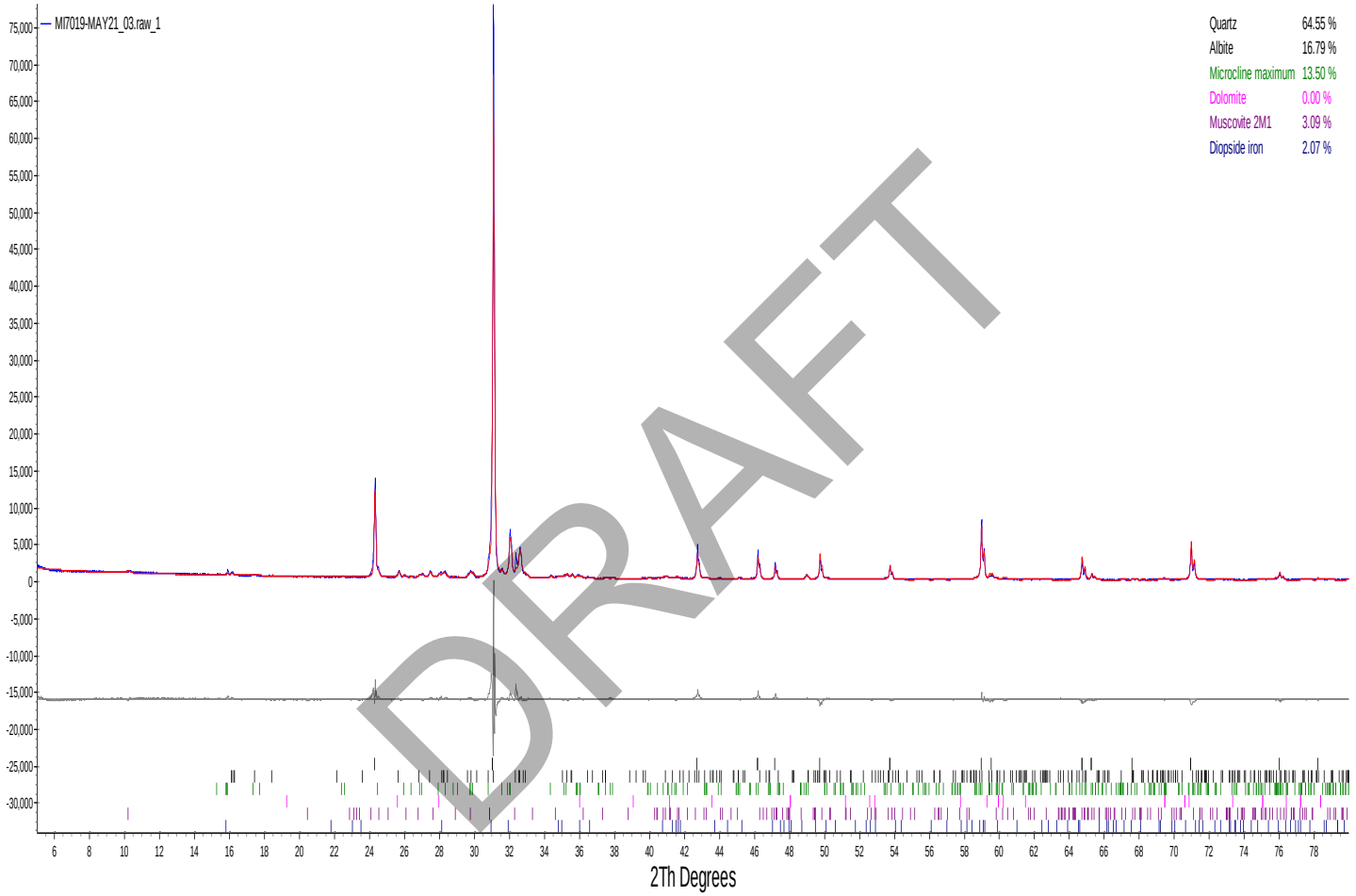
L-BH-03S



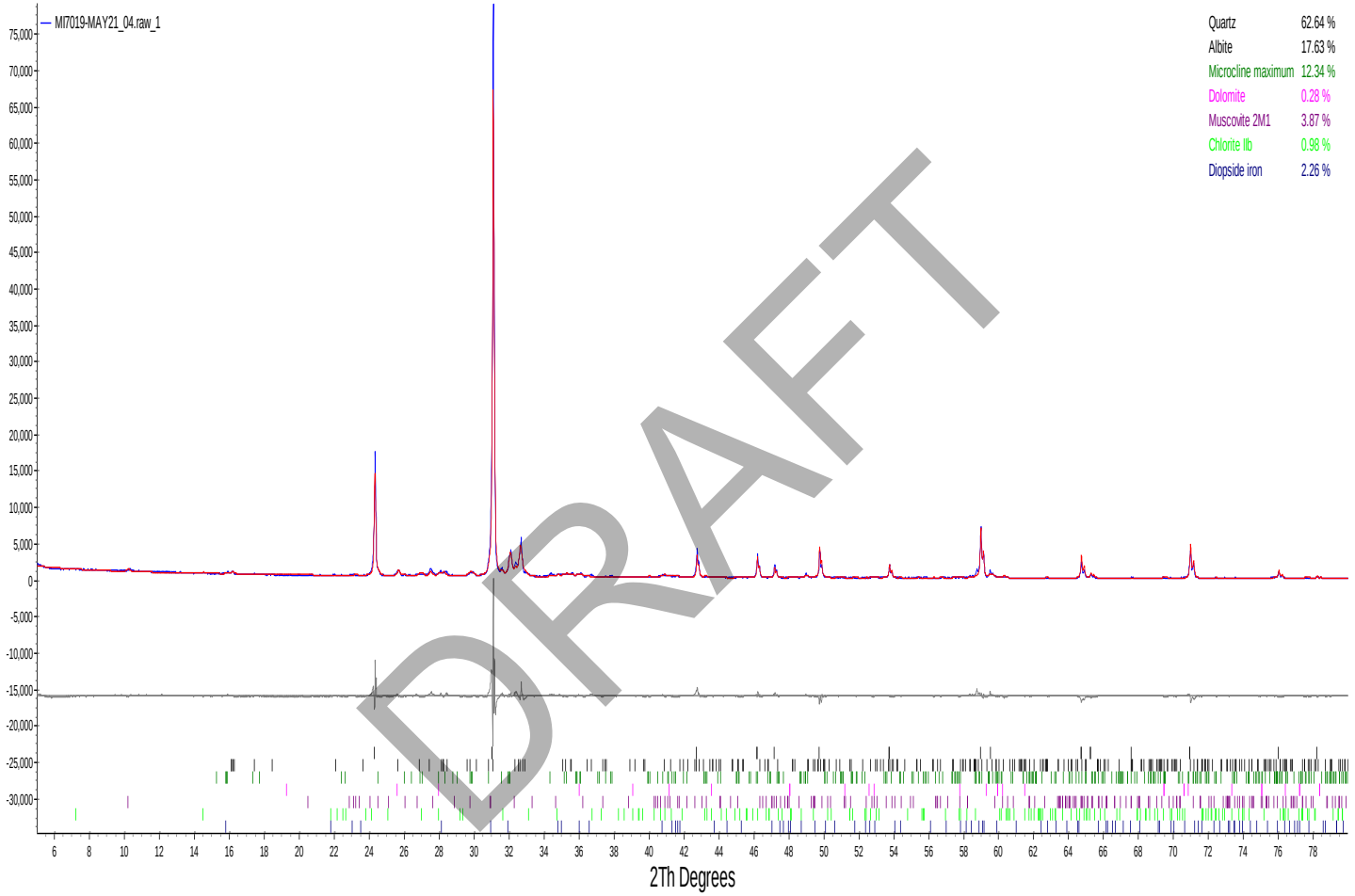
L-BH-03M



L-BH-03D



L-BH-02S



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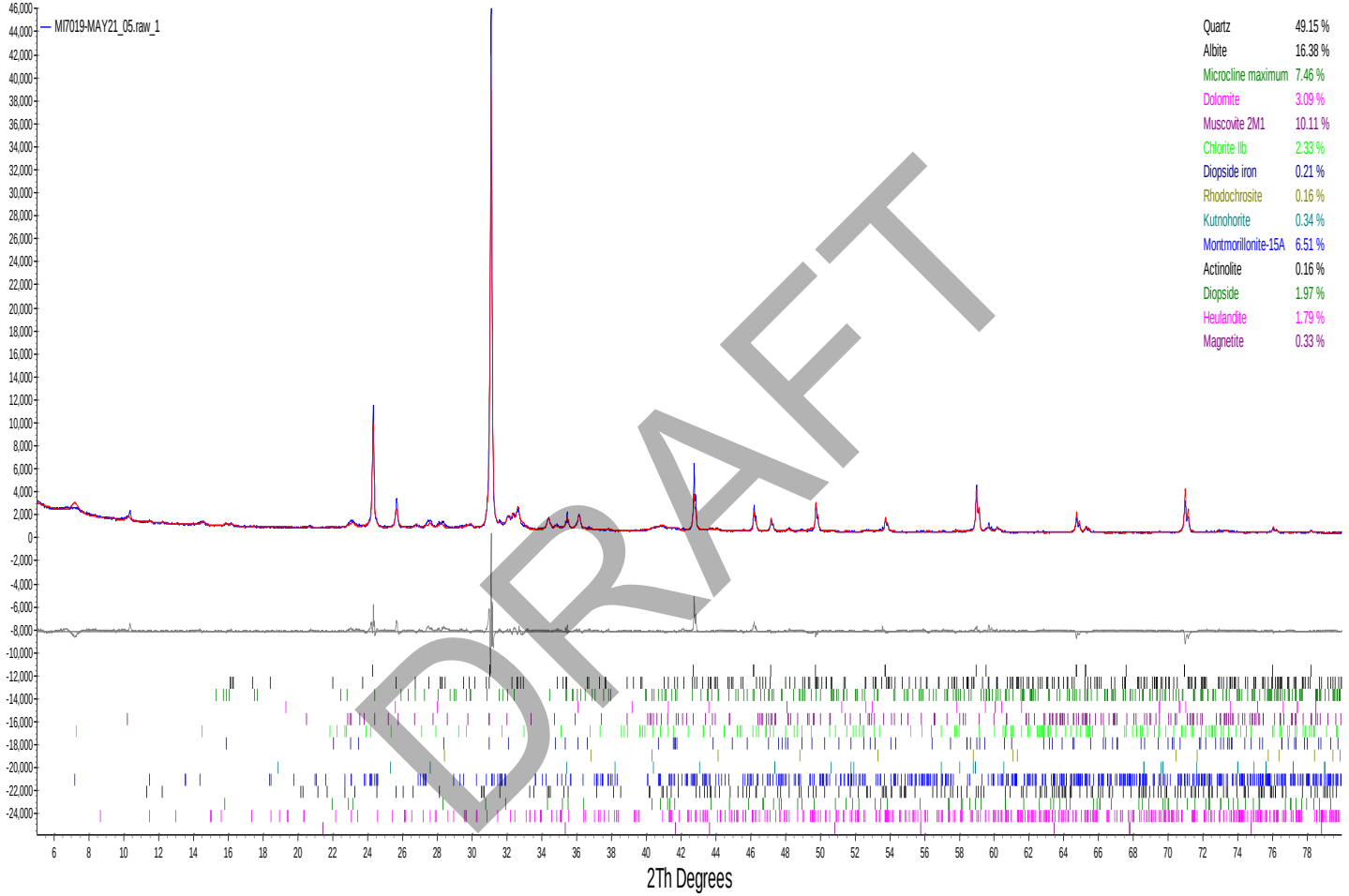

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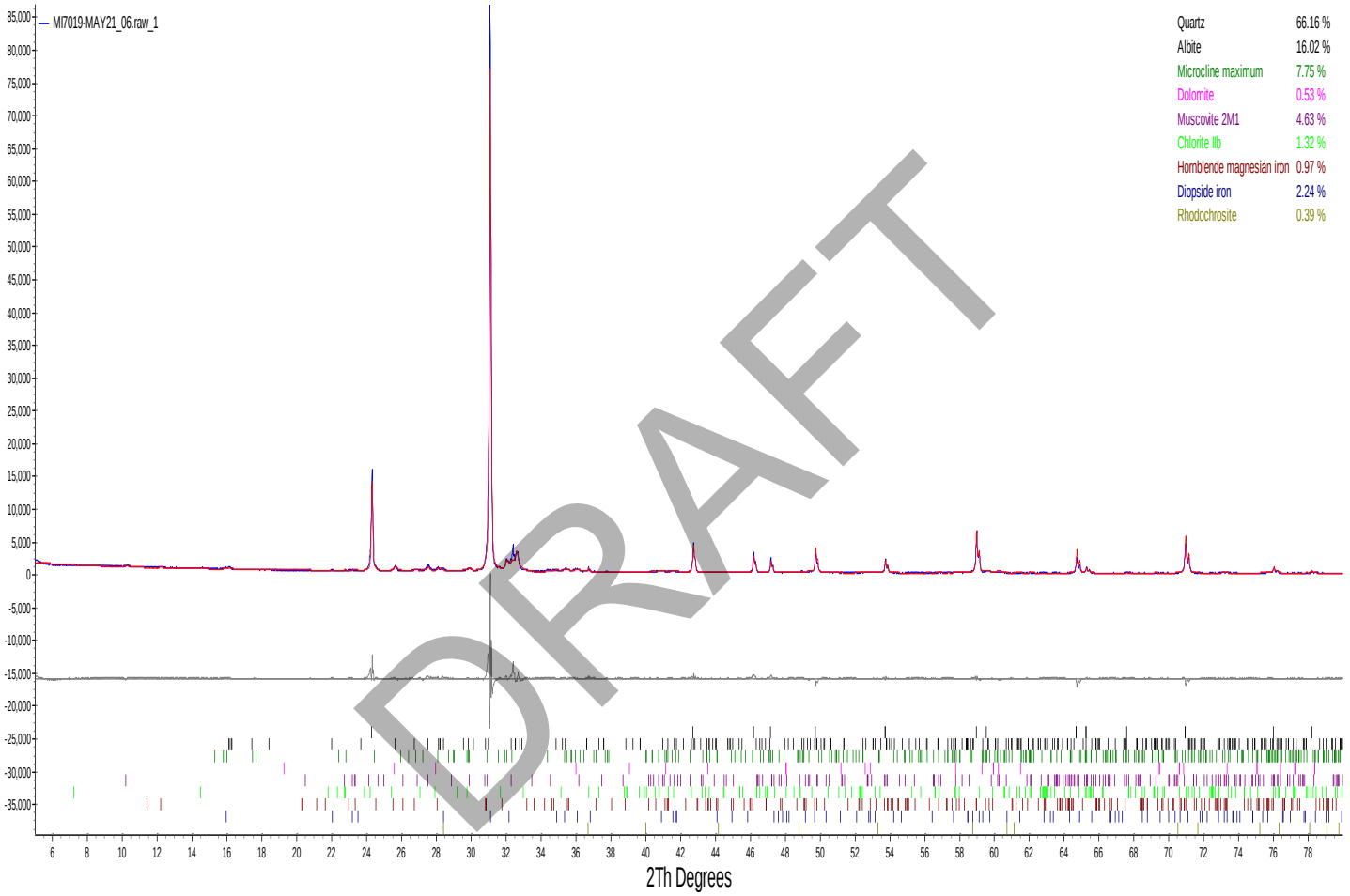
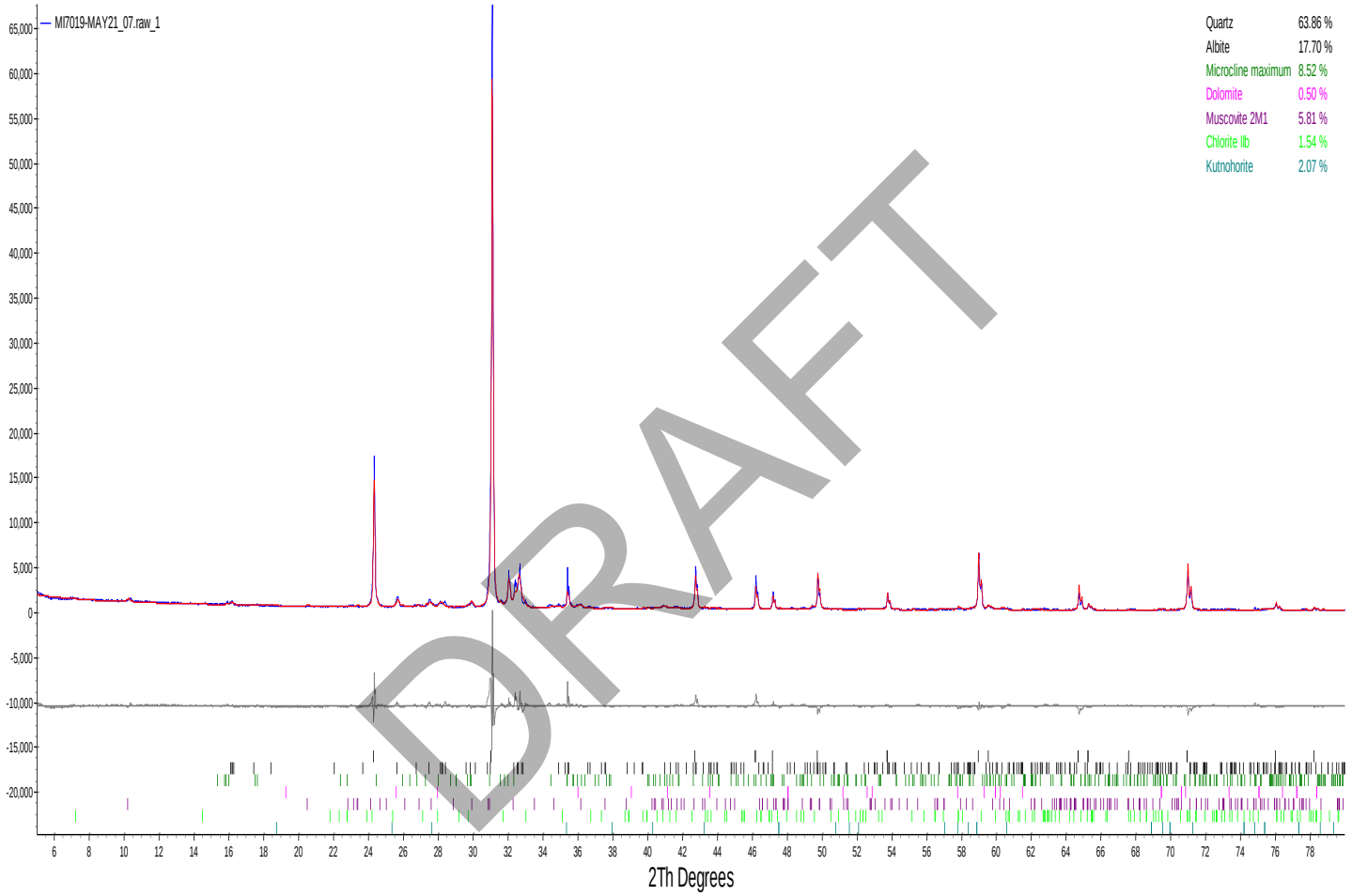


Golder Associates USA
18502-03/MI7019-MAY21
7/15/2021

L-BH-01S



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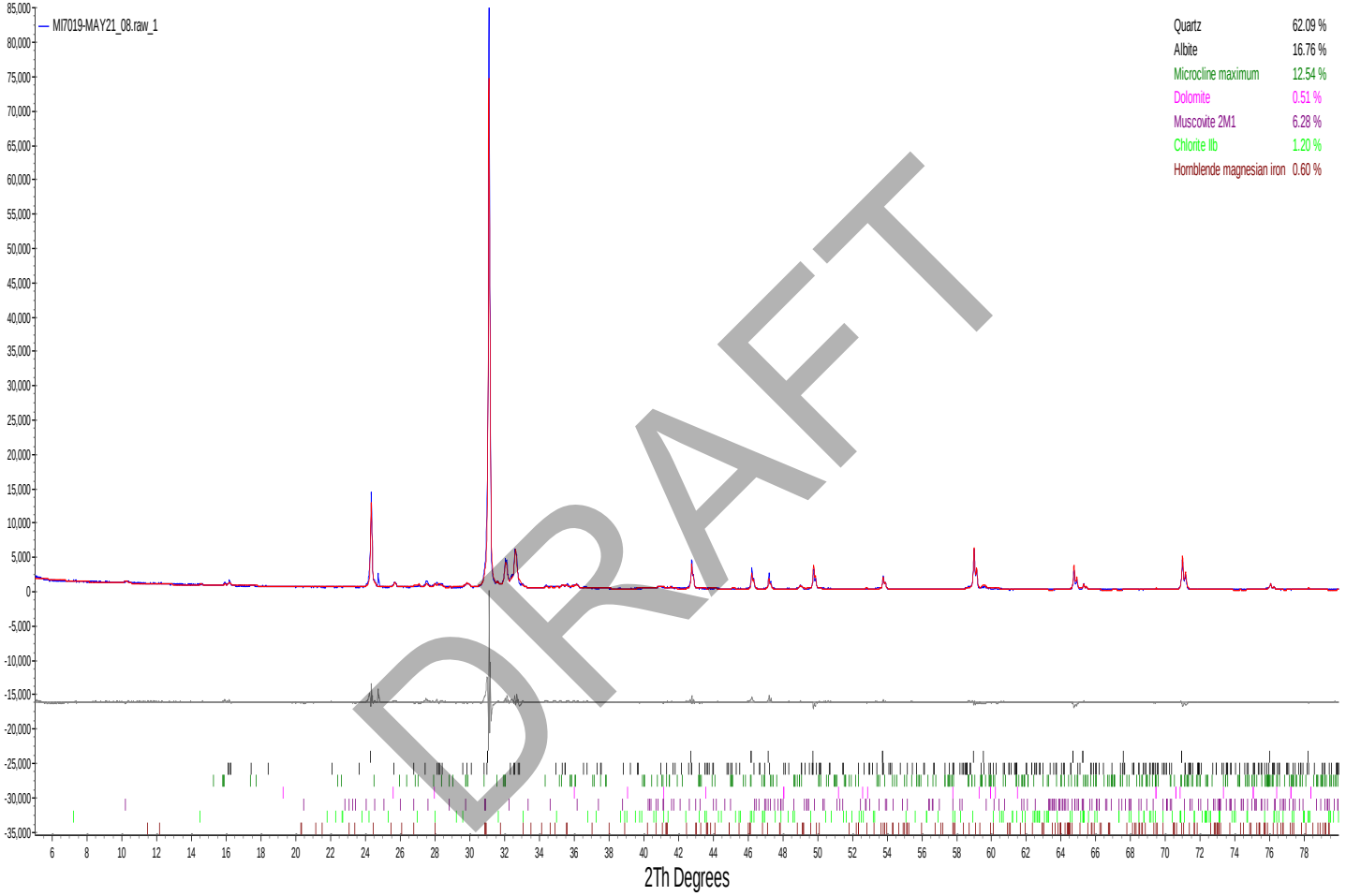

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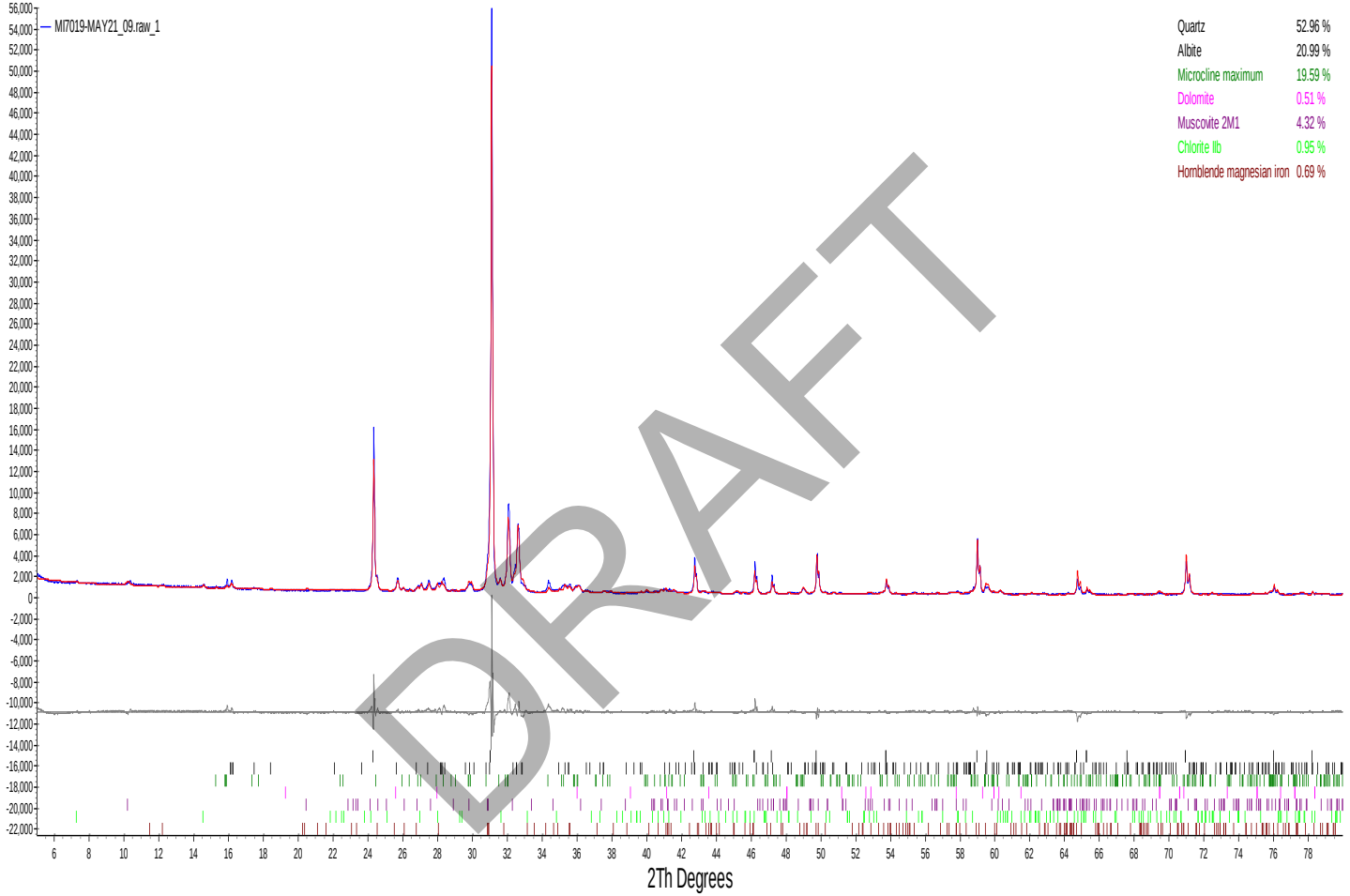

APPENDIX B

Sequential Extraction Laboratory Report

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 140-23290-1
Client Project/Site: Labadie Energy Center - Missouri

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

Attn: Jeffrey Ingram

Ryan Henry

Authorized for release by:
7/30/2021 10:20:24 AM

Ryan Henry, Project Manager I
(865)291-3000
williamr.henry@eurofinset.com

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Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Qualifiers

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
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
CFU	Colony Forming Unit
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)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
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)
TNTC	Too Numerous To Count

Job ID: 140-23290-1

Laboratory: Eurofins TestAmerica, Knoxville

Narrative

Job Narrative
140-23290-1

Receipt
The samples were received on 5/28/2021 at 10:00am and arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 0.5º C.

Metals
7 Step Sequential Extraction Procedure

These soil samples were prepared and analyzed using Eurofins TestAmerica Knoxville standard operating procedure KNOX-MT-0008, "7 Step Sequential Extraction Procedure". SW-846 Method 6010B as incorporated in Eurofins 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)

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

Job ID: 140-23290-1 (Continued)

Laboratory: Eurofins TestAmerica, Knoxville (Continued)

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.

Magnesium was not reported for step 1 because the extraction solution for this step (magnesium sulfate) contains high levels of magnesium. Sodium was not reported for steps 2 and 5 since the extraction solutions for these steps contain high levels of sodium. The sum of steps 1 through 7 is much higher than the total result for sodium and magnesium due to the magnesium and sodium introduced by the extraction solutions.

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: The following samples were diluted due to the nature of the sample matrix: L-BH-03S (140-23290-1), L-BH-03M (140-23290-2), L-BH-03D (140-23290-3), L-BH-02S (140-23290-4), L-BH-02M (140-23290-5), L-BH-02D (140-23290-6), L-BH-01S (140-23290-7), L-BH-01M (140-23290-8) and L-BH-01D (140-23290-9). Elevated reporting limits (RLs) are provided for aluminum and calcium.

Method 6010B: The following sample was diluted due to the presence of titanium which interferes with Cobalt: L-BH-02M (140-23290-5). Elevated reporting limits (RLs) are provided.

Method 6010B: The following samples were diluted to bring the concentration of target analyte, potassium, within the calibration range: L-BH-03S (140-23290-1), L-BH-03M (140-23290-2), L-BH-03D (140-23290-3), L-BH-02S (140-23290-4), L-BH-02M (140-23290-5), L-BH-02D (140-23290-6), L-BH-01S (140-23290-7), L-BH-01M (140-23290-8) and L-BH-01D (140-23290-9). Elevated reporting limits (RLs) are provided.

Method 6010B: The following samples were diluted to bring the concentration of target analyte, sodium, within the calibration range: L-BH-03M (140-23290-2), L-BH-02S (140-23290-4) and L-BH-01D (140-23290-9). Elevated reporting limits (RLs) are provided.

Method 6010B SEP: The following samples were diluted to bring the concentration of target analyte, sodium, within the calibration range: L-BH-03S (140-23290-1), L-BH-03M (140-23290-2), L-BH-03D (140-23290-3), L-BH-02S (140-23290-4), L-BH-02M (140-23290-5), L-BH-02D (140-23290-6), L-BH-01S (140-23290-7), L-BH-01M (140-23290-8) and L-BH-01D (140-23290-9). Elevated reporting limits (RLs) are provided.

Method 6010B SEP: The following samples were diluted to bring the concentration of target analyte, potassium, within the calibration range: L-BH-03S (140-23290-1), L-BH-03M (140-23290-2), L-BH-03D (140-23290-3), L-BH-02S (140-23290-4), L-BH-02M (140-23290-5), L-BH-02D (140-23290-6), L-BH-01S (140-23290-7), L-BH-01M (140-23290-8) and L-BH-01D (140-23290-9). Elevated reporting limits (RLs) are provided.

Method 6010B SEP: The following sample was diluted to bring the concentration of target analyte, sodium, within the calibration range: L-BH-01D (140-23290-9). Elevated reporting limits (RLs) are provided.

Method 6010B SEP: The following samples were diluted due to the presence of silicon which interferes with Arsenic and Selenium: L-BH-03M (140-23290-2), L-BH-03D (140-23290-3), L-BH-02D (140-23290-6) and L-BH-01M (140-23290-8). Elevated reporting limits (RLs) are provided.

Job ID: 140-23290-1 (Continued)

Laboratory: Eurofins TestAmerica, Knoxville (Continued)

Method 6010B SEP: The following sample was diluted due to the presence of titanium which interferes with Cobalt: L-BH-02M (140-23290-5). Elevated reporting limits (RLs) are provided.

Method 6010B SEP: The following samples were diluted due to the nature of the sample matrix: L-BH-03S (140-23290-1), L-BH-03M (140-23290-2), L-BH-03D (140-23290-3), L-BH-02S (140-23290-4), L-BH-02M (140-23290-5), L-BH-02D (140-23290-6), L-BH-01S (140-23290-7), L-BH-01M (140-23290-8) and L-BH-01D (140-23290-9). Elevated reporting limits (RLs) are provided for aluminum and calcium.

Method 6010B SEP: The following samples were diluted to bring the concentration of target analyte, potassium, within the calibration range: L-BH-03M (140-23290-2), L-BH-03D (140-23290-3), L-BH-02M (140-23290-5), L-BH-02D (140-23290-6) and L-BH-01M (140-23290-8). Elevated reporting limits (RLs) are provided.

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

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

Sample Summary

Client: Golder Associates Inc.
Project/Site: Labadie Energy Center - Missouri

Job ID: 140-23290-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
140-23290-1	L-BH-03S	Solid	05/24/21 08:45	05/28/21 10:00
140-23290-2	L-BH-03M	Solid	05/24/21 10:00	05/28/21 10:00
140-23290-3	L-BH-03D	Solid	05/24/21 11:45	05/28/21 10:00
140-23290-4	L-BH-02S	Solid	05/25/21 09:00	05/28/21 10:00
140-23290-5	L-BH-02M	Solid	05/25/21 10:25	05/28/21 10:00
140-23290-6	L-BH-02D	Solid	05/25/21 10:25	05/28/21 10:00
140-23290-7	L-BH-01S	Solid	05/26/21 08:10	05/28/21 10:00
140-23290-8	L-BH-01M	Solid	05/26/21 09:25	05/28/21 10:00
140-23290-9	L-BH-01D	Solid	05/26/21 11:05	05/28/21 10:00

Client Sample ID: L-BH-03S
Date Collected: 05/24/21 08:45
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-1
Matrix: Solid
Percent Solids: 80.7

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		50	7.9	mg/Kg	☼	07/13/21 08:00	07/21/21 12:47	4
Antimony	ND		15	1.4	mg/Kg	☼	07/13/21 08:00	07/21/21 12:47	4
Arsenic	ND		2.5	0.64	mg/Kg	☼	07/13/21 08:00	07/21/21 12:47	4
Calcium	**430**	**J B**	1200	9.4	mg/Kg	☼	07/13/21 08:00	07/21/21 12:47	4
Cobalt	ND		12	0.22	mg/Kg	☼	07/13/21 08:00	07/21/21 12:47	4
Iron	ND		25	14	mg/Kg	☼	07/13/21 08:00	07/21/21 12:47	4
Lithium	ND		12	0.74	mg/Kg	☼	07/13/21 08:00	07/21/21 12:47	4
Manganese	**0.67**	**J**	3.7	0.15	mg/Kg	☼	07/13/21 08:00	07/21/21 12:47	4
Molybdenum	ND		9.9	0.41	mg/Kg	☼	07/13/21 08:00	07/21/21 12:47	4
Potassium	ND		1200	130	mg/Kg	☼	07/13/21 08:00	07/21/21 12:47	4
Selenium	ND		2.5	0.84	mg/Kg	☼	07/13/21 08:00	07/21/21 12:47	4
Sodium	ND		1200	640	mg/Kg	☼	07/13/21 08:00	07/21/21 12:47	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		37	5.9	mg/Kg	☼	07/13/21 08:00	07/21/21 14:36	3
Antimony	ND		11	1.0	mg/Kg	☼	07/13/21 08:00	07/21/21 14:36	3
Arsenic	ND		1.9	0.48	mg/Kg	☼	07/13/21 08:00	07/21/21 14:36	3
Calcium	**1400**		930	8.2	mg/Kg	☼	07/13/21 08:00	07/21/21 14:36	3
Cobalt	ND		9.3	0.23	mg/Kg	☼	07/13/21 08:00	07/21/21 14:36	3
Iron	**13**	**J**	19	11	mg/Kg	☼	07/13/21 08:00	07/21/21 14:36	3
Lithium	ND		9.3	0.56	mg/Kg	☼	07/13/21 08:00	07/21/21 14:36	3
Manganese	**16**		2.8	1.0	mg/Kg	☼	07/13/21 08:00	07/21/21 14:36	3
Molybdenum	ND		7.4	0.30	mg/Kg	☼	07/13/21 08:00	07/21/21 14:36	3
Potassium	**110**	**J**	930	97	mg/Kg	☼	07/13/21 08:00	07/21/21 14:36	3
Selenium	ND		1.9	0.63	mg/Kg	☼	07/13/21 08:00	07/21/21 14:36	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**31**		12	2.6	mg/Kg	☼	07/14/21 08:00	07/21/21 16:37	1
Antimony	ND		3.7	0.35	mg/Kg	☼	07/14/21 08:00	07/21/21 16:37	1
Arsenic	**0.44**	**J**	0.62	0.16	mg/Kg	☼	07/14/21 08:00	07/21/21 16:37	1
Calcium	**5.8**	**J**	310	1.9	mg/Kg	☼	07/14/21 08:00	07/21/21 16:37	1
Cobalt	**0.49**	**J**	3.1	0.056	mg/Kg	☼	07/14/21 08:00	07/21/21 16:37	1
Iron	**310**		6.2	3.6	mg/Kg	☼	07/14/21 08:00	07/21/21 16:37	1
Lithium	ND		3.1	0.19	mg/Kg	☼	07/14/21 08:00	07/21/21 16:37	1
Manganese	**8.5**	**B**	0.93	0.033	mg/Kg	☼	07/14/21 08:00	07/21/21 16:37	1
Molybdenum	ND		2.5	0.10	mg/Kg	☼	07/14/21 08:00	07/21/21 16:37	1
Potassium	ND		310	32	mg/Kg	☼	07/14/21 08:00	07/21/21 16:37	1
Selenium	ND		0.62	0.21	mg/Kg	☼	07/14/21 08:00	07/21/21 16:37	1
Sodium	**6700**		310	160	mg/Kg	☼	07/14/21 08:00	07/21/21 16:37	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**410**		12	2.0	mg/Kg	☼	07/15/21 08:00	07/22/21 14:03	1
Antimony	ND		3.7	0.56	mg/Kg	☼	07/15/21 08:00	07/22/21 14:03	1
Arsenic	**0.80**		0.62	0.27	mg/Kg	☼	07/15/21 08:00	07/22/21 14:03	1
Calcium	**1200**		310	2.7	mg/Kg	☼	07/15/21 08:00	07/22/21 14:03	1
Cobalt	**0.89**	**J**	3.1	0.066	mg/Kg	☼	07/15/21 08:00	07/22/21 14:03	1
Iron	**1600**		6.2	3.6	mg/Kg	☼	07/15/21 08:00	07/22/21 14:03	1

Client Sample ID: L-BH-03S

Date Collected: 05/24/21 08:45
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-1

Matrix: Solid
Percent Solids: 80.7

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.75	J	3.1	0.19	mg/Kg	☼	07/15/21 08:00	07/22/21 14:03	1
Manganese	15		0.93	0.16	mg/Kg	☼	07/15/21 08:00	07/22/21 14:03	1
Molybdenum	ND		2.5	0.10	mg/Kg	☼	07/15/21 08:00	07/22/21 14:03	1
Potassium	43	J	310	32	mg/Kg	☼	07/15/21 08:00	07/22/21 14:03	1
Selenium	ND		0.62	0.58	mg/Kg	☼	07/15/21 08:00	07/22/21 14:03	1
Sodium	370		310	160	mg/Kg	☼	07/15/21 08:00	07/22/21 14:03	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	100	J	190	29	mg/Kg	☼	07/17/21 08:14	07/22/21 15:51	5
Antimony	ND		56	5.2	mg/Kg	☼	07/17/21 08:14	07/22/21 15:51	5
Arsenic	ND		9.3	2.4	mg/Kg	☼	07/17/21 08:14	07/22/21 15:51	5
Calcium	360	J B	4600	14	mg/Kg	☼	07/17/21 08:14	07/22/21 15:51	5
Cobalt	ND		46	0.74	mg/Kg	☼	07/17/21 08:14	07/22/21 15:51	5
Iron	ND		93	55	mg/Kg	☼	07/17/21 08:14	07/22/21 15:51	5
Lithium	ND		46	2.7	mg/Kg	☼	07/17/21 08:14	07/22/21 15:51	5
Manganese	ND		14	2.3	mg/Kg	☼	07/17/21 08:14	07/22/21 15:51	5
Molybdenum	ND		37	1.5	mg/Kg	☼	07/17/21 08:14	07/22/21 15:51	5
Potassium	3200	J B	4600	530	mg/Kg	☼	07/17/21 08:14	07/22/21 15:51	5
Selenium	ND		9.3	3.2	mg/Kg	☼	07/17/21 08:14	07/22/21 15:51	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	720		12	2.0	mg/Kg	☼	07/16/21 12:00	07/22/21 17:39	1
Antimony	ND		3.7	0.35	mg/Kg	☼	07/16/21 12:00	07/22/21 17:39	1
Arsenic	0.75		0.62	0.19	mg/Kg	☼	07/16/21 12:00	07/22/21 17:39	1
Calcium	160	J	310	2.6	mg/Kg	☼	07/16/21 12:00	07/22/21 17:39	1
Cobalt	0.56	J	3.1	0.057	mg/Kg	☼	07/16/21 12:00	07/22/21 17:39	1
Iron	2000		6.2	3.6	mg/Kg	☼	07/16/21 12:00	07/22/21 17:39	1
Lithium	0.84	J	3.1	0.19	mg/Kg	☼	07/16/21 12:00	07/22/21 17:39	1
Manganese	15		0.93	0.31	mg/Kg	☼	07/16/21 12:00	07/22/21 17:39	1
Molybdenum	ND		2.5	0.12	mg/Kg	☼	07/16/21 12:00	07/22/21 17:39	1
Potassium	230	J	310	32	mg/Kg	☼	07/16/21 12:00	07/22/21 17:39	1
Selenium	ND		0.62	0.21	mg/Kg	☼	07/16/21 12:00	07/22/21 17:39	1
Sodium	21000		1500	810	mg/Kg	☼	07/16/21 12:00	07/22/21 19:14	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	43000		120	20	mg/Kg	☼	07/20/21 08:00	07/23/21 13:57	10
Antimony	0.46	J	3.7	0.17	mg/Kg	☼	07/20/21 08:00	07/23/21 15:15	1
Arsenic	1.8		0.62	0.16	mg/Kg	☼	07/20/21 08:00	07/23/21 15:15	1
Calcium	6200		3100	32	mg/Kg	☼	07/20/21 08:00	07/23/21 13:57	10
Cobalt	0.20	J	3.1	0.032	mg/Kg	☼	07/20/21 08:00	07/23/21 15:15	1
Iron	2100		6.2	5.1	mg/Kg	☼	07/20/21 08:00	07/23/21 15:15	1
Lithium	3.8		3.1	0.19	mg/Kg	☼	07/20/21 08:00	07/23/21 15:15	1
Manganese	34		0.93	0.14	mg/Kg	☼	07/20/21 08:00	07/23/21 15:15	1
Molybdenum	ND		2.5	0.10	mg/Kg	☼	07/20/21 08:00	07/23/21 15:15	1
Potassium	24000		1500	62	mg/Kg	☼	07/20/21 08:00	07/28/21 14:55	5
Selenium	ND		0.62	0.21	mg/Kg	☼	07/20/21 08:00	07/23/21 15:15	1
Sodium	8700		310	53	mg/Kg	☼	07/20/21 08:00	07/23/21 15:15	1

Client Sample ID: L-BH-03S

Date Collected: 05/24/21 08:45
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-1

Matrix: Solid
Percent Solids: 80.7

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	44000		10	1.6	mg/Kg			07/29/21 21:07	1
Antimony	0.46	J	3.0	0.14	mg/Kg			07/29/21 21:07	1
Arsenic	3.8		0.50	0.13	mg/Kg			07/29/21 21:07	1
Calcium	9800		250	0.74	mg/Kg			07/29/21 21:07	1
Cobalt	2.1	J	2.5	0.023	mg/Kg			07/29/21 21:07	1
Iron	6000		5.0	4.1	mg/Kg			07/29/21 21:07	1
Lithium	5.4		2.5	0.15	mg/Kg			07/29/21 21:07	1
Manganese	89		0.75	0.052	mg/Kg			07/29/21 21:07	1
Molybdenum	ND		2.0	0.082	mg/Kg			07/29/21 21:07	1
Potassium	27000		250	26	mg/Kg			07/29/21 21:07	1
Selenium	ND		0.50	0.17	mg/Kg			07/29/21 21:07	1
Sodium	37000		250	130	mg/Kg			07/29/21 21:07	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	1700		47	5.8	mg/Kg	☼	06/28/21 08:00	07/07/21 15:29	1
Antimony	ND		7.0	0.40	mg/Kg	☼	06/28/21 08:00	07/07/21 15:29	1
Arsenic	2.3		2.3	0.34	mg/Kg	☼	06/28/21 08:00	07/07/21 15:29	1
Calcium	3400		580	100	mg/Kg	☼	06/28/21 08:00	07/07/21 15:29	1
Cobalt	2.4	J	5.8	0.056	mg/Kg	☼	06/28/21 08:00	07/07/21 15:29	1
Iron	4200		23	9.2	mg/Kg	☼	06/28/21 08:00	07/07/21 15:29	1
Lithium	2.0	J	5.8	0.35	mg/Kg	☼	06/28/21 08:00	07/07/21 15:29	1
Manganese	58		1.7	0.72	mg/Kg	☼	06/28/21 08:00	07/07/21 15:29	1
Molybdenum	ND		4.7	0.13	mg/Kg	☼	06/28/21 08:00	07/07/21 15:29	1
Potassium	380	J	580	28	mg/Kg	☼	06/28/21 08:00	07/07/21 15:29	1
Selenium	ND		1.7	0.51	mg/Kg	☼	06/28/21 08:00	07/07/21 15:29	1
Sodium	59	J	580	42	mg/Kg	☼	06/28/21 08:00	07/07/21 15:29	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	41000		120	20	mg/Kg	☼	07/12/21 08:00	07/28/21 17:42	10
Antimony	0.35	J	3.7	0.17	mg/Kg	☼	07/12/21 08:00	07/29/21 11:53	1
Arsenic	4.5	B	0.62	0.16	mg/Kg	☼	07/12/21 08:00	07/29/21 11:53	1
Calcium	9400		3100	32	mg/Kg	☼	07/12/21 08:00	07/28/21 17:42	10
Cobalt	2.7	J	3.1	0.032	mg/Kg	☼	07/12/21 08:00	07/29/21 11:53	1
Iron	6200		6.2	5.1	mg/Kg	☼	07/12/21 08:00	07/29/21 11:53	1
Lithium	6.1		3.1	0.19	mg/Kg	☼	07/12/21 08:00	07/29/21 11:53	1
Manganese	96		0.93	0.14	mg/Kg	☼	07/12/21 08:00	07/29/21 11:53	1
Molybdenum	0.23	J	2.5	0.10	mg/Kg	☼	07/12/21 08:00	07/29/21 11:53	1
Potassium	21000		1500	62	mg/Kg	☼	07/12/21 08:00	07/29/21 13:25	5
Selenium	ND		0.62	0.21	mg/Kg	☼	07/12/21 08:00	07/29/21 11:53	1
Sodium	11000		310	53	mg/Kg	☼	07/12/21 08:00	07/29/21 11:53	1

Client Sample ID: L-BH-03M
Date Collected: 05/24/21 10:00
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-2
Matrix: Solid
Percent Solids: 91.1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		44	7.0	mg/Kg	☼	07/13/21 08:00	07/21/21 13:06	4
Antimony	ND		13	1.2	mg/Kg	☼	07/13/21 08:00	07/21/21 13:06	4
Arsenic	ND		2.2	0.57	mg/Kg	☼	07/13/21 08:00	07/21/21 13:06	4
Calcium	**210**	**J B**	1100	8.3	mg/Kg	☼	07/13/21 08:00	07/21/21 13:06	4
Cobalt	ND		11	0.20	mg/Kg	☼	07/13/21 08:00	07/21/21 13:06	4
Iron	ND		22	13	mg/Kg	☼	07/13/21 08:00	07/21/21 13:06	4
Lithium	ND		11	0.66	mg/Kg	☼	07/13/21 08:00	07/21/21 13:06	4
Manganese	**2.8**	**J**	3.3	0.14	mg/Kg	☼	07/13/21 08:00	07/21/21 13:06	4
Molybdenum	ND		8.8	0.36	mg/Kg	☼	07/13/21 08:00	07/21/21 13:06	4
Potassium	ND		1100	110	mg/Kg	☼	07/13/21 08:00	07/21/21 13:06	4
Selenium	ND		2.2	0.75	mg/Kg	☼	07/13/21 08:00	07/21/21 13:06	4
Sodium	ND		1100	570	mg/Kg	☼	07/13/21 08:00	07/21/21 13:06	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		33	5.3	mg/Kg	☼	07/13/21 08:00	07/21/21 14:56	3
Antimony	ND		9.9	0.92	mg/Kg	☼	07/13/21 08:00	07/21/21 14:56	3
Arsenic	ND		1.6	0.43	mg/Kg	☼	07/13/21 08:00	07/21/21 14:56	3
Calcium	**990**		820	7.2	mg/Kg	☼	07/13/21 08:00	07/21/21 14:56	3
Cobalt	ND		8.2	0.21	mg/Kg	☼	07/13/21 08:00	07/21/21 14:56	3
Iron	**34**		16	9.5	mg/Kg	☼	07/13/21 08:00	07/21/21 14:56	3
Lithium	ND		8.2	0.49	mg/Kg	☼	07/13/21 08:00	07/21/21 14:56	3
Manganese	**48**		2.5	0.92	mg/Kg	☼	07/13/21 08:00	07/21/21 14:56	3
Molybdenum	ND		6.6	0.27	mg/Kg	☼	07/13/21 08:00	07/21/21 14:56	3
Potassium	ND		820	86	mg/Kg	☼	07/13/21 08:00	07/21/21 14:56	3
Selenium	ND		1.6	0.56	mg/Kg	☼	07/13/21 08:00	07/21/21 14:56	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**17**		11	2.3	mg/Kg	☼	07/14/21 08:00	07/21/21 16:56	1
Antimony	ND		3.3	0.31	mg/Kg	☼	07/14/21 08:00	07/21/21 16:56	1
Arsenic	ND		0.55	0.14	mg/Kg	☼	07/14/21 08:00	07/21/21 16:56	1
Calcium	**5.8**	**J**	270	1.6	mg/Kg	☼	07/14/21 08:00	07/21/21 16:56	1
Cobalt	**0.14**	**J**	2.7	0.049	mg/Kg	☼	07/14/21 08:00	07/21/21 16:56	1
Iron	**220**		5.5	3.2	mg/Kg	☼	07/14/21 08:00	07/21/21 16:56	1
Lithium	ND		2.7	0.16	mg/Kg	☼	07/14/21 08:00	07/21/21 16:56	1
Manganese	**16**	**B**	0.82	0.030	mg/Kg	☼	07/14/21 08:00	07/21/21 16:56	1
Molybdenum	ND		2.2	0.090	mg/Kg	☼	07/14/21 08:00	07/21/21 16:56	1
Potassium	ND		270	29	mg/Kg	☼	07/14/21 08:00	07/21/21 16:56	1
Selenium	ND		0.55	0.19	mg/Kg	☼	07/14/21 08:00	07/21/21 16:56	1
Sodium	**5800**		270	140	mg/Kg	☼	07/14/21 08:00	07/21/21 16:56	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**170**		11	1.8	mg/Kg	☼	07/15/21 08:00	07/22/21 14:23	1
Antimony	ND		3.3	0.49	mg/Kg	☼	07/15/21 08:00	07/22/21 14:23	1
Arsenic	**0.34**	**J**	0.55	0.24	mg/Kg	☼	07/15/21 08:00	07/22/21 14:23	1
Calcium	**1000**		270	2.4	mg/Kg	☼	07/15/21 08:00	07/22/21 14:23	1
Cobalt	**1.2**	**J**	2.7	0.058	mg/Kg	☼	07/15/21 08:00	07/22/21 14:23	1
Iron	**1000**		5.5	3.2	mg/Kg	☼	07/15/21 08:00	07/22/21 14:23	1

Client: Golder Associates Inc.
Project/Site: Labadie Energy Center - Missouri

Job ID: 140-23290-1

Client Sample ID: L-BH-03M
Date Collected: 05/24/21 10:00
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-2
Matrix: Solid
Percent Solids: 91.1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.28	J	2.7	0.16	mg/Kg	☼	07/15/21 08:00	07/22/21 14:23	1
Manganese	21		0.82	0.14	mg/Kg	☼	07/15/21 08:00	07/22/21 14:23	1
Molybdenum	ND		2.2	0.090	mg/Kg	☼	07/15/21 08:00	07/22/21 14:23	1
Potassium	ND		270	29	mg/Kg	☼	07/15/21 08:00	07/22/21 14:23	1
Selenium	ND		0.55	0.52	mg/Kg	☼	07/15/21 08:00	07/22/21 14:23	1
Sodium	330		270	140	mg/Kg	☼	07/15/21 08:00	07/22/21 14:23	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	53	J	160	26	mg/Kg	☼	07/17/21 08:14	07/22/21 16:11	5
Antimony	ND		49	4.6	mg/Kg	☼	07/17/21 08:14	07/22/21 16:11	5
Arsenic	ND		8.2	2.1	mg/Kg	☼	07/17/21 08:14	07/22/21 16:11	5
Calcium	710	J B	4100	12	mg/Kg	☼	07/17/21 08:14	07/22/21 16:11	5
Cobalt	ND		41	0.66	mg/Kg	☼	07/17/21 08:14	07/22/21 16:11	5
Iron	ND		82	48	mg/Kg	☼	07/17/21 08:14	07/22/21 16:11	5
Lithium	ND		41	2.4	mg/Kg	☼	07/17/21 08:14	07/22/21 16:11	5
Manganese	3.2	J	12	2.0	mg/Kg	☼	07/17/21 08:14	07/22/21 16:11	5
Molybdenum	ND		33	1.4	mg/Kg	☼	07/17/21 08:14	07/22/21 16:11	5
Potassium	2800	J B	4100	470	mg/Kg	☼	07/17/21 08:14	07/22/21 16:11	5
Selenium	ND		8.2	2.9	mg/Kg	☼	07/17/21 08:14	07/22/21 16:11	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	500		11	1.8	mg/Kg	☼	07/16/21 12:00	07/22/21 17:59	1
Antimony	ND		3.3	0.31	mg/Kg	☼	07/16/21 12:00	07/22/21 17:59	1
Arsenic	0.67		0.55	0.16	mg/Kg	☼	07/16/21 12:00	07/22/21 17:59	1
Calcium	390		270	2.3	mg/Kg	☼	07/16/21 12:00	07/22/21 17:59	1
Cobalt	0.80	J	2.7	0.050	mg/Kg	☼	07/16/21 12:00	07/22/21 17:59	1
Iron	2300		5.5	3.2	mg/Kg	☼	07/16/21 12:00	07/22/21 17:59	1
Lithium	0.63	J	2.7	0.16	mg/Kg	☼	07/16/21 12:00	07/22/21 17:59	1
Manganese	17		0.82	0.27	mg/Kg	☼	07/16/21 12:00	07/22/21 17:59	1
Molybdenum	ND		2.2	0.11	mg/Kg	☼	07/16/21 12:00	07/22/21 17:59	1
Potassium	120	J	270	29	mg/Kg	☼	07/16/21 12:00	07/22/21 17:59	1
Selenium	ND		0.55	0.19	mg/Kg	☼	07/16/21 12:00	07/22/21 17:59	1
Sodium	17000		1400	710	mg/Kg	☼	07/16/21 12:00	07/22/21 19:19	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	35000		110	18	mg/Kg	☼	07/20/21 08:00	07/23/21 14:01	10
Antimony	0.49	J	3.3	0.15	mg/Kg	☼	07/20/21 08:00	07/23/21 15:20	1
Arsenic	ND		1.1	0.29	mg/Kg	☼	07/20/21 08:00	07/28/21 15:00	2
Calcium	5600		2700	29	mg/Kg	☼	07/20/21 08:00	07/23/21 14:01	10
Cobalt	ND		2.7	0.029	mg/Kg	☼	07/20/21 08:00	07/23/21 15:20	1
Iron	1300		5.5	4.5	mg/Kg	☼	07/20/21 08:00	07/23/21 15:20	1
Lithium	2.4	J	2.7	0.16	mg/Kg	☼	07/20/21 08:00	07/23/21 15:20	1
Manganese	35		0.82	0.12	mg/Kg	☼	07/20/21 08:00	07/23/21 15:20	1
Molybdenum	ND		2.2	0.090	mg/Kg	☼	07/20/21 08:00	07/23/21 15:20	1
Potassium	21000		1400	55	mg/Kg	☼	07/20/21 08:00	07/28/21 15:05	5
Selenium	ND		1.1	0.37	mg/Kg	☼	07/20/21 08:00	07/28/21 15:00	2
Sodium	7600		270	47	mg/Kg	☼	07/20/21 08:00	07/23/21 15:20	1

Client Sample ID: L-BH-03M
Date Collected: 05/24/21 10:00
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-2
Matrix: Solid
Percent Solids: 91.1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	36000		10	1.6	mg/Kg			07/29/21 21:07	1
Antimony	0.49	J	3.0	0.14	mg/Kg			07/29/21 21:07	1
Arsenic	1.0		0.50	0.13	mg/Kg			07/29/21 21:07	1
Calcium	8900		250	0.74	mg/Kg			07/29/21 21:07	1
Cobalt	2.1	J	2.5	0.023	mg/Kg			07/29/21 21:07	1
Iron	4900		5.0	4.1	mg/Kg			07/29/21 21:07	1
Lithium	3.3		2.5	0.15	mg/Kg			07/29/21 21:07	1
Manganese	140		0.75	0.052	mg/Kg			07/29/21 21:07	1
Molybdenum	ND		2.0	0.082	mg/Kg			07/29/21 21:07	1
Potassium	24000		250	26	mg/Kg			07/29/21 21:07	1
Selenium	ND		0.50	0.17	mg/Kg			07/29/21 21:07	1
Sodium	31000		250	130	mg/Kg			07/29/21 21:07	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	1200		41	5.2	mg/Kg	☼	06/28/21 08:00	07/07/21 15:50	1
Antimony	ND		6.2	0.35	mg/Kg	☼	06/28/21 08:00	07/07/21 15:50	1
Arsenic	0.87	J	2.1	0.30	mg/Kg	☼	06/28/21 08:00	07/07/21 15:50	1
Calcium	15000		520	91	mg/Kg	☼	06/28/21 08:00	07/07/21 15:50	1
Cobalt	2.7	J	5.2	0.050	mg/Kg	☼	06/28/21 08:00	07/07/21 15:50	1
Iron	3500		21	8.2	mg/Kg	☼	06/28/21 08:00	07/07/21 15:50	1
Lithium	2.1	J	5.2	0.31	mg/Kg	☼	06/28/21 08:00	07/07/21 15:50	1
Manganese	420		1.5	0.64	mg/Kg	☼	06/28/21 08:00	07/07/21 15:50	1
Molybdenum	0.15	J	4.1	0.11	mg/Kg	☼	06/28/21 08:00	07/07/21 15:50	1
Potassium	230	J	520	25	mg/Kg	☼	06/28/21 08:00	07/07/21 15:50	1
Selenium	ND		1.5	0.45	mg/Kg	☼	06/28/21 08:00	07/07/21 15:50	1
Sodium	60	J	520	37	mg/Kg	☼	06/28/21 08:00	07/07/21 15:50	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	37000		110	18	mg/Kg	☼	07/12/21 08:00	07/28/21 17:47	10
Antimony	0.42	J	3.3	0.15	mg/Kg	☼	07/12/21 08:00	07/29/21 11:59	1
Arsenic	2.1	B	0.55	0.14	mg/Kg	☼	07/12/21 08:00	07/29/21 11:59	1
Calcium	7800		2700	29	mg/Kg	☼	07/12/21 08:00	07/28/21 17:47	10
Cobalt	2.2	J	2.7	0.029	mg/Kg	☼	07/12/21 08:00	07/29/21 11:59	1
Iron	3900		5.5	4.5	mg/Kg	☼	07/12/21 08:00	07/29/21 11:59	1
Lithium	3.6		2.7	0.16	mg/Kg	☼	07/12/21 08:00	07/29/21 11:59	1
Manganese	160		0.82	0.12	mg/Kg	☼	07/12/21 08:00	07/29/21 11:59	1
Molybdenum	0.33	J	2.2	0.090	mg/Kg	☼	07/12/21 08:00	07/29/21 11:59	1
Potassium	25000		1400	55	mg/Kg	☼	07/12/21 08:00	07/29/21 13:30	5
Selenium	ND		0.55	0.19	mg/Kg	☼	07/12/21 08:00	07/29/21 11:59	1
Sodium	12000		1400	240	mg/Kg	☼	07/12/21 08:00	07/29/21 13:30	5

Client Sample ID: L-BH-03D
Date Collected: 05/24/21 11:45
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-3
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	☼	07/13/21 08:00	07/21/21 13:11	4
Antimony	ND		14	1.3	mg/Kg	☼	07/13/21 08:00	07/21/21 13:11	4
Arsenic	ND		2.3	0.61	mg/Kg	☼	07/13/21 08:00	07/21/21 13:11	4
Calcium	**170**	**J B**	1200	8.9	mg/Kg	☼	07/13/21 08:00	07/21/21 13:11	4
Cobalt	ND		12	0.21	mg/Kg	☼	07/13/21 08:00	07/21/21 13:11	4
Iron	ND		23	14	mg/Kg	☼	07/13/21 08:00	07/21/21 13:11	4
Lithium	ND		12	0.70	mg/Kg	☼	07/13/21 08:00	07/21/21 13:11	4
Manganese	**3.7**		3.5	0.14	mg/Kg	☼	07/13/21 08:00	07/21/21 13:11	4
Molybdenum	ND		9.3	0.38	mg/Kg	☼	07/13/21 08:00	07/21/21 13:11	4
Potassium	ND		1200	120	mg/Kg	☼	07/13/21 08:00	07/21/21 13:11	4
Selenium	ND		2.3	0.79	mg/Kg	☼	07/13/21 08:00	07/21/21 13:11	4
Sodium	ND		1200	610	mg/Kg	☼	07/13/21 08:00	07/21/21 13:11	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**10**	**J**	35	5.6	mg/Kg	☼	07/13/21 08:00	07/21/21 15:01	3
Antimony	ND		10	0.98	mg/Kg	☼	07/13/21 08:00	07/21/21 15:01	3
Arsenic	ND		1.7	0.45	mg/Kg	☼	07/13/21 08:00	07/21/21 15:01	3
Calcium	**220**	**J**	870	7.7	mg/Kg	☼	07/13/21 08:00	07/21/21 15:01	3
Cobalt	**0.42**	**J**	8.7	0.22	mg/Kg	☼	07/13/21 08:00	07/21/21 15:01	3
Iron	**44**		17	10	mg/Kg	☼	07/13/21 08:00	07/21/21 15:01	3
Lithium	ND		8.7	0.52	mg/Kg	☼	07/13/21 08:00	07/21/21 15:01	3
Manganese	**36**		2.6	0.98	mg/Kg	☼	07/13/21 08:00	07/21/21 15:01	3
Molybdenum	ND		7.0	0.29	mg/Kg	☼	07/13/21 08:00	07/21/21 15:01	3
Potassium	**99**	**J**	870	91	mg/Kg	☼	07/13/21 08:00	07/21/21 15:01	3
Selenium	ND		1.7	0.59	mg/Kg	☼	07/13/21 08:00	07/21/21 15:01	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**39**		12	2.4	mg/Kg	☼	07/14/21 08:00	07/21/21 17:01	1
Antimony	ND		3.5	0.33	mg/Kg	☼	07/14/21 08:00	07/21/21 17:01	1
Arsenic	ND		0.58	0.15	mg/Kg	☼	07/14/21 08:00	07/21/21 17:01	1
Calcium	**4.8**	**J**	290	1.7	mg/Kg	☼	07/14/21 08:00	07/21/21 17:01	1
Cobalt	**0.74**	**J**	2.9	0.052	mg/Kg	☼	07/14/21 08:00	07/21/21 17:01	1
Iron	**220**		5.8	3.4	mg/Kg	☼	07/14/21 08:00	07/21/21 17:01	1
Lithium	ND		2.9	0.17	mg/Kg	☼	07/14/21 08:00	07/21/21 17:01	1
Manganese	**8.6**	**B**	0.87	0.031	mg/Kg	☼	07/14/21 08:00	07/21/21 17:01	1
Molybdenum	**0.15**	**J**	2.3	0.096	mg/Kg	☼	07/14/21 08:00	07/21/21 17:01	1
Potassium	ND		290	30	mg/Kg	☼	07/14/21 08:00	07/21/21 17:01	1
Selenium	ND		0.58	0.20	mg/Kg	☼	07/14/21 08:00	07/21/21 17:01	1
Sodium	**6200**		290	150	mg/Kg	☼	07/14/21 08:00	07/21/21 17:01	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**270**		12	1.9	mg/Kg	☼	07/15/21 08:00	07/22/21 14:28	1
Antimony	ND		3.5	0.52	mg/Kg	☼	07/15/21 08:00	07/22/21 14:28	1
Arsenic	**0.61**		0.58	0.26	mg/Kg	☼	07/15/21 08:00	07/22/21 14:28	1
Calcium	**410**		290	2.6	mg/Kg	☼	07/15/21 08:00	07/22/21 14:28	1
Cobalt	**1.6**	**J**	2.9	0.062	mg/Kg	☼	07/15/21 08:00	07/22/21 14:28	1
Iron	**1800**		5.8	3.4	mg/Kg	☼	07/15/21 08:00	07/22/21 14:28	1

Client Sample ID: L-BH-03D
Date Collected: 05/24/21 11:45
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-3
Matrix: Solid
Percent Solids: 85.7

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.33	J	2.9	0.17	mg/Kg	☼	07/15/21 08:00	07/22/21 14:28	1
Manganese	19		0.87	0.15	mg/Kg	☼	07/15/21 08:00	07/22/21 14:28	1
Molybdenum	0.12	J	2.3	0.096	mg/Kg	☼	07/15/21 08:00	07/22/21 14:28	1
Potassium	ND		290	30	mg/Kg	☼	07/15/21 08:00	07/22/21 14:28	1
Selenium	ND		0.58	0.55	mg/Kg	☼	07/15/21 08:00	07/22/21 14:28	1
Sodium	360		290	150	mg/Kg	☼	07/15/21 08:00	07/22/21 14:28	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	61	J	170	27	mg/Kg	☼	07/17/21 08:14	07/22/21 16:16	5
Antimony	ND		52	4.9	mg/Kg	☼	07/17/21 08:14	07/22/21 16:16	5
Arsenic	ND		8.7	2.2	mg/Kg	☼	07/17/21 08:14	07/22/21 16:16	5
Calcium	98	J B	4400	13	mg/Kg	☼	07/17/21 08:14	07/22/21 16:16	5
Cobalt	ND		44	0.70	mg/Kg	☼	07/17/21 08:14	07/22/21 16:16	5
Iron	ND		87	51	mg/Kg	☼	07/17/21 08:14	07/22/21 16:16	5
Lithium	ND		44	2.6	mg/Kg	☼	07/17/21 08:14	07/22/21 16:16	5
Manganese	ND		13	2.2	mg/Kg	☼	07/17/21 08:14	07/22/21 16:16	5
Molybdenum	ND		35	1.5	mg/Kg	☼	07/17/21 08:14	07/22/21 16:16	5
Potassium	3000	J B	4400	500	mg/Kg	☼	07/17/21 08:14	07/22/21 16:16	5
Selenium	ND		8.7	3.0	mg/Kg	☼	07/17/21 08:14	07/22/21 16:16	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	410		12	1.9	mg/Kg	☼	07/16/21 12:00	07/22/21 18:04	1
Antimony	ND		3.5	0.33	mg/Kg	☼	07/16/21 12:00	07/22/21 18:04	1
Arsenic	1.1		0.58	0.17	mg/Kg	☼	07/16/21 12:00	07/22/21 18:04	1
Calcium	110	J	290	2.4	mg/Kg	☼	07/16/21 12:00	07/22/21 18:04	1
Cobalt	1.4	J	2.9	0.054	mg/Kg	☼	07/16/21 12:00	07/22/21 18:04	1
Iron	2900		5.8	3.4	mg/Kg	☼	07/16/21 12:00	07/22/21 18:04	1
Lithium	0.47	J	2.9	0.17	mg/Kg	☼	07/16/21 12:00	07/22/21 18:04	1
Manganese	22		0.87	0.29	mg/Kg	☼	07/16/21 12:00	07/22/21 18:04	1
Molybdenum	ND		2.3	0.12	mg/Kg	☼	07/16/21 12:00	07/22/21 18:04	1
Potassium	130	J	290	30	mg/Kg	☼	07/16/21 12:00	07/22/21 18:04	1
Selenium	ND		0.58	0.20	mg/Kg	☼	07/16/21 12:00	07/22/21 18:04	1
Sodium	18000		1500	760	mg/Kg	☼	07/16/21 12:00	07/22/21 19:24	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	24000		120	19	mg/Kg	☼	07/20/21 08:00	07/23/21 14:06	10
Antimony	0.25	J	3.5	0.16	mg/Kg	☼	07/20/21 08:00	07/23/21 15:25	1
Arsenic	ND		1.2	0.30	mg/Kg	☼	07/20/21 08:00	07/28/21 15:24	2
Calcium	2200		290	3.0	mg/Kg	☼	07/20/21 08:00	07/23/21 15:25	1
Cobalt	ND		2.9	0.030	mg/Kg	☼	07/20/21 08:00	07/23/21 15:25	1
Iron	1300		5.8	4.8	mg/Kg	☼	07/20/21 08:00	07/23/21 15:25	1
Lithium	2.0	J	2.9	0.17	mg/Kg	☼	07/20/21 08:00	07/23/21 15:25	1
Manganese	14		0.87	0.13	mg/Kg	☼	07/20/21 08:00	07/23/21 15:25	1
Molybdenum	ND		2.3	0.096	mg/Kg	☼	07/20/21 08:00	07/23/21 15:25	1
Potassium	18000		1500	58	mg/Kg	☼	07/20/21 08:00	07/28/21 15:29	5
Selenium	ND		1.2	0.40	mg/Kg	☼	07/20/21 08:00	07/28/21 15:24	2
Sodium	6400		290	50	mg/Kg	☼	07/20/21 08:00	07/23/21 15:25	1

Client Sample ID: L-BH-03D

Date Collected: 05/24/21 11:45
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-3

Matrix: Solid
Percent Solids: 85.7

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			07/29/21 21:07	1
Antimony	0.25	J	3.0	0.14	mg/Kg			07/29/21 21:07	1
Arsenic	1.7		0.50	0.13	mg/Kg			07/29/21 21:07	1
Calcium	3200		250	0.74	mg/Kg			07/29/21 21:07	1
Cobalt	4.2		2.5	0.023	mg/Kg			07/29/21 21:07	1
Iron	6300		5.0	4.1	mg/Kg			07/29/21 21:07	1
Lithium	2.8		2.5	0.15	mg/Kg			07/29/21 21:07	1
Manganese	100		0.75	0.052	mg/Kg			07/29/21 21:07	1
Molybdenum	0.26	J	2.0	0.082	mg/Kg			07/29/21 21:07	1
Potassium	21000		250	26	mg/Kg			07/29/21 21:07	1
Selenium	ND		0.50	0.17	mg/Kg			07/29/21 21:07	1
Sodium	31000		250	130	mg/Kg			07/29/21 21:07	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	800		44	5.5	mg/Kg	☼	06/28/21 08:00	07/07/21 15:55	1
Antimony	ND		6.6	0.38	mg/Kg	☼	06/28/21 08:00	07/07/21 15:55	1
Arsenic	1.6	J	2.2	0.32	mg/Kg	☼	06/28/21 08:00	07/07/21 15:55	1
Calcium	2000		550	97	mg/Kg	☼	06/28/21 08:00	07/07/21 15:55	1
Cobalt	3.1	J	5.5	0.053	mg/Kg	☼	06/28/21 08:00	07/07/21 15:55	1
Iron	3900		22	8.7	mg/Kg	☼	06/28/21 08:00	07/07/21 15:55	1
Lithium	0.94	J	5.5	0.33	mg/Kg	☼	06/28/21 08:00	07/07/21 15:55	1
Manganese	87		1.7	0.69	mg/Kg	☼	06/28/21 08:00	07/07/21 15:55	1
Molybdenum	0.29	J	4.4	0.12	mg/Kg	☼	06/28/21 08:00	07/07/21 15:55	1
Potassium	190	J	550	27	mg/Kg	☼	06/28/21 08:00	07/07/21 15:55	1
Selenium	ND		1.7	0.49	mg/Kg	☼	06/28/21 08:00	07/07/21 15:55	1
Sodium	57	J	550	40	mg/Kg	☼	06/28/21 08:00	07/07/21 15:55	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	34000		120	19	mg/Kg	☼	07/12/21 08:00	07/28/21 17:51	10
Antimony	0.48	J	3.5	0.16	mg/Kg	☼	07/12/21 08:00	07/29/21 12:04	1
Arsenic	3.0	B	0.58	0.15	mg/Kg	☼	07/12/21 08:00	07/29/21 12:04	1
Calcium	5100		2900	30	mg/Kg	☼	07/12/21 08:00	07/28/21 17:51	10
Cobalt	4.0		2.9	0.030	mg/Kg	☼	07/12/21 08:00	07/29/21 12:04	1
Iron	6300		5.8	4.8	mg/Kg	☼	07/12/21 08:00	07/29/21 12:04	1
Lithium	3.5		2.9	0.17	mg/Kg	☼	07/12/21 08:00	07/29/21 12:04	1
Manganese	160		0.87	0.13	mg/Kg	☼	07/12/21 08:00	07/29/21 12:04	1
Molybdenum	1.3	J	2.3	0.096	mg/Kg	☼	07/12/21 08:00	07/29/21 12:04	1
Potassium	22000		1500	58	mg/Kg	☼	07/12/21 08:00	07/29/21 13:34	5
Selenium	ND		0.58	0.20	mg/Kg	☼	07/12/21 08:00	07/29/21 12:04	1
Sodium	11000		290	50	mg/Kg	☼	07/12/21 08:00	07/29/21 12:04	1

Client Sample ID: L-BH-02S
Date Collected: 05/25/21 09:00
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-4
Matrix: Solid
Percent Solids: 78.4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		51	8.2	mg/Kg	☼	07/13/21 08:00	07/21/21 13:16	4
Antimony	ND		15	1.4	mg/Kg	☼	07/13/21 08:00	07/21/21 13:16	4
Arsenic	ND		2.6	0.66	mg/Kg	☼	07/13/21 08:00	07/21/21 13:16	4
Calcium	**450**	**J B**	1300	9.7	mg/Kg	☼	07/13/21 08:00	07/21/21 13:16	4
Cobalt	ND		13	0.23	mg/Kg	☼	07/13/21 08:00	07/21/21 13:16	4
Iron	ND		26	15	mg/Kg	☼	07/13/21 08:00	07/21/21 13:16	4
Lithium	ND		13	0.77	mg/Kg	☼	07/13/21 08:00	07/21/21 13:16	4
Manganese	**0.65**	**J**	3.8	0.16	mg/Kg	☼	07/13/21 08:00	07/21/21 13:16	4
Molybdenum	ND		10	0.42	mg/Kg	☼	07/13/21 08:00	07/21/21 13:16	4
Potassium	ND		1300	130	mg/Kg	☼	07/13/21 08:00	07/21/21 13:16	4
Selenium	ND		2.6	0.87	mg/Kg	☼	07/13/21 08:00	07/21/21 13:16	4
Sodium	ND		1300	660	mg/Kg	☼	07/13/21 08:00	07/21/21 13:16	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**9.1**	**J**	38	6.1	mg/Kg	☼	07/13/21 08:00	07/21/21 15:06	3
Antimony	ND		11	1.1	mg/Kg	☼	07/13/21 08:00	07/21/21 15:06	3
Arsenic	ND		1.9	0.50	mg/Kg	☼	07/13/21 08:00	07/21/21 15:06	3
Calcium	**1500**		960	8.4	mg/Kg	☼	07/13/21 08:00	07/21/21 15:06	3
Cobalt	**0.30**	**J**	9.6	0.24	mg/Kg	☼	07/13/21 08:00	07/21/21 15:06	3
Iron	**120**		19	11	mg/Kg	☼	07/13/21 08:00	07/21/21 15:06	3
Lithium	ND		9.6	0.57	mg/Kg	☼	07/13/21 08:00	07/21/21 15:06	3
Manganese	**19**		2.9	1.1	mg/Kg	☼	07/13/21 08:00	07/21/21 15:06	3
Molybdenum	ND		7.7	0.31	mg/Kg	☼	07/13/21 08:00	07/21/21 15:06	3
Potassium	**120**	**J**	960	100	mg/Kg	☼	07/13/21 08:00	07/21/21 15:06	3
Selenium	ND		1.9	0.65	mg/Kg	☼	07/13/21 08:00	07/21/21 15:06	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**43**		13	2.7	mg/Kg	☼	07/14/21 08:00	07/21/21 17:06	1
Antimony	ND		3.8	0.36	mg/Kg	☼	07/14/21 08:00	07/21/21 17:06	1
Arsenic	**0.93**		0.64	0.17	mg/Kg	☼	07/14/21 08:00	07/21/21 17:06	1
Calcium	**5.5**	**J**	320	1.9	mg/Kg	☼	07/14/21 08:00	07/21/21 17:06	1
Cobalt	**0.54**	**J**	3.2	0.057	mg/Kg	☼	07/14/21 08:00	07/21/21 17:06	1
Iron	**500**		6.4	3.7	mg/Kg	☼	07/14/21 08:00	07/21/21 17:06	1
Lithium	ND		3.2	0.19	mg/Kg	☼	07/14/21 08:00	07/21/21 17:06	1
Manganese	**5.1**	**B**	0.96	0.034	mg/Kg	☼	07/14/21 08:00	07/21/21 17:06	1
Molybdenum	ND		2.6	0.10	mg/Kg	☼	07/14/21 08:00	07/21/21 17:06	1
Potassium	ND		320	33	mg/Kg	☼	07/14/21 08:00	07/21/21 17:06	1
Selenium	ND		0.64	0.22	mg/Kg	☼	07/14/21 08:00	07/21/21 17:06	1
Sodium	**6700**		320	170	mg/Kg	☼	07/14/21 08:00	07/21/21 17:06	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**430**		13	2.0	mg/Kg	☼	07/15/21 08:00	07/22/21 14:32	1
Antimony	ND		3.8	0.57	mg/Kg	☼	07/15/21 08:00	07/22/21 14:32	1
Arsenic	**0.92**		0.64	0.28	mg/Kg	☼	07/15/21 08:00	07/22/21 14:32	1
Calcium	**1200**		320	2.8	mg/Kg	☼	07/15/21 08:00	07/22/21 14:32	1
Cobalt	**1.0**	**J**	3.2	0.068	mg/Kg	☼	07/15/21 08:00	07/22/21 14:32	1
Iron	**1500**		6.4	3.7	mg/Kg	☼	07/15/21 08:00	07/22/21 14:32	1

Client Sample ID: L-BH-02S
Date Collected: 05/25/21 09:00
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-4
Matrix: Solid
Percent Solids: 78.4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.81	J	3.2	0.19	mg/Kg	☼	07/15/21 08:00	07/22/21 14:32	1
Manganese	15		0.96	0.17	mg/Kg	☼	07/15/21 08:00	07/22/21 14:32	1
Molybdenum	ND		2.6	0.10	mg/Kg	☼	07/15/21 08:00	07/22/21 14:32	1
Potassium	50	J	320	33	mg/Kg	☼	07/15/21 08:00	07/22/21 14:32	1
Selenium	ND		0.64	0.60	mg/Kg	☼	07/15/21 08:00	07/22/21 14:32	1
Sodium	380		320	170	mg/Kg	☼	07/15/21 08:00	07/22/21 14:32	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	91	J	190	30	mg/Kg	☼	07/17/21 08:14	07/22/21 16:21	5
Antimony	ND		57	5.4	mg/Kg	☼	07/17/21 08:14	07/22/21 16:21	5
Arsenic	ND		9.6	2.4	mg/Kg	☼	07/17/21 08:14	07/22/21 16:21	5
Calcium	370	J B	4800	14	mg/Kg	☼	07/17/21 08:14	07/22/21 16:21	5
Cobalt	ND		48	0.77	mg/Kg	☼	07/17/21 08:14	07/22/21 16:21	5
Iron	ND		96	56	mg/Kg	☼	07/17/21 08:14	07/22/21 16:21	5
Lithium	ND		48	2.8	mg/Kg	☼	07/17/21 08:14	07/22/21 16:21	5
Manganese	ND		14	2.4	mg/Kg	☼	07/17/21 08:14	07/22/21 16:21	5
Molybdenum	ND		38	1.6	mg/Kg	☼	07/17/21 08:14	07/22/21 16:21	5
Potassium	3200	J B	4800	540	mg/Kg	☼	07/17/21 08:14	07/22/21 16:21	5
Selenium	ND		9.6	3.3	mg/Kg	☼	07/17/21 08:14	07/22/21 16:21	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	700		13	2.0	mg/Kg	☼	07/16/21 12:00	07/22/21 18:09	1
Antimony	ND		3.8	0.36	mg/Kg	☼	07/16/21 12:00	07/22/21 18:09	1
Arsenic	1.0		0.64	0.19	mg/Kg	☼	07/16/21 12:00	07/22/21 18:09	1
Calcium	200	J	320	2.7	mg/Kg	☼	07/16/21 12:00	07/22/21 18:09	1
Cobalt	0.72	J	3.2	0.059	mg/Kg	☼	07/16/21 12:00	07/22/21 18:09	1
Iron	2000		6.4	3.7	mg/Kg	☼	07/16/21 12:00	07/22/21 18:09	1
Lithium	0.80	J	3.2	0.19	mg/Kg	☼	07/16/21 12:00	07/22/21 18:09	1
Manganese	15		0.96	0.32	mg/Kg	☼	07/16/21 12:00	07/22/21 18:09	1
Molybdenum	ND		2.6	0.13	mg/Kg	☼	07/16/21 12:00	07/22/21 18:09	1
Potassium	240	J	320	33	mg/Kg	☼	07/16/21 12:00	07/22/21 18:09	1
Selenium	ND		0.64	0.22	mg/Kg	☼	07/16/21 12:00	07/22/21 18:09	1
Sodium	21000		1600	830	mg/Kg	☼	07/16/21 12:00	07/22/21 19:29	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	41000		130	20	mg/Kg	☼	07/20/21 08:00	07/23/21 14:11	10
Antimony	ND		3.8	0.18	mg/Kg	☼	07/20/21 08:00	07/23/21 15:30	1
Arsenic	1.6		0.64	0.17	mg/Kg	☼	07/20/21 08:00	07/23/21 15:30	1
Calcium	5000		3200	33	mg/Kg	☼	07/20/21 08:00	07/23/21 14:11	10
Cobalt	0.28	J	3.2	0.033	mg/Kg	☼	07/20/21 08:00	07/23/21 15:30	1
Iron	2300		6.4	5.2	mg/Kg	☼	07/20/21 08:00	07/23/21 15:30	1
Lithium	3.5		3.2	0.19	mg/Kg	☼	07/20/21 08:00	07/23/21 15:30	1
Manganese	42		0.96	0.14	mg/Kg	☼	07/20/21 08:00	07/23/21 15:30	1
Molybdenum	ND		2.6	0.10	mg/Kg	☼	07/20/21 08:00	07/23/21 15:30	1
Potassium	26000		1600	64	mg/Kg	☼	07/20/21 08:00	07/28/21 15:34	5
Selenium	ND		0.64	0.22	mg/Kg	☼	07/20/21 08:00	07/23/21 15:30	1
Sodium	8800		320	55	mg/Kg	☼	07/20/21 08:00	07/23/21 15:30	1

Client Sample ID: L-BH-02S

Date Collected: 05/25/21 09:00
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-4

Matrix: Solid
Percent Solids: 78.4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**43000**		10	1.6	mg/Kg			07/29/21 21:07	1
Antimony	ND		3.0	0.14	mg/Kg			07/29/21 21:07	1
Arsenic	**4.5**		0.50	0.13	mg/Kg			07/29/21 21:07	1
Calcium	**8800**		250	0.74	mg/Kg			07/29/21 21:07	1
Cobalt	**2.9**		2.5	0.023	mg/Kg			07/29/21 21:07	1
Iron	**6400**		5.0	4.1	mg/Kg			07/29/21 21:07	1
Lithium	**5.2**		2.5	0.15	mg/Kg			07/29/21 21:07	1
Manganese	**96**		0.75	0.052	mg/Kg			07/29/21 21:07	1
Molybdenum	ND		2.0	0.082	mg/Kg			07/29/21 21:07	1
Potassium	**29000**		250	26	mg/Kg			07/29/21 21:07	1
Selenium	ND		0.50	0.17	mg/Kg			07/29/21 21:07	1
Sodium	**37000**		250	130	mg/Kg			07/29/21 21:07	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**2200**		48	6.0	mg/Kg	☼	06/28/21 08:00	07/07/21 16:00	1
Antimony	ND		7.2	0.41	mg/Kg	☼	06/28/21 08:00	07/07/21 16:00	1
Arsenic	**3.0**		2.4	0.35	mg/Kg	☼	06/28/21 08:00	07/07/21 16:00	1
Calcium	**3800**		600	110	mg/Kg	☼	06/28/21 08:00	07/07/21 16:00	1
Cobalt	**3.6**	**J**	6.0	0.058	mg/Kg	☼	06/28/21 08:00	07/07/21 16:00	1
Iron	**4800**		24	9.5	mg/Kg	☼	06/28/21 08:00	07/07/21 16:00	1
Lithium	**2.7**	**J**	6.0	0.36	mg/Kg	☼	06/28/21 08:00	07/07/21 16:00	1
Manganese	**64**		1.8	0.74	mg/Kg	☼	06/28/21 08:00	07/07/21 16:00	1
Molybdenum	ND		4.8	0.13	mg/Kg	☼	06/28/21 08:00	07/07/21 16:00	1
Potassium	**450**	**J**	600	29	mg/Kg	☼	06/28/21 08:00	07/07/21 16:00	1
Selenium	ND		1.8	0.53	mg/Kg	☼	06/28/21 08:00	07/07/21 16:00	1
Sodium	**71**	**J**	600	43	mg/Kg	☼	06/28/21 08:00	07/07/21 16:00	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**54000**		130	20	mg/Kg	☼	07/12/21 08:00	07/28/21 17:56	10
Antimony	**0.63**	**J**	3.8	0.18	mg/Kg	☼	07/12/21 08:00	07/29/21 12:09	1
Arsenic	**4.8**	**B**	0.64	0.17	mg/Kg	☼	07/12/21 08:00	07/29/21 12:09	1
Calcium	**12000**		3200	33	mg/Kg	☼	07/12/21 08:00	07/28/21 17:56	10
Cobalt	**3.9**		3.2	0.033	mg/Kg	☼	07/12/21 08:00	07/29/21 12:09	1
Iron	**8000**		6.4	5.2	mg/Kg	☼	07/12/21 08:00	07/29/21 12:09	1
Lithium	**7.2**		3.2	0.19	mg/Kg	☼	07/12/21 08:00	07/29/21 12:09	1
Manganese	**140**		0.96	0.14	mg/Kg	☼	07/12/21 08:00	07/29/21 12:09	1
Molybdenum	**0.21**	**J**	2.6	0.10	mg/Kg	☼	07/12/21 08:00	07/29/21 12:09	1
Potassium	**29000**		1600	64	mg/Kg	☼	07/12/21 08:00	07/29/21 13:39	5
Selenium	ND		0.64	0.22	mg/Kg	☼	07/12/21 08:00	07/29/21 12:09	1
Sodium	**17000**		1600	270	mg/Kg	☼	07/12/21 08:00	07/29/21 13:39	5

Client Sample ID: L-BH-02M

Date Collected: 05/25/21 10:25
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-5

Matrix: Solid
Percent Solids: 74.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		54	8.6	mg/Kg	☼	07/13/21 08:00	07/21/21 13:21	4
Antimony	ND		16	1.5	mg/Kg	☼	07/13/21 08:00	07/21/21 13:21	4
Arsenic	ND		2.7	0.70	mg/Kg	☼	07/13/21 08:00	07/21/21 13:21	4
Calcium	**2200**	**B**	1300	10	mg/Kg	☼	07/13/21 08:00	07/21/21 13:21	4
Cobalt	ND		13	0.24	mg/Kg	☼	07/13/21 08:00	07/21/21 13:21	4
Iron	ND		27	16	mg/Kg	☼	07/13/21 08:00	07/21/21 13:21	4
Lithium	ND		13	0.80	mg/Kg	☼	07/13/21 08:00	07/21/21 13:21	4
Manganese	**7.3**		4.0	0.17	mg/Kg	☼	07/13/21 08:00	07/21/21 13:21	4
Molybdenum	ND		11	0.44	mg/Kg	☼	07/13/21 08:00	07/21/21 13:21	4
Potassium	ND		1300	140	mg/Kg	☼	07/13/21 08:00	07/21/21 13:21	4
Selenium	ND		2.7	0.91	mg/Kg	☼	07/13/21 08:00	07/21/21 13:21	4
Sodium	ND		1300	700	mg/Kg	☼	07/13/21 08:00	07/21/21 13:21	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**17**	**J**	40	6.4	mg/Kg	☼	07/13/21 08:00	07/21/21 15:11	3
Antimony	ND		12	1.1	mg/Kg	☼	07/13/21 08:00	07/21/21 15:11	3
Arsenic	ND		2.0	0.52	mg/Kg	☼	07/13/21 08:00	07/21/21 15:11	3
Calcium	**6800**		1000	8.9	mg/Kg	☼	07/13/21 08:00	07/21/21 15:11	3
Cobalt	**1.2**	**J**	10	0.25	mg/Kg	☼	07/13/21 08:00	07/21/21 15:11	3
Iron	**860**		20	12	mg/Kg	☼	07/13/21 08:00	07/21/21 15:11	3
Lithium	ND		10	0.60	mg/Kg	☼	07/13/21 08:00	07/21/21 15:11	3
Manganese	**160**		3.0	1.1	mg/Kg	☼	07/13/21 08:00	07/21/21 15:11	3
Molybdenum	ND		8.0	0.33	mg/Kg	☼	07/13/21 08:00	07/21/21 15:11	3
Potassium	**180**	**J**	1000	100	mg/Kg	☼	07/13/21 08:00	07/21/21 15:11	3
Selenium	ND		2.0	0.68	mg/Kg	☼	07/13/21 08:00	07/21/21 15:11	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**190**		13	2.8	mg/Kg	☼	07/14/21 08:00	07/21/21 17:10	1
Antimony	ND		4.0	0.38	mg/Kg	☼	07/14/21 08:00	07/21/21 17:10	1
Arsenic	**3.4**		0.67	0.17	mg/Kg	☼	07/14/21 08:00	07/21/21 17:10	1
Calcium	**7.3**	**J**	340	2.0	mg/Kg	☼	07/14/21 08:00	07/21/21 17:10	1
Cobalt	**1.0**	**J**	3.4	0.060	mg/Kg	☼	07/14/21 08:00	07/21/21 17:10	1
Iron	**3400**		6.7	3.9	mg/Kg	☼	07/14/21 08:00	07/21/21 17:10	1
Lithium	ND		3.4	0.20	mg/Kg	☼	07/14/21 08:00	07/21/21 17:10	1
Manganese	**53**	**B**	1.0	0.036	mg/Kg	☼	07/14/21 08:00	07/21/21 17:10	1
Molybdenum	**0.25**	**J**	2.7	0.11	mg/Kg	☼	07/14/21 08:00	07/21/21 17:10	1
Potassium	**75**	**J**	340	35	mg/Kg	☼	07/14/21 08:00	07/21/21 17:10	1
Selenium	ND		0.67	0.23	mg/Kg	☼	07/14/21 08:00	07/21/21 17:10	1
Sodium	**11000**		340	170	mg/Kg	☼	07/14/21 08:00	07/21/21 17:10	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1100**		13	2.1	mg/Kg	☼	07/15/21 08:00	07/22/21 14:37	1
Antimony	ND		4.0	0.60	mg/Kg	☼	07/15/21 08:00	07/22/21 14:37	1
Arsenic	**1.4**		0.67	0.30	mg/Kg	☼	07/15/21 08:00	07/22/21 14:37	1
Calcium	**3800**		340	3.0	mg/Kg	☼	07/15/21 08:00	07/22/21 14:37	1
Cobalt	**1.3**	**J**	3.4	0.071	mg/Kg	☼	07/15/21 08:00	07/22/21 14:37	1
Iron	**2800**		6.7	3.9	mg/Kg	☼	07/15/21 08:00	07/22/21 14:37	1

Client: Golder Associates Inc.
Project/Site: Labadie Energy Center - Missouri

Job ID: 140-23290-1

Client Sample ID: L-BH-02M
Date Collected: 05/25/21 10:25
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-5
Matrix: Solid
Percent Solids: 74.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	2.8	J	3.4	0.20	mg/Kg	☼	07/15/21 08:00	07/22/21 14:37	1
Manganese	35		1.0	0.17	mg/Kg	☼	07/15/21 08:00	07/22/21 14:37	1
Molybdenum	0.12	J	2.7	0.11	mg/Kg	☼	07/15/21 08:00	07/22/21 14:37	1
Potassium	120	J	340	35	mg/Kg	☼	07/15/21 08:00	07/22/21 14:37	1
Selenium	ND		0.67	0.63	mg/Kg	☼	07/15/21 08:00	07/22/21 14:37	1
Sodium	1200		340	170	mg/Kg	☼	07/15/21 08:00	07/22/21 14:37	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	62	J	200	32	mg/Kg	☼	07/17/21 08:14	07/22/21 16:26	5
Antimony	ND		60	5.6	mg/Kg	☼	07/17/21 08:14	07/22/21 16:26	5
Arsenic	ND		10	2.5	mg/Kg	☼	07/17/21 08:14	07/22/21 16:26	5
Calcium	3600	J B	5000	15	mg/Kg	☼	07/17/21 08:14	07/22/21 16:26	5
Cobalt	ND		50	0.80	mg/Kg	☼	07/17/21 08:14	07/22/21 16:26	5
Iron	ND		100	59	mg/Kg	☼	07/17/21 08:14	07/22/21 16:26	5
Lithium	ND		50	3.0	mg/Kg	☼	07/17/21 08:14	07/22/21 16:26	5
Manganese	9.9	J	15	2.5	mg/Kg	☼	07/17/21 08:14	07/22/21 16:26	5
Molybdenum	ND		40	1.7	mg/Kg	☼	07/17/21 08:14	07/22/21 16:26	5
Potassium	3200	J B	5000	570	mg/Kg	☼	07/17/21 08:14	07/22/21 16:26	5
Selenium	ND		10	3.5	mg/Kg	☼	07/17/21 08:14	07/22/21 16:26	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	3100		13	2.1	mg/Kg	☼	07/16/21 12:00	07/22/21 18:13	1
Antimony	ND		4.0	0.38	mg/Kg	☼	07/16/21 12:00	07/22/21 18:13	1
Arsenic	1.0		0.67	0.20	mg/Kg	☼	07/16/21 12:00	07/22/21 18:13	1
Calcium	1300		340	2.8	mg/Kg	☼	07/16/21 12:00	07/22/21 18:13	1
Cobalt	1.2	J	3.4	0.062	mg/Kg	☼	07/16/21 12:00	07/22/21 18:13	1
Iron	4400		6.7	3.9	mg/Kg	☼	07/16/21 12:00	07/22/21 18:13	1
Lithium	3.4		3.4	0.20	mg/Kg	☼	07/16/21 12:00	07/22/21 18:13	1
Manganese	33		1.0	0.34	mg/Kg	☼	07/16/21 12:00	07/22/21 18:13	1
Molybdenum	ND		2.7	0.13	mg/Kg	☼	07/16/21 12:00	07/22/21 18:13	1
Potassium	940		340	35	mg/Kg	☼	07/16/21 12:00	07/22/21 18:13	1
Selenium	ND		0.67	0.23	mg/Kg	☼	07/16/21 12:00	07/22/21 18:13	1
Sodium	34000		1700	870	mg/Kg	☼	07/16/21 12:00	07/22/21 19:48	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	36000		130	21	mg/Kg	☼	07/20/21 08:00	07/23/21 14:16	10
Antimony	1.1	J	4.0	0.19	mg/Kg	☼	07/20/21 08:00	07/23/21 15:49	1
Arsenic	2.0		0.67	0.17	mg/Kg	☼	07/20/21 08:00	07/23/21 15:49	1
Calcium	4000		3400	35	mg/Kg	☼	07/20/21 08:00	07/23/21 14:16	10
Cobalt	1.2	J	6.7	0.070	mg/Kg	☼	07/20/21 08:00	07/28/21 15:39	2
Iron	6500		6.7	5.5	mg/Kg	☼	07/20/21 08:00	07/23/21 15:49	1
Lithium	10		3.4	0.20	mg/Kg	☼	07/20/21 08:00	07/23/21 15:49	1
Manganese	67		1.0	0.15	mg/Kg	☼	07/20/21 08:00	07/23/21 15:49	1
Molybdenum	0.22	J	2.7	0.11	mg/Kg	☼	07/20/21 08:00	07/23/21 15:49	1
Potassium	17000		1700	67	mg/Kg	☼	07/20/21 08:00	07/28/21 15:44	5
Selenium	0.28	J	0.67	0.23	mg/Kg	☼	07/20/21 08:00	07/23/21 15:49	1
Sodium	10000		340	58	mg/Kg	☼	07/20/21 08:00	07/23/21 15:49	1

Client Sample ID: L-BH-02M

Date Collected: 05/25/21 10:25
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-5

Matrix: Solid
Percent Solids: 74.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	40000		10	1.6	mg/Kg			07/29/21 21:07	1
Antimony	1.1	J	3.0	0.14	mg/Kg			07/29/21 21:07	1
Arsenic	7.7		0.50	0.13	mg/Kg			07/29/21 21:07	1
Calcium	22000		250	0.74	mg/Kg			07/29/21 21:07	1
Cobalt	5.8		2.5	0.023	mg/Kg			07/29/21 21:07	1
Iron	18000		5.0	4.1	mg/Kg			07/29/21 21:07	1
Lithium	16		2.5	0.15	mg/Kg			07/29/21 21:07	1
Manganese	370		0.75	0.052	mg/Kg			07/29/21 21:07	1
Molybdenum	0.59	J	2.0	0.082	mg/Kg			07/29/21 21:07	1
Potassium	22000		250	26	mg/Kg			07/29/21 21:07	1
Selenium	0.28	J	0.50	0.17	mg/Kg			07/29/21 21:07	1
Sodium	56000		250	130	mg/Kg			07/29/21 21:07	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	6500		53	6.6	mg/Kg	☼	06/28/21 08:00	07/07/21 16:05	1
Antimony	ND		7.9	0.45	mg/Kg	☼	06/28/21 08:00	07/07/21 16:05	1
Arsenic	6.1		2.6	0.38	mg/Kg	☼	06/28/21 08:00	07/07/21 16:05	1
Calcium	14000		660	120	mg/Kg	☼	06/28/21 08:00	07/07/21 16:05	1
Cobalt	5.0	J	6.6	0.063	mg/Kg	☼	06/28/21 08:00	07/07/21 16:05	1
Iron	10000		26	10	mg/Kg	☼	06/28/21 08:00	07/07/21 16:05	1
Lithium	8.0		6.6	0.39	mg/Kg	☼	06/28/21 08:00	07/07/21 16:05	1
Manganese	230		2.0	0.81	mg/Kg	☼	06/28/21 08:00	07/07/21 16:05	1
Molybdenum	0.35	J	5.3	0.14	mg/Kg	☼	06/28/21 08:00	07/07/21 16:05	1
Potassium	1600		660	32	mg/Kg	☼	06/28/21 08:00	07/07/21 16:05	1
Selenium	ND		2.0	0.58	mg/Kg	☼	06/28/21 08:00	07/07/21 16:05	1
Sodium	160	J	660	47	mg/Kg	☼	06/28/21 08:00	07/07/21 16:05	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	64000		130	21	mg/Kg	☼	07/12/21 08:00	07/28/21 18:01	10
Antimony	1.1	J	4.0	0.19	mg/Kg	☼	07/12/21 08:00	07/29/21 12:15	1
Arsenic	9.6	B	0.67	0.17	mg/Kg	☼	07/12/21 08:00	07/29/21 12:15	1
Calcium	30000		3400	35	mg/Kg	☼	07/12/21 08:00	07/28/21 18:01	10
Cobalt	8.1		6.7	0.070	mg/Kg	☼	07/12/21 08:00	07/29/21 13:58	2
Iron	19000		6.7	5.5	mg/Kg	☼	07/12/21 08:00	07/29/21 12:15	1
Lithium	21		3.4	0.20	mg/Kg	☼	07/12/21 08:00	07/29/21 12:15	1
Manganese	410		1.0	0.15	mg/Kg	☼	07/12/21 08:00	07/29/21 12:15	1
Molybdenum	0.82	J	2.7	0.11	mg/Kg	☼	07/12/21 08:00	07/29/21 12:15	1
Potassium	25000		1700	67	mg/Kg	☼	07/12/21 08:00	07/29/21 14:03	5
Selenium	ND		0.67	0.23	mg/Kg	☼	07/12/21 08:00	07/29/21 12:15	1
Sodium	11000		340	58	mg/Kg	☼	07/12/21 08:00	07/29/21 12:15	1

Client Sample ID: L-BH-02D

Date Collected: 05/25/21 10:25
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-6

Matrix: Solid
Percent Solids: 81.6

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		49	7.8	mg/Kg	☼	07/13/21 08:00	07/21/21 13:26	4
Antimony	ND		15	1.4	mg/Kg	☼	07/13/21 08:00	07/21/21 13:26	4
Arsenic	ND		2.4	0.64	mg/Kg	☼	07/13/21 08:00	07/21/21 13:26	4
Calcium	**320**	**J B**	1200	9.3	mg/Kg	☼	07/13/21 08:00	07/21/21 13:26	4
Cobalt	ND		12	0.22	mg/Kg	☼	07/13/21 08:00	07/21/21 13:26	4
Iron	ND		24	14	mg/Kg	☼	07/13/21 08:00	07/21/21 13:26	4
Lithium	ND		12	0.73	mg/Kg	☼	07/13/21 08:00	07/21/21 13:26	4
Manganese	**0.91**	**J**	3.7	0.15	mg/Kg	☼	07/13/21 08:00	07/21/21 13:26	4
Molybdenum	ND		9.8	0.40	mg/Kg	☼	07/13/21 08:00	07/21/21 13:26	4
Potassium	ND		1200	130	mg/Kg	☼	07/13/21 08:00	07/21/21 13:26	4
Selenium	ND		2.4	0.83	mg/Kg	☼	07/13/21 08:00	07/21/21 13:26	4
Sodium	ND		1200	640	mg/Kg	☼	07/13/21 08:00	07/21/21 13:26	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**11**	**J**	37	5.9	mg/Kg	☼	07/13/21 08:00	07/21/21 15:16	3
Antimony	ND		11	1.0	mg/Kg	☼	07/13/21 08:00	07/21/21 15:16	3
Arsenic	ND		1.8	0.48	mg/Kg	☼	07/13/21 08:00	07/21/21 15:16	3
Calcium	**1300**		920	8.1	mg/Kg	☼	07/13/21 08:00	07/21/21 15:16	3
Cobalt	ND		9.2	0.23	mg/Kg	☼	07/13/21 08:00	07/21/21 15:16	3
Iron	**190**		18	11	mg/Kg	☼	07/13/21 08:00	07/21/21 15:16	3
Lithium	ND		9.2	0.55	mg/Kg	☼	07/13/21 08:00	07/21/21 15:16	3
Manganese	**23**		2.8	1.0	mg/Kg	☼	07/13/21 08:00	07/21/21 15:16	3
Molybdenum	ND		7.3	0.30	mg/Kg	☼	07/13/21 08:00	07/21/21 15:16	3
Potassium	**100**	**J**	920	96	mg/Kg	☼	07/13/21 08:00	07/21/21 15:16	3
Selenium	ND		1.8	0.62	mg/Kg	☼	07/13/21 08:00	07/21/21 15:16	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**47**		12	2.6	mg/Kg	☼	07/14/21 08:00	07/21/21 17:15	1
Antimony	ND		3.7	0.34	mg/Kg	☼	07/14/21 08:00	07/21/21 17:15	1
Arsenic	**0.47**	**J**	0.61	0.16	mg/Kg	☼	07/14/21 08:00	07/21/21 17:15	1
Calcium	**5.2**	**J**	310	1.8	mg/Kg	☼	07/14/21 08:00	07/21/21 17:15	1
Cobalt	**0.39**	**J**	3.1	0.055	mg/Kg	☼	07/14/21 08:00	07/21/21 17:15	1
Iron	**600**		6.1	3.6	mg/Kg	☼	07/14/21 08:00	07/21/21 17:15	1
Lithium	ND		3.1	0.18	mg/Kg	☼	07/14/21 08:00	07/21/21 17:15	1
Manganese	**15**	**B**	0.92	0.033	mg/Kg	☼	07/14/21 08:00	07/21/21 17:15	1
Molybdenum	ND		2.4	0.10	mg/Kg	☼	07/14/21 08:00	07/21/21 17:15	1
Potassium	ND		310	32	mg/Kg	☼	07/14/21 08:00	07/21/21 17:15	1
Selenium	ND		0.61	0.21	mg/Kg	☼	07/14/21 08:00	07/21/21 17:15	1
Sodium	**6700**		310	160	mg/Kg	☼	07/14/21 08:00	07/21/21 17:15	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**360**		12	2.0	mg/Kg	☼	07/15/21 08:00	07/22/21 14:42	1
Antimony	ND		3.7	0.55	mg/Kg	☼	07/15/21 08:00	07/22/21 14:42	1
Arsenic	**0.50**	**J**	0.61	0.27	mg/Kg	☼	07/15/21 08:00	07/22/21 14:42	1
Calcium	**1400**		310	2.7	mg/Kg	☼	07/15/21 08:00	07/22/21 14:42	1
Cobalt	**0.63**	**J**	3.1	0.065	mg/Kg	☼	07/15/21 08:00	07/22/21 14:42	1
Iron	**1000**		6.1	3.6	mg/Kg	☼	07/15/21 08:00	07/22/21 14:42	1

Client Sample ID: L-BH-02D

Date Collected: 05/25/21 10:25
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-6

Matrix: Solid
Percent Solids: 81.6

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.71	J	3.1	0.18	mg/Kg	☼	07/15/21 08:00	07/22/21 14:42	1
Manganese	13		0.92	0.16	mg/Kg	☼	07/15/21 08:00	07/22/21 14:42	1
Molybdenum	ND		2.4	0.10	mg/Kg	☼	07/15/21 08:00	07/22/21 14:42	1
Potassium	42	J	310	32	mg/Kg	☼	07/15/21 08:00	07/22/21 14:42	1
Selenium	ND		0.61	0.58	mg/Kg	☼	07/15/21 08:00	07/22/21 14:42	1
Sodium	390		310	160	mg/Kg	☼	07/15/21 08:00	07/22/21 14:42	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	74	J	180	29	mg/Kg	☼	07/17/21 08:14	07/22/21 16:31	5
Antimony	ND		55	5.1	mg/Kg	☼	07/17/21 08:14	07/22/21 16:31	5
Arsenic	ND		9.2	2.3	mg/Kg	☼	07/17/21 08:14	07/22/21 16:31	5
Calcium	850	J B	4600	13	mg/Kg	☼	07/17/21 08:14	07/22/21 16:31	5
Cobalt	ND		46	0.73	mg/Kg	☼	07/17/21 08:14	07/22/21 16:31	5
Iron	ND		92	54	mg/Kg	☼	07/17/21 08:14	07/22/21 16:31	5
Lithium	ND		46	2.7	mg/Kg	☼	07/17/21 08:14	07/22/21 16:31	5
Manganese	ND		14	2.3	mg/Kg	☼	07/17/21 08:14	07/22/21 16:31	5
Molybdenum	ND		37	1.5	mg/Kg	☼	07/17/21 08:14	07/22/21 16:31	5
Potassium	3100	J B	4600	520	mg/Kg	☼	07/17/21 08:14	07/22/21 16:31	5
Selenium	ND		9.2	3.2	mg/Kg	☼	07/17/21 08:14	07/22/21 16:31	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	720		12	2.0	mg/Kg	☼	07/16/21 12:00	07/22/21 18:18	1
Antimony	ND		3.7	0.34	mg/Kg	☼	07/16/21 12:00	07/22/21 18:18	1
Arsenic	0.86		0.61	0.18	mg/Kg	☼	07/16/21 12:00	07/22/21 18:18	1
Calcium	250	J	310	2.6	mg/Kg	☼	07/16/21 12:00	07/22/21 18:18	1
Cobalt	0.53	J	3.1	0.056	mg/Kg	☼	07/16/21 12:00	07/22/21 18:18	1
Iron	1700		6.1	3.6	mg/Kg	☼	07/16/21 12:00	07/22/21 18:18	1
Lithium	0.89	J	3.1	0.18	mg/Kg	☼	07/16/21 12:00	07/22/21 18:18	1
Manganese	14		0.92	0.31	mg/Kg	☼	07/16/21 12:00	07/22/21 18:18	1
Molybdenum	ND		2.4	0.12	mg/Kg	☼	07/16/21 12:00	07/22/21 18:18	1
Potassium	250	J	310	32	mg/Kg	☼	07/16/21 12:00	07/22/21 18:18	1
Selenium	ND		0.61	0.21	mg/Kg	☼	07/16/21 12:00	07/22/21 18:18	1
Sodium	23000		1500	800	mg/Kg	☼	07/16/21 12:00	07/22/21 19:53	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	37000		120	20	mg/Kg	☼	07/20/21 08:00	07/23/21 14:21	10
Antimony	0.45	J	3.7	0.17	mg/Kg	☼	07/20/21 08:00	07/23/21 15:54	1
Arsenic	1.5		1.2	0.32	mg/Kg	☼	07/20/21 08:00	07/28/21 15:48	2
Calcium	6600		3100	32	mg/Kg	☼	07/20/21 08:00	07/23/21 14:21	10
Cobalt	0.30	J	3.1	0.032	mg/Kg	☼	07/20/21 08:00	07/23/21 15:54	1
Iron	2400		6.1	5.0	mg/Kg	☼	07/20/21 08:00	07/23/21 15:54	1
Lithium	4.4		3.1	0.18	mg/Kg	☼	07/20/21 08:00	07/23/21 15:54	1
Manganese	47		0.92	0.13	mg/Kg	☼	07/20/21 08:00	07/23/21 15:54	1
Molybdenum	0.10	J	2.4	0.10	mg/Kg	☼	07/20/21 08:00	07/23/21 15:54	1
Potassium	19000		1500	61	mg/Kg	☼	07/20/21 08:00	07/28/21 15:54	5
Selenium	ND		1.2	0.42	mg/Kg	☼	07/20/21 08:00	07/28/21 15:48	2
Sodium	9500		310	53	mg/Kg	☼	07/20/21 08:00	07/23/21 15:54	1

Client Sample ID: L-BH-02D

Date Collected: 05/25/21 10:25
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-6

Matrix: Solid
Percent Solids: 81.6

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	39000		10	1.6	mg/Kg			07/29/21 21:07	1
Antimony	0.45	J	3.0	0.14	mg/Kg			07/29/21 21:07	1
Arsenic	3.4		0.50	0.13	mg/Kg			07/29/21 21:07	1
Calcium	11000		250	0.74	mg/Kg			07/29/21 21:07	1
Cobalt	1.8	J	2.5	0.023	mg/Kg			07/29/21 21:07	1
Iron	5900		5.0	4.1	mg/Kg			07/29/21 21:07	1
Lithium	6.0		2.5	0.15	mg/Kg			07/29/21 21:07	1
Manganese	110		0.75	0.052	mg/Kg			07/29/21 21:07	1
Molybdenum	0.10	J	2.0	0.082	mg/Kg			07/29/21 21:07	1
Potassium	22000		250	26	mg/Kg			07/29/21 21:07	1
Selenium	ND		0.50	0.17	mg/Kg			07/29/21 21:07	1
Sodium	40000		250	130	mg/Kg			07/29/21 21:07	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	1700		47	5.9	mg/Kg	☼	06/28/21 08:00	07/07/21 16:10	1
Antimony	ND		7.1	0.40	mg/Kg	☼	06/28/21 08:00	07/07/21 16:10	1
Arsenic	2.1	J	2.4	0.34	mg/Kg	☼	06/28/21 08:00	07/07/21 16:10	1
Calcium	3800		590	100	mg/Kg	☼	06/28/21 08:00	07/07/21 16:10	1
Cobalt	1.8	J	5.9	0.057	mg/Kg	☼	06/28/21 08:00	07/07/21 16:10	1
Iron	3400		24	9.4	mg/Kg	☼	06/28/21 08:00	07/07/21 16:10	1
Lithium	2.0	J	5.9	0.36	mg/Kg	☼	06/28/21 08:00	07/07/21 16:10	1
Manganese	63		1.8	0.74	mg/Kg	☼	06/28/21 08:00	07/07/21 16:10	1
Molybdenum	ND		4.7	0.13	mg/Kg	☼	06/28/21 08:00	07/07/21 16:10	1
Potassium	380	J	590	28	mg/Kg	☼	06/28/21 08:00	07/07/21 16:10	1
Selenium	ND		1.8	0.52	mg/Kg	☼	06/28/21 08:00	07/07/21 16:10	1
Sodium	71	J	590	43	mg/Kg	☼	06/28/21 08:00	07/07/21 16:10	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	41000		120	20	mg/Kg	☼	07/12/21 08:00	07/28/21 18:06	10
Antimony	0.41	J	3.7	0.17	mg/Kg	☼	07/12/21 08:00	07/29/21 12:20	1
Arsenic	4.4	B	0.61	0.16	mg/Kg	☼	07/12/21 08:00	07/29/21 12:20	1
Calcium	13000		3100	32	mg/Kg	☼	07/12/21 08:00	07/28/21 18:06	10
Cobalt	2.6	J	3.1	0.032	mg/Kg	☼	07/12/21 08:00	07/29/21 12:20	1
Iron	6800		6.1	5.0	mg/Kg	☼	07/12/21 08:00	07/29/21 12:20	1
Lithium	6.7		3.1	0.18	mg/Kg	☼	07/12/21 08:00	07/29/21 12:20	1
Manganese	150		0.92	0.13	mg/Kg	☼	07/12/21 08:00	07/29/21 12:20	1
Molybdenum	0.29	J	2.4	0.10	mg/Kg	☼	07/12/21 08:00	07/29/21 12:20	1
Potassium	18000		1500	61	mg/Kg	☼	07/12/21 08:00	07/29/21 14:08	5
Selenium	ND		0.61	0.21	mg/Kg	☼	07/12/21 08:00	07/29/21 12:20	1
Sodium	11000		310	53	mg/Kg	☼	07/12/21 08:00	07/29/21 12:20	1

Client Sample ID: L-BH-01S
Date Collected: 05/26/21 08:10
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-7
Matrix: Solid
Percent Solids: 76.3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		52	8.4	mg/Kg	☼	07/13/21 08:00	07/21/21 13:31	4
Antimony	ND		16	1.5	mg/Kg	☼	07/13/21 08:00	07/21/21 13:31	4
Arsenic	ND		2.6	0.68	mg/Kg	☼	07/13/21 08:00	07/21/21 13:31	4
Calcium	**740**	**J B**	1300	10	mg/Kg	☼	07/13/21 08:00	07/21/21 13:31	4
Cobalt	ND		13	0.24	mg/Kg	☼	07/13/21 08:00	07/21/21 13:31	4
Iron	ND		26	15	mg/Kg	☼	07/13/21 08:00	07/21/21 13:31	4
Lithium	ND		13	0.79	mg/Kg	☼	07/13/21 08:00	07/21/21 13:31	4
Manganese	**0.55**	**J**	3.9	0.16	mg/Kg	☼	07/13/21 08:00	07/21/21 13:31	4
Molybdenum	ND		10	0.43	mg/Kg	☼	07/13/21 08:00	07/21/21 13:31	4
Potassium	ND		1300	140	mg/Kg	☼	07/13/21 08:00	07/21/21 13:31	4
Selenium	ND		2.6	0.89	mg/Kg	☼	07/13/21 08:00	07/21/21 13:31	4
Sodium	ND		1300	680	mg/Kg	☼	07/13/21 08:00	07/21/21 13:31	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**6.6**	**J**	39	6.3	mg/Kg	☼	07/13/21 08:00	07/21/21 15:21	3
Antimony	ND		12	1.1	mg/Kg	☼	07/13/21 08:00	07/21/21 15:21	3
Arsenic	ND		2.0	0.51	mg/Kg	☼	07/13/21 08:00	07/21/21 15:21	3
Calcium	**1800**		980	8.6	mg/Kg	☼	07/13/21 08:00	07/21/21 15:21	3
Cobalt	**0.46**	**J**	9.8	0.25	mg/Kg	☼	07/13/21 08:00	07/21/21 15:21	3
Iron	**14**	**J**	20	11	mg/Kg	☼	07/13/21 08:00	07/21/21 15:21	3
Lithium	ND		9.8	0.59	mg/Kg	☼	07/13/21 08:00	07/21/21 15:21	3
Manganese	**16**		2.9	1.1	mg/Kg	☼	07/13/21 08:00	07/21/21 15:21	3
Molybdenum	ND		7.9	0.32	mg/Kg	☼	07/13/21 08:00	07/21/21 15:21	3
Potassium	**110**	**J**	980	100	mg/Kg	☼	07/13/21 08:00	07/21/21 15:21	3
Selenium	ND		2.0	0.67	mg/Kg	☼	07/13/21 08:00	07/21/21 15:21	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**36**		13	2.8	mg/Kg	☼	07/14/21 08:00	07/21/21 17:20	1
Antimony	ND		3.9	0.37	mg/Kg	☼	07/14/21 08:00	07/21/21 17:20	1
Arsenic	**1.6**		0.65	0.17	mg/Kg	☼	07/14/21 08:00	07/21/21 17:20	1
Calcium	**6.4**	**J**	330	2.0	mg/Kg	☼	07/14/21 08:00	07/21/21 17:20	1
Cobalt	**0.91**	**J**	3.3	0.059	mg/Kg	☼	07/14/21 08:00	07/21/21 17:20	1
Iron	**560**		6.5	3.8	mg/Kg	☼	07/14/21 08:00	07/21/21 17:20	1
Lithium	ND		3.3	0.20	mg/Kg	☼	07/14/21 08:00	07/21/21 17:20	1
Manganese	**4.6**	**B**	0.98	0.035	mg/Kg	☼	07/14/21 08:00	07/21/21 17:20	1
Molybdenum	ND		2.6	0.11	mg/Kg	☼	07/14/21 08:00	07/21/21 17:20	1
Potassium	ND		330	34	mg/Kg	☼	07/14/21 08:00	07/21/21 17:20	1
Selenium	ND		0.65	0.22	mg/Kg	☼	07/14/21 08:00	07/21/21 17:20	1
Sodium	**7100**		330	170	mg/Kg	☼	07/14/21 08:00	07/21/21 17:20	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**410**		13	2.1	mg/Kg	☼	07/15/21 08:00	07/22/21 14:47	1
Antimony	ND		3.9	0.59	mg/Kg	☼	07/15/21 08:00	07/22/21 14:47	1
Arsenic	**1.1**		0.65	0.29	mg/Kg	☼	07/15/21 08:00	07/22/21 14:47	1
Calcium	**1200**		330	2.9	mg/Kg	☼	07/15/21 08:00	07/22/21 14:47	1
Cobalt	**1.3**	**J**	3.3	0.069	mg/Kg	☼	07/15/21 08:00	07/22/21 14:47	1
Iron	**1700**		6.5	3.8	mg/Kg	☼	07/15/21 08:00	07/22/21 14:47	1

Client Sample ID: L-BH-01S

Date Collected: 05/26/21 08:10
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-7

Matrix: Solid
Percent Solids: 76.3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.80	J	3.3	0.20	mg/Kg	☼	07/15/21 08:00	07/22/21 14:47	1
Manganese	16		0.98	0.17	mg/Kg	☼	07/15/21 08:00	07/22/21 14:47	1
Molybdenum	ND		2.6	0.11	mg/Kg	☼	07/15/21 08:00	07/22/21 14:47	1
Potassium	39	J	330	34	mg/Kg	☼	07/15/21 08:00	07/22/21 14:47	1
Selenium	ND		0.65	0.62	mg/Kg	☼	07/15/21 08:00	07/22/21 14:47	1
Sodium	420		330	170	mg/Kg	☼	07/15/21 08:00	07/22/21 14:47	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	130	J	200	31	mg/Kg	☼	07/17/21 08:14	07/22/21 16:36	5
Antimony	ND		59	5.5	mg/Kg	☼	07/17/21 08:14	07/22/21 16:36	5
Arsenic	ND		9.8	2.5	mg/Kg	☼	07/17/21 08:14	07/22/21 16:36	5
Calcium	480	J B	4900	14	mg/Kg	☼	07/17/21 08:14	07/22/21 16:36	5
Cobalt	ND		49	0.79	mg/Kg	☼	07/17/21 08:14	07/22/21 16:36	5
Iron	ND		98	58	mg/Kg	☼	07/17/21 08:14	07/22/21 16:36	5
Lithium	ND		49	2.9	mg/Kg	☼	07/17/21 08:14	07/22/21 16:36	5
Manganese	ND		15	2.4	mg/Kg	☼	07/17/21 08:14	07/22/21 16:36	5
Molybdenum	ND		39	1.6	mg/Kg	☼	07/17/21 08:14	07/22/21 16:36	5
Potassium	3300	J B	4900	560	mg/Kg	☼	07/17/21 08:14	07/22/21 16:36	5
Selenium	ND		9.8	3.4	mg/Kg	☼	07/17/21 08:14	07/22/21 16:36	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	740		13	2.1	mg/Kg	☼	07/16/21 12:00	07/22/21 18:23	1
Antimony	ND		3.9	0.37	mg/Kg	☼	07/16/21 12:00	07/22/21 18:23	1
Arsenic	0.80		0.65	0.20	mg/Kg	☼	07/16/21 12:00	07/22/21 18:23	1
Calcium	150	J	330	2.8	mg/Kg	☼	07/16/21 12:00	07/22/21 18:23	1
Cobalt	0.62	J	3.3	0.060	mg/Kg	☼	07/16/21 12:00	07/22/21 18:23	1
Iron	2300		6.5	3.8	mg/Kg	☼	07/16/21 12:00	07/22/21 18:23	1
Lithium	0.97	J	3.3	0.20	mg/Kg	☼	07/16/21 12:00	07/22/21 18:23	1
Manganese	18		0.98	0.33	mg/Kg	☼	07/16/21 12:00	07/22/21 18:23	1
Molybdenum	ND		2.6	0.13	mg/Kg	☼	07/16/21 12:00	07/22/21 18:23	1
Potassium	240	J	330	34	mg/Kg	☼	07/16/21 12:00	07/22/21 18:23	1
Selenium	ND		0.65	0.22	mg/Kg	☼	07/16/21 12:00	07/22/21 18:23	1
Sodium	23000		1600	850	mg/Kg	☼	07/16/21 12:00	07/22/21 19:58	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	41000		130	21	mg/Kg	☼	07/20/21 08:00	07/23/21 14:25	10
Antimony	0.43	J	3.9	0.18	mg/Kg	☼	07/20/21 08:00	07/23/21 16:00	1
Arsenic	1.9		0.65	0.17	mg/Kg	☼	07/20/21 08:00	07/23/21 16:00	1
Calcium	5400		3300	34	mg/Kg	☼	07/20/21 08:00	07/23/21 14:25	10
Cobalt	0.44	J	3.3	0.034	mg/Kg	☼	07/20/21 08:00	07/23/21 16:00	1
Iron	2600		6.5	5.4	mg/Kg	☼	07/20/21 08:00	07/23/21 16:00	1
Lithium	5.4		3.3	0.20	mg/Kg	☼	07/20/21 08:00	07/23/21 16:00	1
Manganese	39		0.98	0.14	mg/Kg	☼	07/20/21 08:00	07/23/21 16:00	1
Molybdenum	0.12	J	2.6	0.11	mg/Kg	☼	07/20/21 08:00	07/23/21 16:00	1
Potassium	26000		1600	65	mg/Kg	☼	07/20/21 08:00	07/28/21 15:58	5
Selenium	ND		0.65	0.22	mg/Kg	☼	07/20/21 08:00	07/23/21 16:00	1
Sodium	8900		330	56	mg/Kg	☼	07/20/21 08:00	07/23/21 16:00	1

Client: Golder Associates Inc.
Project/Site: Labadie Energy Center - Missouri

Job ID: 140-23290-1

Client Sample ID: L-BH-01S

Date Collected: 05/26/21 08:10
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-7

Matrix: Solid
Percent Solids: 76.3

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			07/29/21 21:07	1
Antimony	0.43	J	3.0	0.14	mg/Kg			07/29/21 21:07	1
Arsenic	5.3		0.50	0.13	mg/Kg			07/29/21 21:07	1
Calcium	9800		250	0.74	mg/Kg			07/29/21 21:07	1
Cobalt	3.7		2.5	0.023	mg/Kg			07/29/21 21:07	1
Iron	7200		5.0	4.1	mg/Kg			07/29/21 21:07	1
Lithium	7.2		2.5	0.15	mg/Kg			07/29/21 21:07	1
Manganese	94		0.75	0.052	mg/Kg			07/29/21 21:07	1
Molybdenum	0.12	J	2.0	0.082	mg/Kg			07/29/21 21:07	1
Potassium	30000		250	26	mg/Kg			07/29/21 21:07	1
Selenium	ND		0.50	0.17	mg/Kg			07/29/21 21:07	1
Sodium	40000		250	130	mg/Kg			07/29/21 21:07	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	1800		49	6.1	mg/Kg	☼	06/28/21 08:00	07/07/21 16:24	1
Antimony	ND		7.4	0.42	mg/Kg	☼	06/28/21 08:00	07/07/21 16:24	1
Arsenic	4.2		2.5	0.36	mg/Kg	☼	06/28/21 08:00	07/07/21 16:24	1
Calcium	3900		610	110	mg/Kg	☼	06/28/21 08:00	07/07/21 16:24	1
Cobalt	4.6	J	6.1	0.059	mg/Kg	☼	06/28/21 08:00	07/07/21 16:24	1
Iron	4500		25	9.7	mg/Kg	☼	06/28/21 08:00	07/07/21 16:24	1
Lithium	2.3	J	6.1	0.37	mg/Kg	☼	06/28/21 08:00	07/07/21 16:24	1
Manganese	50		1.8	0.76	mg/Kg	☼	06/28/21 08:00	07/07/21 16:24	1
Molybdenum	ND		4.9	0.13	mg/Kg	☼	06/28/21 08:00	07/07/21 16:24	1
Potassium	390	J	610	29	mg/Kg	☼	06/28/21 08:00	07/07/21 16:24	1
Selenium	ND		1.8	0.54	mg/Kg	☼	06/28/21 08:00	07/07/21 16:24	1
Sodium	51	J	610	44	mg/Kg	☼	06/28/21 08:00	07/07/21 16:24	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	42000		130	21	mg/Kg	☼	07/12/21 08:00	07/28/21 18:10	10
Antimony	0.47	J	3.9	0.18	mg/Kg	☼	07/12/21 08:00	07/29/21 12:26	1
Arsenic	7.9	B	0.65	0.17	mg/Kg	☼	07/12/21 08:00	07/29/21 12:26	1
Calcium	12000		3300	34	mg/Kg	☼	07/12/21 08:00	07/28/21 18:10	10
Cobalt	4.8		3.3	0.034	mg/Kg	☼	07/12/21 08:00	07/29/21 12:26	1
Iron	7400		6.5	5.4	mg/Kg	☼	07/12/21 08:00	07/29/21 12:26	1
Lithium	6.6		3.3	0.20	mg/Kg	☼	07/12/21 08:00	07/29/21 12:26	1
Manganese	100		0.98	0.14	mg/Kg	☼	07/12/21 08:00	07/29/21 12:26	1
Molybdenum	0.26	J	2.6	0.11	mg/Kg	☼	07/12/21 08:00	07/29/21 12:26	1
Potassium	19000		1600	65	mg/Kg	☼	07/12/21 08:00	07/29/21 14:13	5
Selenium	0.54	J	0.65	0.22	mg/Kg	☼	07/12/21 08:00	07/29/21 12:26	1
Sodium	12000		330	56	mg/Kg	☼	07/12/21 08:00	07/29/21 12:26	1

Client: Golder Associates Inc.
Project/Site: Labadie Energy Center - Missouri

Job ID: 140-23290-1

Client Sample ID: L-BH-01M

Date Collected: 05/26/21 09:25
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-8

Matrix: Solid
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	☼	07/13/21 08:00	07/21/21 13:36	4
Antimony	ND		14	1.3	mg/Kg	☼	07/13/21 08:00	07/21/21 13:36	4
Arsenic	ND		2.3	0.60	mg/Kg	☼	07/13/21 08:00	07/21/21 13:36	4
Calcium	**340**	**J B**	1200	8.8	mg/Kg	☼	07/13/21 08:00	07/21/21 13:36	4
Cobalt	ND		12	0.21	mg/Kg	☼	07/13/21 08:00	07/21/21 13:36	4
Iron	ND		23	13	mg/Kg	☼	07/13/21 08:00	07/21/21 13:36	4
Lithium	ND		12	0.69	mg/Kg	☼	07/13/21 08:00	07/21/21 13:36	4
Manganese	**1.4**	**J**	3.5	0.14	mg/Kg	☼	07/13/21 08:00	07/21/21 13:36	4
Molybdenum	ND		9.3	0.38	mg/Kg	☼	07/13/21 08:00	07/21/21 13:36	4
Potassium	ND		1200	120	mg/Kg	☼	07/13/21 08:00	07/21/21 13:36	4
Selenium	ND		2.3	0.79	mg/Kg	☼	07/13/21 08:00	07/21/21 13:36	4
Sodium	ND		1200	600	mg/Kg	☼	07/13/21 08:00	07/21/21 13:36	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**6.5**	**J**	35	5.6	mg/Kg	☼	07/13/21 08:00	07/21/21 15:26	3
Antimony	ND		10	0.97	mg/Kg	☼	07/13/21 08:00	07/21/21 15:26	3
Arsenic	ND		1.7	0.45	mg/Kg	☼	07/13/21 08:00	07/21/21 15:26	3
Calcium	**1400**		870	7.6	mg/Kg	☼	07/13/21 08:00	07/21/21 15:26	3
Cobalt	ND		8.7	0.22	mg/Kg	☼	07/13/21 08:00	07/21/21 15:26	3
Iron	**75**		17	10	mg/Kg	☼	07/13/21 08:00	07/21/21 15:26	3
Lithium	ND		8.7	0.52	mg/Kg	☼	07/13/21 08:00	07/21/21 15:26	3
Manganese	**33**		2.6	0.97	mg/Kg	☼	07/13/21 08:00	07/21/21 15:26	3
Molybdenum	ND		6.9	0.28	mg/Kg	☼	07/13/21 08:00	07/21/21 15:26	3
Potassium	**93**	**J**	870	90	mg/Kg	☼	07/13/21 08:00	07/21/21 15:26	3
Selenium	ND		1.7	0.59	mg/Kg	☼	07/13/21 08:00	07/21/21 15:26	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**32**		12	2.4	mg/Kg	☼	07/14/21 08:00	07/21/21 17:25	1
Antimony	ND		3.5	0.32	mg/Kg	☼	07/14/21 08:00	07/21/21 17:25	1
Arsenic	**0.48**	**J**	0.58	0.15	mg/Kg	☼	07/14/21 08:00	07/21/21 17:25	1
Calcium	**5.0**	**J**	290	1.7	mg/Kg	☼	07/14/21 08:00	07/21/21 17:25	1
Cobalt	**0.51**	**J**	2.9	0.052	mg/Kg	☼	07/14/21 08:00	07/21/21 17:25	1
Iron	**400**		5.8	3.4	mg/Kg	☼	07/14/21 08:00	07/21/21 17:25	1
Lithium	ND		2.9	0.17	mg/Kg	☼	07/14/21 08:00	07/21/21 17:25	1
Manganese	**15**	**B**	0.87	0.031	mg/Kg	☼	07/14/21 08:00	07/21/21 17:25	1
Molybdenum	ND		2.3	0.095	mg/Kg	☼	07/14/21 08:00	07/21/21 17:25	1
Potassium	ND		290	30	mg/Kg	☼	07/14/21 08:00	07/21/21 17:25	1
Selenium	ND		0.58	0.20	mg/Kg	☼	07/14/21 08:00	07/21/21 17:25	1
Sodium	**5800**		290	150	mg/Kg	☼	07/14/21 08:00	07/21/21 17:25	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**350**		12	1.9	mg/Kg	☼	07/15/21 08:00	07/22/21 14:51	1
Antimony	ND		3.5	0.52	mg/Kg	☼	07/15/21 08:00	07/22/21 14:51	1
Arsenic	**0.64**		0.58	0.25	mg/Kg	☼	07/15/21 08:00	07/22/21 14:51	1
Calcium	**1500**		290	2.5	mg/Kg	☼	07/15/21 08:00	07/22/21 14:51	1
Cobalt	**0.94**	**J**	2.9	0.061	mg/Kg	☼	07/15/21 08:00	07/22/21 14:51	1
Iron	**1300**		5.8	3.4	mg/Kg	☼	07/15/21 08:00	07/22/21 14:51	1

Client Sample ID: L-BH-01M

Date Collected: 05/26/21 09:25
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-8

Matrix: Solid
Percent Solids: 86.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.68	J	2.9	0.17	mg/Kg	☼	07/15/21 08:00	07/22/21 14:51	1
Manganese	17		0.87	0.15	mg/Kg	☼	07/15/21 08:00	07/22/21 14:51	1
Molybdenum	ND		2.3	0.095	mg/Kg	☼	07/15/21 08:00	07/22/21 14:51	1
Potassium	36	J	290	30	mg/Kg	☼	07/15/21 08:00	07/22/21 14:51	1
Selenium	ND		0.58	0.54	mg/Kg	☼	07/15/21 08:00	07/22/21 14:51	1
Sodium	330		290	150	mg/Kg	☼	07/15/21 08:00	07/22/21 14:51	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	84	J	170	27	mg/Kg	☼	07/17/21 08:14	07/22/21 16:41	5
Antimony	ND		52	4.9	mg/Kg	☼	07/17/21 08:14	07/22/21 16:41	5
Arsenic	ND		8.7	2.2	mg/Kg	☼	07/17/21 08:14	07/22/21 16:41	5
Calcium	510	J B	4300	13	mg/Kg	☼	07/17/21 08:14	07/22/21 16:41	5
Cobalt	ND		43	0.69	mg/Kg	☼	07/17/21 08:14	07/22/21 16:41	5
Iron	ND		87	51	mg/Kg	☼	07/17/21 08:14	07/22/21 16:41	5
Lithium	ND		43	2.5	mg/Kg	☼	07/17/21 08:14	07/22/21 16:41	5
Manganese	2.1	J	13	2.1	mg/Kg	☼	07/17/21 08:14	07/22/21 16:41	5
Molybdenum	ND		35	1.4	mg/Kg	☼	07/17/21 08:14	07/22/21 16:41	5
Potassium	2900	J B	4300	490	mg/Kg	☼	07/17/21 08:14	07/22/21 16:41	5
Selenium	ND		8.7	3.0	mg/Kg	☼	07/17/21 08:14	07/22/21 16:41	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	590		12	1.9	mg/Kg	☼	07/16/21 12:00	07/22/21 18:28	1
Antimony	ND		3.5	0.32	mg/Kg	☼	07/16/21 12:00	07/22/21 18:28	1
Arsenic	0.88		0.58	0.17	mg/Kg	☼	07/16/21 12:00	07/22/21 18:28	1
Calcium	380		290	2.4	mg/Kg	☼	07/16/21 12:00	07/22/21 18:28	1
Cobalt	0.65	J	2.9	0.053	mg/Kg	☼	07/16/21 12:00	07/22/21 18:28	1
Iron	1900		5.8	3.4	mg/Kg	☼	07/16/21 12:00	07/22/21 18:28	1
Lithium	0.72	J	2.9	0.17	mg/Kg	☼	07/16/21 12:00	07/22/21 18:28	1
Manganese	14		0.87	0.29	mg/Kg	☼	07/16/21 12:00	07/22/21 18:28	1
Molybdenum	ND		2.3	0.11	mg/Kg	☼	07/16/21 12:00	07/22/21 18:28	1
Potassium	180	J	290	30	mg/Kg	☼	07/16/21 12:00	07/22/21 18:28	1
Selenium	ND		0.58	0.20	mg/Kg	☼	07/16/21 12:00	07/22/21 18:28	1
Sodium	18000		1400	750	mg/Kg	☼	07/16/21 12:00	07/22/21 20:03	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	31000		120	19	mg/Kg	☼	07/20/21 08:00	07/23/21 14:30	10
Antimony	0.39	J	3.5	0.16	mg/Kg	☼	07/20/21 08:00	07/23/21 16:05	1
Arsenic	0.79	J	1.2	0.30	mg/Kg	☼	07/20/21 08:00	07/28/21 16:03	2
Calcium	4400		2900	30	mg/Kg	☼	07/20/21 08:00	07/23/21 14:30	10
Cobalt	ND		2.9	0.030	mg/Kg	☼	07/20/21 08:00	07/23/21 16:05	1
Iron	1400		5.8	4.7	mg/Kg	☼	07/20/21 08:00	07/23/21 16:05	1
Lithium	2.7	J	2.9	0.17	mg/Kg	☼	07/20/21 08:00	07/23/21 16:05	1
Manganese	25		0.87	0.13	mg/Kg	☼	07/20/21 08:00	07/23/21 16:05	1
Molybdenum	0.11	J	2.3	0.095	mg/Kg	☼	07/20/21 08:00	07/23/21 16:05	1
Potassium	18000		1400	58	mg/Kg	☼	07/20/21 08:00	07/28/21 16:08	5
Selenium	ND		1.2	0.39	mg/Kg	☼	07/20/21 08:00	07/28/21 16:03	2
Sodium	8800		290	50	mg/Kg	☼	07/20/21 08:00	07/23/21 16:05	1

Client Sample ID: L-BH-01M

Date Collected: 05/26/21 09:25
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-8

Matrix: Solid
Percent Solids: 86.5

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			07/29/21 21:07	1
Antimony	0.39	J	3.0	0.14	mg/Kg			07/29/21 21:07	1
Arsenic	2.8		0.50	0.13	mg/Kg			07/29/21 21:07	1
Calcium	8500		250	0.74	mg/Kg			07/29/21 21:07	1
Cobalt	2.1	J	2.5	0.023	mg/Kg			07/29/21 21:07	1
Iron	5100		5.0	4.1	mg/Kg			07/29/21 21:07	1
Lithium	4.1		2.5	0.15	mg/Kg			07/29/21 21:07	1
Manganese	110		0.75	0.052	mg/Kg			07/29/21 21:07	1
Molybdenum	0.11	J	2.0	0.082	mg/Kg			07/29/21 21:07	1
Potassium	22000		250	26	mg/Kg			07/29/21 21:07	1
Selenium	ND		0.50	0.17	mg/Kg			07/29/21 21:07	1
Sodium	33000		250	130	mg/Kg			07/29/21 21:07	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	1300		43	5.4	mg/Kg	☼	06/28/21 08:00	07/07/21 16:28	1
Antimony	ND		6.5	0.37	mg/Kg	☼	06/28/21 08:00	07/07/21 16:28	1
Arsenic	2.9		2.2	0.31	mg/Kg	☼	06/28/21 08:00	07/07/21 16:28	1
Calcium	4200		540	95	mg/Kg	☼	06/28/21 08:00	07/07/21 16:28	1
Cobalt	2.3	J	5.4	0.052	mg/Kg	☼	06/28/21 08:00	07/07/21 16:28	1
Iron	3400		22	8.6	mg/Kg	☼	06/28/21 08:00	07/07/21 16:28	1
Lithium	1.7	J	5.4	0.33	mg/Kg	☼	06/28/21 08:00	07/07/21 16:28	1
Manganese	95		1.6	0.67	mg/Kg	☼	06/28/21 08:00	07/07/21 16:28	1
Molybdenum	0.16	J	4.3	0.12	mg/Kg	☼	06/28/21 08:00	07/07/21 16:28	1
Potassium	280	J	540	26	mg/Kg	☼	06/28/21 08:00	07/07/21 16:28	1
Selenium	ND		1.6	0.48	mg/Kg	☼	06/28/21 08:00	07/07/21 16:28	1
Sodium	46	J	540	39	mg/Kg	☼	06/28/21 08:00	07/07/21 16:28	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	38000		120	19	mg/Kg	☼	07/12/21 08:00	07/28/21 18:15	10
Antimony	0.41	J	3.5	0.16	mg/Kg	☼	07/12/21 08:00	07/29/21 12:31	1
Arsenic	4.1	B	0.58	0.15	mg/Kg	☼	07/12/21 08:00	07/29/21 12:31	1
Calcium	9900		2900	30	mg/Kg	☼	07/12/21 08:00	07/28/21 18:15	10
Cobalt	2.8	J	2.9	0.030	mg/Kg	☼	07/12/21 08:00	07/29/21 12:31	1
Iron	5700		5.8	4.7	mg/Kg	☼	07/12/21 08:00	07/29/21 12:31	1
Lithium	5.3		2.9	0.17	mg/Kg	☼	07/12/21 08:00	07/29/21 12:31	1
Manganese	140		0.87	0.13	mg/Kg	☼	07/12/21 08:00	07/29/21 12:31	1
Molybdenum	0.26	J	2.3	0.095	mg/Kg	☼	07/12/21 08:00	07/29/21 12:31	1
Potassium	18000		1400	58	mg/Kg	☼	07/12/21 08:00	07/29/21 14:18	5
Selenium	ND		0.58	0.20	mg/Kg	☼	07/12/21 08:00	07/29/21 12:31	1
Sodium	11000		290	50	mg/Kg	☼	07/12/21 08:00	07/29/21 12:31	1

Client Sample ID: L-BH-01D
Date Collected: 05/26/21 11:05
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-9
Matrix: Solid
Percent Solids: 88.2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		45	7.3	mg/Kg	☼	07/13/21 08:00	07/21/21 13:40	4
Antimony	ND		14	1.3	mg/Kg	☼	07/13/21 08:00	07/21/21 13:40	4
Arsenic	ND		2.3	0.59	mg/Kg	☼	07/13/21 08:00	07/21/21 13:40	4
Calcium	**270**	**J B**	1100	8.6	mg/Kg	☼	07/13/21 08:00	07/21/21 13:40	4
Cobalt	ND		11	0.20	mg/Kg	☼	07/13/21 08:00	07/21/21 13:40	4
Iron	ND		23	13	mg/Kg	☼	07/13/21 08:00	07/21/21 13:40	4
Lithium	ND		11	0.68	mg/Kg	☼	07/13/21 08:00	07/21/21 13:40	4
Manganese	**3.4**		3.4	0.14	mg/Kg	☼	07/13/21 08:00	07/21/21 13:40	4
Molybdenum	ND		9.1	0.37	mg/Kg	☼	07/13/21 08:00	07/21/21 13:40	4
Potassium	ND		1100	120	mg/Kg	☼	07/13/21 08:00	07/21/21 13:40	4
Selenium	ND		2.3	0.77	mg/Kg	☼	07/13/21 08:00	07/21/21 13:40	4
Sodium	ND		1100	590	mg/Kg	☼	07/13/21 08:00	07/21/21 13:40	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**6.0**	**J**	34	5.4	mg/Kg	☼	07/13/21 08:00	07/21/21 15:31	3
Antimony	ND		10	0.95	mg/Kg	☼	07/13/21 08:00	07/21/21 15:31	3
Arsenic	ND		1.7	0.44	mg/Kg	☼	07/13/21 08:00	07/21/21 15:31	3
Calcium	**2700**		850	7.5	mg/Kg	☼	07/13/21 08:00	07/21/21 15:31	3
Cobalt	ND		8.5	0.21	mg/Kg	☼	07/13/21 08:00	07/21/21 15:31	3
Iron	**100**		17	9.9	mg/Kg	☼	07/13/21 08:00	07/21/21 15:31	3
Lithium	ND		8.5	0.51	mg/Kg	☼	07/13/21 08:00	07/21/21 15:31	3
Manganese	**68**		2.6	0.95	mg/Kg	☼	07/13/21 08:00	07/21/21 15:31	3
Molybdenum	ND		6.8	0.28	mg/Kg	☼	07/13/21 08:00	07/21/21 15:31	3
Potassium	**90**	**J**	850	88	mg/Kg	☼	07/13/21 08:00	07/21/21 15:31	3
Selenium	ND		1.7	0.58	mg/Kg	☼	07/13/21 08:00	07/21/21 15:31	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**16**		11	2.4	mg/Kg	☼	07/14/21 08:00	07/21/21 17:30	1
Antimony	ND		3.4	0.32	mg/Kg	☼	07/14/21 08:00	07/21/21 17:30	1
Arsenic	ND		0.57	0.15	mg/Kg	☼	07/14/21 08:00	07/21/21 17:30	1
Calcium	**5.9**	**J**	280	1.7	mg/Kg	☼	07/14/21 08:00	07/21/21 17:30	1
Cobalt	**0.21**	**J**	2.8	0.051	mg/Kg	☼	07/14/21 08:00	07/21/21 17:30	1
Iron	**310**		5.7	3.3	mg/Kg	☼	07/14/21 08:00	07/21/21 17:30	1
Lithium	ND		2.8	0.17	mg/Kg	☼	07/14/21 08:00	07/21/21 17:30	1
Manganese	**48**	**B**	0.85	0.031	mg/Kg	☼	07/14/21 08:00	07/21/21 17:30	1
Molybdenum	**0.14**	**J**	2.3	0.093	mg/Kg	☼	07/14/21 08:00	07/21/21 17:30	1
Potassium	ND		280	29	mg/Kg	☼	07/14/21 08:00	07/21/21 17:30	1
Selenium	ND		0.57	0.19	mg/Kg	☼	07/14/21 08:00	07/21/21 17:30	1
Sodium	**6000**		280	150	mg/Kg	☼	07/14/21 08:00	07/21/21 17:30	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**220**		11	1.8	mg/Kg	☼	07/15/21 08:00	07/22/21 14:56	1
Antimony	ND		3.4	0.51	mg/Kg	☼	07/15/21 08:00	07/22/21 14:56	1
Arsenic	**0.31**	**J**	0.57	0.25	mg/Kg	☼	07/15/21 08:00	07/22/21 14:56	1
Calcium	**1300**		280	2.5	mg/Kg	☼	07/15/21 08:00	07/22/21 14:56	1
Cobalt	**1.3**	**J**	2.8	0.060	mg/Kg	☼	07/15/21 08:00	07/22/21 14:56	1
Iron	**1100**		5.7	3.3	mg/Kg	☼	07/15/21 08:00	07/22/21 14:56	1

Client: Golder Associates Inc.
Project/Site: Labadie Energy Center - Missouri

Job ID: 140-23290-1

Client Sample ID: L-BH-01D

Date Collected: 05/26/21 11:05
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-9

Matrix: Solid
Percent Solids: 88.2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.36	J	2.8	0.17	mg/Kg	☼	07/15/21 08:00	07/22/21 14:56	1
Manganese	100		0.85	0.15	mg/Kg	☼	07/15/21 08:00	07/22/21 14:56	1
Molybdenum	ND		2.3	0.093	mg/Kg	☼	07/15/21 08:00	07/22/21 14:56	1
Potassium	ND		280	29	mg/Kg	☼	07/15/21 08:00	07/22/21 14:56	1
Selenium	ND		0.57	0.53	mg/Kg	☼	07/15/21 08:00	07/22/21 14:56	1
Sodium	360		280	150	mg/Kg	☼	07/15/21 08:00	07/22/21 14:56	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	31	J	170	27	mg/Kg	☼	07/17/21 08:14	07/22/21 16:46	5
Antimony	ND		51	4.8	mg/Kg	☼	07/17/21 08:14	07/22/21 16:46	5
Arsenic	ND		8.5	2.2	mg/Kg	☼	07/17/21 08:14	07/22/21 16:46	5
Calcium	990	J B	4300	12	mg/Kg	☼	07/17/21 08:14	07/22/21 16:46	5
Cobalt	ND		43	0.68	mg/Kg	☼	07/17/21 08:14	07/22/21 16:46	5
Iron	ND		85	50	mg/Kg	☼	07/17/21 08:14	07/22/21 16:46	5
Lithium	ND		43	2.5	mg/Kg	☼	07/17/21 08:14	07/22/21 16:46	5
Manganese	5.2	J	13	2.1	mg/Kg	☼	07/17/21 08:14	07/22/21 16:46	5
Molybdenum	ND		34	1.4	mg/Kg	☼	07/17/21 08:14	07/22/21 16:46	5
Potassium	2900	J B	4300	480	mg/Kg	☼	07/17/21 08:14	07/22/21 16:46	5
Selenium	ND		8.5	2.9	mg/Kg	☼	07/17/21 08:14	07/22/21 16:46	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	450		11	1.8	mg/Kg	☼	07/16/21 12:00	07/22/21 18:33	1
Antimony	ND		3.4	0.32	mg/Kg	☼	07/16/21 12:00	07/22/21 18:33	1
Arsenic	0.54	J	0.57	0.17	mg/Kg	☼	07/16/21 12:00	07/22/21 18:33	1
Calcium	690		280	2.4	mg/Kg	☼	07/16/21 12:00	07/22/21 18:33	1
Cobalt	0.71	J	2.8	0.052	mg/Kg	☼	07/16/21 12:00	07/22/21 18:33	1
Iron	1300		5.7	3.3	mg/Kg	☼	07/16/21 12:00	07/22/21 18:33	1
Lithium	0.58	J	2.8	0.17	mg/Kg	☼	07/16/21 12:00	07/22/21 18:33	1
Manganese	17		0.85	0.28	mg/Kg	☼	07/16/21 12:00	07/22/21 18:33	1
Molybdenum	ND		2.3	0.11	mg/Kg	☼	07/16/21 12:00	07/22/21 18:33	1
Potassium	130	J	280	29	mg/Kg	☼	07/16/21 12:00	07/22/21 18:33	1
Selenium	ND		0.57	0.19	mg/Kg	☼	07/16/21 12:00	07/22/21 18:33	1
Sodium	20000		1400	740	mg/Kg	☼	07/16/21 12:00	07/22/21 20:07	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	43000		110	18	mg/Kg	☼	07/20/21 08:00	07/23/21 14:35	10
Antimony	0.16	J	3.4	0.16	mg/Kg	☼	07/20/21 08:00	07/23/21 16:10	1
Arsenic	1.1		0.57	0.15	mg/Kg	☼	07/20/21 08:00	07/23/21 16:10	1
Calcium	4600		2800	29	mg/Kg	☼	07/20/21 08:00	07/23/21 14:35	10
Cobalt	ND		2.8	0.029	mg/Kg	☼	07/20/21 08:00	07/23/21 16:10	1
Iron	1400		5.7	4.7	mg/Kg	☼	07/20/21 08:00	07/23/21 16:10	1
Lithium	2.2	J	2.8	0.17	mg/Kg	☼	07/20/21 08:00	07/23/21 16:10	1
Manganese	38		0.85	0.12	mg/Kg	☼	07/20/21 08:00	07/23/21 16:10	1
Molybdenum	ND		2.3	0.093	mg/Kg	☼	07/20/21 08:00	07/23/21 16:10	1
Potassium	26000		1400	57	mg/Kg	☼	07/20/21 08:00	07/28/21 16:22	5
Selenium	ND		0.57	0.19	mg/Kg	☼	07/20/21 08:00	07/23/21 16:10	1
Sodium	18000		1400	240	mg/Kg	☼	07/20/21 08:00	07/28/21 16:22	5

Client Sample ID: L-BH-01D

Date Collected: 05/26/21 11:05
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-9

Matrix: Solid
Percent Solids: 88.2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	44000		10	1.6	mg/Kg			07/29/21 21:07	1
Antimony	0.16	J	3.0	0.14	mg/Kg			07/29/21 21:07	1
Arsenic	2.0		0.50	0.13	mg/Kg			07/29/21 21:07	1
Calcium	11000		250	0.74	mg/Kg			07/29/21 21:07	1
Cobalt	2.2	J	2.5	0.023	mg/Kg			07/29/21 21:07	1
Iron	4200		5.0	4.1	mg/Kg			07/29/21 21:07	1
Lithium	3.1		2.5	0.15	mg/Kg			07/29/21 21:07	1
Manganese	280		0.75	0.052	mg/Kg			07/29/21 21:07	1
Molybdenum	0.14	J	2.0	0.082	mg/Kg			07/29/21 21:07	1
Potassium	30000		250	26	mg/Kg			07/29/21 21:07	1
Selenium	ND		0.50	0.17	mg/Kg			07/29/21 21:07	1
Sodium	45000		250	130	mg/Kg			07/29/21 21:07	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	840		42	5.2	mg/Kg	☼	06/28/21 08:00	07/07/21 16:48	1
Antimony	ND		6.3	0.36	mg/Kg	☼	06/28/21 08:00	07/07/21 16:48	1
Arsenic	0.87	J	2.1	0.30	mg/Kg	☼	06/28/21 08:00	07/07/21 16:48	1
Calcium	4800		520	92	mg/Kg	☼	06/28/21 08:00	07/07/21 16:48	1
Cobalt	2.1	J	5.2	0.050	mg/Kg	☼	06/28/21 08:00	07/07/21 16:48	1
Iron	2100		21	8.3	mg/Kg	☼	06/28/21 08:00	07/07/21 16:48	1
Lithium	1.6	J	5.2	0.31	mg/Kg	☼	06/28/21 08:00	07/07/21 16:48	1
Manganese	99		1.6	0.65	mg/Kg	☼	06/28/21 08:00	07/07/21 16:48	1
Molybdenum	0.60	J	4.2	0.12	mg/Kg	☼	06/28/21 08:00	07/07/21 16:48	1
Potassium	200	J	520	25	mg/Kg	☼	06/28/21 08:00	07/07/21 16:48	1
Selenium	ND		1.6	0.46	mg/Kg	☼	06/28/21 08:00	07/07/21 16:48	1
Sodium	39	J	520	38	mg/Kg	☼	06/28/21 08:00	07/07/21 16:48	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	40000		110	18	mg/Kg	☼	07/12/21 08:00	07/28/21 18:20	10
Antimony	0.34	J	3.4	0.16	mg/Kg	☼	07/12/21 08:00	07/29/21 12:36	1
Arsenic	2.4	B	0.57	0.15	mg/Kg	☼	07/12/21 08:00	07/29/21 12:36	1
Calcium	8400		2800	29	mg/Kg	☼	07/12/21 08:00	07/28/21 18:20	10
Cobalt	2.1	J	2.8	0.029	mg/Kg	☼	07/12/21 08:00	07/29/21 12:36	1
Iron	6100		5.7	4.7	mg/Kg	☼	07/12/21 08:00	07/29/21 12:36	1
Lithium	3.6		2.8	0.17	mg/Kg	☼	07/12/21 08:00	07/29/21 12:36	1
Manganese	250		0.85	0.12	mg/Kg	☼	07/12/21 08:00	07/29/21 12:36	1
Molybdenum	3.2		2.3	0.093	mg/Kg	☼	07/12/21 08:00	07/29/21 12:36	1
Potassium	27000		1400	57	mg/Kg	☼	07/12/21 08:00	07/29/21 14:22	5
Selenium	0.38	J	0.57	0.19	mg/Kg	☼	07/12/21 08:00	07/29/21 12:36	1
Sodium	12000		1400	240	mg/Kg	☼	07/12/21 08:00	07/29/21 14:22	5

Default Detection Limits

Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Method: 6010B SEP - SEP Metals (ICP) - Step 1
Prep: 3010A
SEP: Exchangeable

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg
Antimony	3.0	0.28	mg/Kg
Arsenic	0.50	0.13	mg/Kg
Calcium	250	1.9	mg/Kg
Cobalt	2.5	0.045	mg/Kg
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.031	mg/Kg
Molybdenum	2.0	0.082	mg/Kg
Potassium	250	26	mg/Kg
Selenium	0.50	0.17	mg/Kg
Sodium	250	130	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 2
Prep: 3010A
SEP: Carbonate

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg
Antimony	3.0	0.28	mg/Kg
Arsenic	0.50	0.13	mg/Kg
Calcium	250	2.2	mg/Kg
Cobalt	2.5	0.063	mg/Kg
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.28	mg/Kg
Molybdenum	2.0	0.082	mg/Kg
Potassium	250	26	mg/Kg
Selenium	0.50	0.17	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 3
Prep: 3010A
SEP: Non-Crystalline

Analyte	RL	MDL	Units
Aluminum	10	2.1	mg/Kg
Antimony	3.0	0.28	mg/Kg
Arsenic	0.50	0.13	mg/Kg
Calcium	250	1.5	mg/Kg
Cobalt	2.5	0.045	mg/Kg
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.027	mg/Kg
Molybdenum	2.0	0.082	mg/Kg
Potassium	250	26	mg/Kg
Selenium	0.50	0.17	mg/Kg
Sodium	250	130	mg/Kg

Method: 6010B SEP - SEP Metals (ICP) - Step 4
Prep: 3010A
SEP: Metal Hydroxide

Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

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

Prep: 3010A

SEP: Metal Hydroxide

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg
Antimony	3.0	0.45	mg/Kg
Arsenic	0.50	0.22	mg/Kg
Calcium	250	2.2	mg/Kg
Cobalt	2.5	0.053	mg/Kg
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.13	mg/Kg
Molybdenum	2.0	0.082	mg/Kg
Potassium	250	26	mg/Kg
Selenium	0.50	0.47	mg/Kg
Sodium	250	130	mg/Kg

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

Prep: 3010A

SEP: Organic-Bound

Analyte	RL	MDL	Units
Aluminum	30	4.7	mg/Kg
Antimony	9.0	0.84	mg/Kg
Arsenic	1.5	0.38	mg/Kg
Calcium	750	2.2	mg/Kg
Cobalt	7.5	0.12	mg/Kg
Iron	15	8.8	mg/Kg
Lithium	7.5	0.44	mg/Kg
Manganese	2.3	0.37	mg/Kg
Molybdenum	6.0	0.25	mg/Kg
Potassium	750	85	mg/Kg
Selenium	1.5	0.52	mg/Kg

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

SEP: Acid/Sulfide

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg
Antimony	3.0	0.28	mg/Kg
Arsenic	0.50	0.15	mg/Kg
Calcium	250	2.1	mg/Kg
Cobalt	2.5	0.046	mg/Kg
Iron	5.0	2.9	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.25	mg/Kg
Molybdenum	2.0	0.099	mg/Kg
Potassium	250	26	mg/Kg
Selenium	0.50	0.17	mg/Kg
Sodium	250	130	mg/Kg

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

Prep: Residual

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg
Antimony	3.0	0.14	mg/Kg

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

Prep: Residual

Analyte	RL	MDL	Units
Arsenic	0.50	0.13	mg/Kg
Calcium	250	2.6	mg/Kg
Cobalt	2.5	0.026	mg/Kg
Iron	5.0	4.1	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.11	mg/Kg
Molybdenum	2.0	0.082	mg/Kg
Potassium	250	10	mg/Kg
Selenium	0.50	0.17	mg/Kg
Sodium	250	43	mg/Kg

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

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg
Antimony	3.0	0.14	mg/Kg
Arsenic	0.50	0.13	mg/Kg
Calcium	250	0.74	mg/Kg
Cobalt	2.5	0.023	mg/Kg
Iron	5.0	4.1	mg/Kg
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.052	mg/Kg
Molybdenum	2.0	0.082	mg/Kg
Potassium	250	26	mg/Kg
Selenium	0.50	0.17	mg/Kg
Sodium	250	130	mg/Kg

Method: 6010B - Metals (ICP)

Prep: 3050B

Analyte	RL	MDL	Units
Aluminum	40	5.0	mg/Kg
Antimony	6.0	0.34	mg/Kg
Arsenic	2.0	0.29	mg/Kg
Calcium	500	88	mg/Kg
Cobalt	5.0	0.048	mg/Kg
Iron	20	7.9	mg/Kg
Lithium	5.0	0.30	mg/Kg
Manganese	1.5	0.62	mg/Kg
Molybdenum	4.0	0.11	mg/Kg
Potassium	500	24	mg/Kg
Selenium	1.5	0.44	mg/Kg
Sodium	500	36	mg/Kg

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

Prep: Total

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg
Antimony	3.0	0.14	mg/Kg
Arsenic	0.50	0.13	mg/Kg
Calcium	250	2.6	mg/Kg
Cobalt	2.5	0.026	mg/Kg
Iron	5.0	4.1	mg/Kg

Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

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

Prep: Total

Analyte	RL	MDL	Units
Lithium	2.5	0.15	mg/Kg
Manganese	0.75	0.11	mg/Kg
Molybdenum	2.0	0.082	mg/Kg
Potassium	250	10	mg/Kg
Selenium	0.50	0.17	mg/Kg
Sodium	250	43	mg/Kg

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 140-51236/21-A
Matrix: Solid
Analysis Batch: 51553

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 51236

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		40	5.0	mg/Kg		06/28/21 08:00	07/07/21 11:36	1
Antimony	ND		6.0	0.34	mg/Kg		06/28/21 08:00	07/07/21 11:36	1
Arsenic	ND		2.0	0.29	mg/Kg		06/28/21 08:00	07/07/21 11:36	1
Calcium	ND		500	88	mg/Kg		06/28/21 08:00	07/07/21 11:36	1
Cobalt	ND		5.0	0.048	mg/Kg		06/28/21 08:00	07/07/21 11:36	1
Iron	ND		20	7.9	mg/Kg		06/28/21 08:00	07/07/21 11:36	1
Lithium	ND		5.0	0.30	mg/Kg		06/28/21 08:00	07/07/21 11:36	1
Manganese	ND		1.5	0.62	mg/Kg		06/28/21 08:00	07/07/21 11:36	1
Molybdenum	ND		4.0	0.11	mg/Kg		06/28/21 08:00	07/07/21 11:36	1
Potassium	ND		500	24	mg/Kg		06/28/21 08:00	07/07/21 11:36	1
Selenium	ND		1.5	0.44	mg/Kg		06/28/21 08:00	07/07/21 11:36	1
Sodium	ND		500	36	mg/Kg		06/28/21 08:00	07/07/21 11:36	1

Lab Sample ID: LCS 140-51236/22-A
Matrix: Solid
Analysis Batch: 51553

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 51236

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	200	200		mg/Kg		100	90 - 110
Antimony	50.0	49.2		mg/Kg		98	90 - 110
Arsenic	10.0	9.56		mg/Kg		96	90 - 110
Calcium	5000	5040		mg/Kg		101	90 - 110
Cobalt	10.0	10.2		mg/Kg		102	90 - 110
Iron	100	103		mg/Kg		103	90 - 113
Lithium	10.0	9.79		mg/Kg		98	80 - 120
Manganese	10.0	10.3		mg/Kg		103	90 - 110
Molybdenum	50.0	51.8		mg/Kg		104	90 - 110
Potassium	5000	4970		mg/Kg		99	90 - 110
Selenium	15.0	14.8		mg/Kg		99	90 - 110
Sodium	5000	5050		mg/Kg		101	87 - 116

Lab Sample ID: 140-23290-6 MS
Matrix: Solid
Analysis Batch: 51553

Client Sample ID: L-BH-02D
Prep Type: Total/NA
Prep Batch: 51236

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	1700		225	3680	4	mg/Kg	☼	886	75 - 125
Antimony	ND		56.3	47.2		mg/Kg	☼	84	75 - 125
Arsenic	2.1	J	11.3	12.4		mg/Kg	☼	92	75 - 125
Calcium	3800		5630	9390		mg/Kg	☼	99	75 - 125
Cobalt	1.8	J	11.3	12.3		mg/Kg	☼	93	75 - 125
Iron	3400		113	3870	4	mg/Kg	☼	462	75 - 125
Lithium	2.0	J	11.3	12.5		mg/Kg	☼	93	75 - 125
Manganese	63		11.3	82.0	4	mg/Kg	☼	169	75 - 125
Molybdenum	ND		56.3	52.5		mg/Kg	☼	93	75 - 125
Potassium	380	J	5630	5820		mg/Kg	☼	97	75 - 125
Selenium	ND		16.9	15.3		mg/Kg	☼	90	75 - 121
Sodium	71	J	5630	5310		mg/Kg	☼	93	75 - 125

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

Lab Sample ID: 140-23290-6 MSD
Matrix: Solid
Analysis Batch: 51553

Client Sample ID: L-BH-02D
Prep Type: Total/NA
Prep Batch: 51236

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	1700		240	3780	4	mg/Kg	☼	875	75 - 125	3	20
Antimony	ND		59.9	52.2		mg/Kg	☼	87	75 - 125	10	20
Arsenic	2.1	J	12.0	13.0		mg/Kg	☼	91	75 - 125	5	20
Calcium	3800		5990	9940		mg/Kg	☼	102	75 - 125	6	20
Cobalt	1.8	J	12.0	13.2		mg/Kg	☼	95	75 - 125	7	20
Iron	3400		120	4090	4	mg/Kg	☼	613	75 - 125	5	20
Lithium	2.0	J	12.0	13.4		mg/Kg	☼	95	75 - 125	7	20
Manganese	63		12.0	86.5	4	mg/Kg	☼	195	75 - 125	5	20
Molybdenum	ND		59.9	57.7		mg/Kg	☼	96	75 - 125	9	20
Potassium	380	J	5990	6350		mg/Kg	☼	100	75 - 125	9	20
Selenium	ND		18.0	16.7		mg/Kg	☼	93	75 - 121	9	20
Sodium	71	J	5990	5840		mg/Kg	☼	96	75 - 125	9	20

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

Lab Sample ID: MB 140-51614/18-A
Matrix: Solid
Analysis Batch: 52192

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 51614

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		07/12/21 08:00	07/28/21 16:44	1
Calcium	ND		250	2.6	mg/Kg		07/12/21 08:00	07/28/21 16:44	1

Lab Sample ID: MB 140-51614/18-A
Matrix: Solid
Analysis Batch: 52210

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 51614

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		07/12/21 08:00	07/29/21 10:53	1
Antimony	ND		3.0	0.14	mg/Kg		07/12/21 08:00	07/29/21 10:53	1
Arsenic	0.134	J	0.50	0.13	mg/Kg		07/12/21 08:00	07/29/21 10:53	1
Calcium	ND		250	2.6	mg/Kg		07/12/21 08:00	07/29/21 10:53	1
Cobalt	ND		2.5	0.026	mg/Kg		07/12/21 08:00	07/29/21 10:53	1
Iron	ND		5.0	4.1	mg/Kg		07/12/21 08:00	07/29/21 10:53	1
Lithium	ND		2.5	0.15	mg/Kg		07/12/21 08:00	07/29/21 10:53	1
Manganese	ND		0.75	0.11	mg/Kg		07/12/21 08:00	07/29/21 10:53	1
Molybdenum	ND		2.0	0.082	mg/Kg		07/12/21 08:00	07/29/21 10:53	1
Potassium	ND		250	10	mg/Kg		07/12/21 08:00	07/29/21 10:53	1
Selenium	ND		0.50	0.17	mg/Kg		07/12/21 08:00	07/29/21 10:53	1
Sodium	ND		250	43	mg/Kg		07/12/21 08:00	07/29/21 10:53	1

Lab Sample ID: LCS 140-51614/19-A
Matrix: Solid
Analysis Batch: 52192

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 51614

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	100		mg/Kg		100	80 - 120
Calcium	2500	2550		mg/Kg		102	80 - 120

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

Lab Sample ID: LCS 140-51614/19-A
Matrix: Solid
Analysis Batch: 52210

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 51614

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	103		mg/Kg		103	80 - 120
Antimony	25.0	25.2		mg/Kg		101	80 - 125
Arsenic	5.00	5.16		mg/Kg		103	80 - 120
Calcium	2500	2610		mg/Kg		104	80 - 120
Cobalt	5.00	5.25		mg/Kg		105	80 - 125
Iron	50.0	53.6		mg/Kg		107	80 - 120
Lithium	5.00	5.15		mg/Kg		103	80 - 120
Manganese	5.00	5.42		mg/Kg		108	80 - 120
Molybdenum	25.0	26.6		mg/Kg		106	80 - 125
Potassium	2500	2630		mg/Kg		105	80 - 120
Selenium	7.50	7.51		mg/Kg		100	80 - 120
Sodium	2500	2660		mg/Kg		106	80 - 120

Lab Sample ID: LCSD 140-51614/20-A
Matrix: Solid
Analysis Batch: 52192

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 51614

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	100		mg/Kg		100	80 - 120	0	30
Calcium	2500	2540		mg/Kg		101	80 - 120	1	30

Lab Sample ID: LCSD 140-51614/20-A
Matrix: Solid
Analysis Batch: 52210

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 51614

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	103		mg/Kg		103	80 - 120	0	30
Antimony	25.0	25.3		mg/Kg		101	80 - 125	0	30
Arsenic	5.00	5.15		mg/Kg		103	80 - 120	0	30
Calcium	2500	2590		mg/Kg		103	80 - 120	1	30
Cobalt	5.00	5.24		mg/Kg		105	80 - 125	0	30
Iron	50.0	53.1		mg/Kg		106	80 - 120	1	30
Lithium	5.00	5.04		mg/Kg		101	80 - 120	2	30
Manganese	5.00	5.44		mg/Kg		109	80 - 120	0	30
Molybdenum	25.0	26.5		mg/Kg		106	80 - 125	0	30
Potassium	2500	2610		mg/Kg		104	80 - 120	1	30
Selenium	7.50	7.40		mg/Kg		99	80 - 120	2	30
Sodium	2500	2640		mg/Kg		105	80 - 120	1	30

Method: 6010B SEP - SEP Metals (ICP)

Lab Sample ID: MB 140-51615/18-B ^4
Matrix: Solid
Analysis Batch: 51972

Client Sample ID: Method Blank
Prep Type: Step 1
Prep Batch: 51654

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		40	6.4	mg/Kg		07/13/21 08:00	07/21/21 12:08	4
Antimony	ND		12	1.1	mg/Kg		07/13/21 08:00	07/21/21 12:08	4
Arsenic	ND		2.0	0.52	mg/Kg		07/13/21 08:00	07/21/21 12:08	4

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

Lab Sample ID: MB 140-51615/18-B ^4
Matrix: Solid
Analysis Batch: 51972

Client Sample ID: Method Blank
Prep Type: Step 1
Prep Batch: 51654

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	23.2	J	1000	7.6	mg/Kg		07/13/21 08:00	07/21/21 12:08	4
Cobalt	ND		10	0.18	mg/Kg		07/13/21 08:00	07/21/21 12:08	4
Iron	ND		20	12	mg/Kg		07/13/21 08:00	07/21/21 12:08	4
Lithium	ND		10	0.60	mg/Kg		07/13/21 08:00	07/21/21 12:08	4
Manganese	ND		3.0	0.12	mg/Kg		07/13/21 08:00	07/21/21 12:08	4
Molybdenum	ND		8.0	0.33	mg/Kg		07/13/21 08:00	07/21/21 12:08	4
Potassium	ND		1000	100	mg/Kg		07/13/21 08:00	07/21/21 12:08	4
Selenium	ND		2.0	0.68	mg/Kg		07/13/21 08:00	07/21/21 12:08	4
Sodium	ND		1000	520	mg/Kg		07/13/21 08:00	07/21/21 12:08	4

Lab Sample ID: LCS 140-51615/19-B ^5
Matrix: Solid
Analysis Batch: 51972

Client Sample ID: Lab Control Sample
Prep Type: Step 1
Prep Batch: 51654

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	94.2		mg/Kg		94	80 - 120
Antimony	25.0	23.2		mg/Kg		93	80 - 120
Arsenic	5.00	4.51		mg/Kg		90	80 - 120
Calcium	2500	2330		mg/Kg		93	80 - 120
Cobalt	5.00	4.68	J	mg/Kg		94	80 - 120
Iron	50.0	48.1		mg/Kg		96	80 - 120
Lithium	5.00	4.89	J	mg/Kg		98	80 - 120
Manganese	5.00	4.95		mg/Kg		99	80 - 120
Molybdenum	25.0	23.6		mg/Kg		94	80 - 120
Potassium	2500	2500		mg/Kg		100	80 - 120
Selenium	7.50	7.36		mg/Kg		98	80 - 120
Sodium	2500	2450		mg/Kg		98	80 - 120

Lab Sample ID: LCSD 140-51615/20-B ^5
Matrix: Solid
Analysis Batch: 51972

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 1
Prep Batch: 51654

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	99.7		mg/Kg		100	80 - 120	6	30
Antimony	25.0	23.7		mg/Kg		95	80 - 120	2	30
Arsenic	5.00	4.52		mg/Kg		90	80 - 120	0	30
Calcium	2500	2390		mg/Kg		95	80 - 120	2	30
Cobalt	5.00	4.80	J	mg/Kg		96	80 - 120	3	30
Iron	50.0	49.4		mg/Kg		99	80 - 120	3	30
Lithium	5.00	4.94	J	mg/Kg		99	80 - 120	1	30
Manganese	5.00	5.04		mg/Kg		101	80 - 120	2	30
Molybdenum	25.0	24.1		mg/Kg		96	80 - 120	2	30
Potassium	2500	2550		mg/Kg		102	80 - 120	2	30
Selenium	7.50	7.47		mg/Kg		100	80 - 120	1	30
Sodium	2500	2510		mg/Kg		100	80 - 120	2	30

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

Lab Sample ID: MB 140-51653/15-B ^3
Matrix: Solid
Analysis Batch: 51972

Client Sample ID: Method Blank
Prep Type: Step 2
Prep Batch: 51667

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		30	4.8	mg/Kg		07/13/21 08:00	07/21/21 13:55	3
Antimony	ND		9.0	0.84	mg/Kg		07/13/21 08:00	07/21/21 13:55	3
Arsenic	ND		1.5	0.39	mg/Kg		07/13/21 08:00	07/21/21 13:55	3
Calcium	ND		750	6.6	mg/Kg		07/13/21 08:00	07/21/21 13:55	3
Cobalt	ND		7.5	0.19	mg/Kg		07/13/21 08:00	07/21/21 13:55	3
Iron	ND		15	8.7	mg/Kg		07/13/21 08:00	07/21/21 13:55	3
Lithium	ND		7.5	0.45	mg/Kg		07/13/21 08:00	07/21/21 13:55	3
Manganese	ND		2.3	0.84	mg/Kg		07/13/21 08:00	07/21/21 13:55	3
Molybdenum	ND		6.0	0.25	mg/Kg		07/13/21 08:00	07/21/21 13:55	3
Potassium	ND		750	78	mg/Kg		07/13/21 08:00	07/21/21 13:55	3
Selenium	ND		1.5	0.51	mg/Kg		07/13/21 08:00	07/21/21 13:55	3

Lab Sample ID: LCS 140-51653/16-B ^5
Matrix: Solid
Analysis Batch: 51972

Client Sample ID: Lab Control Sample
Prep Type: Step 2
Prep Batch: 51667

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	ND		mg/Kg		0.3	
Antimony	25.0	21.2		mg/Kg		85	70 - 120
Arsenic	5.00	3.66		mg/Kg		73	60 - 120
Calcium	2500	659	J	mg/Kg		26	10 - 40
Cobalt	5.00	4.72	J	mg/Kg		94	80 - 120
Iron	50.0	ND		mg/Kg		3	
Lithium	5.00	4.68	J	mg/Kg		94	80 - 120
Manganese	5.00	4.89		mg/Kg		98	80 - 120
Molybdenum	25.0	21.2		mg/Kg		85	70 - 120
Potassium	2500	2550		mg/Kg		102	80 - 120
Selenium	7.50	6.87		mg/Kg		92	70 - 120

Lab Sample ID: LCSD 140-51653/17-B ^5
Matrix: Solid
Analysis Batch: 51972

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 2
Prep Batch: 51667

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	ND		mg/Kg		-2		281	
Antimony	25.0	20.9		mg/Kg		83	70 - 120	2	30
Arsenic	5.00	3.54		mg/Kg		71	60 - 120	3	30
Calcium	2500	641	J	mg/Kg		26	10 - 40	3	30
Cobalt	5.00	4.54	J	mg/Kg		91	80 - 120	4	30
Iron	50.0	ND		mg/Kg		4		35	
Lithium	5.00	4.44	J	mg/Kg		89	80 - 120	5	30
Manganese	5.00	4.69		mg/Kg		94	80 - 120	4	30
Molybdenum	25.0	20.4		mg/Kg		82	70 - 120	4	30
Potassium	2500	2450		mg/Kg		98	80 - 120	4	30
Selenium	7.50	5.97		mg/Kg		80	70 - 120	14	30

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

Lab Sample ID: MB 140-51666/15-B
Matrix: Solid
Analysis Batch: 51972

Client Sample ID: Method Blank
Prep Type: Step 3
Prep Batch: 51707

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	2.1	mg/Kg		07/14/21 08:00	07/21/21 15:58	1
Antimony	ND		3.0	0.28	mg/Kg		07/14/21 08:00	07/21/21 15:58	1
Arsenic	ND		0.50	0.13	mg/Kg		07/14/21 08:00	07/21/21 15:58	1
Calcium	ND		250	1.5	mg/Kg		07/14/21 08:00	07/21/21 15:58	1
Cobalt	ND		2.5	0.045	mg/Kg		07/14/21 08:00	07/21/21 15:58	1
Iron	ND		5.0	2.9	mg/Kg		07/14/21 08:00	07/21/21 15:58	1
Lithium	ND		2.5	0.15	mg/Kg		07/14/21 08:00	07/21/21 15:58	1
Manganese	0.0895	J	0.75	0.027	mg/Kg		07/14/21 08:00	07/21/21 15:58	1
Molybdenum	ND		2.0	0.082	mg/Kg		07/14/21 08:00	07/21/21 15:58	1
Potassium	ND		250	26	mg/Kg		07/14/21 08:00	07/21/21 15:58	1
Selenium	ND		0.50	0.17	mg/Kg		07/14/21 08:00	07/21/21 15:58	1
Sodium	ND		250	130	mg/Kg		07/14/21 08:00	07/21/21 15:58	1

Lab Sample ID: LCS 140-51666/16-B
Matrix: Solid
Analysis Batch: 51972

Client Sample ID: Lab Control Sample
Prep Type: Step 3
Prep Batch: 51707

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	93.0		mg/Kg		93	80 - 120
Antimony	25.0	22.7		mg/Kg		91	80 - 120
Arsenic	5.00	4.51		mg/Kg		90	80 - 120
Calcium	2500	30.3	J	mg/Kg		1	
Cobalt	5.00	4.66		mg/Kg		93	80 - 120
Iron	50.0	48.2		mg/Kg		96	80 - 120
Lithium	5.00	4.55		mg/Kg		91	80 - 120
Manganese	5.00	4.76		mg/Kg		95	80 - 120
Molybdenum	25.0	23.4		mg/Kg		93	80 - 120
Potassium	2500	2350		mg/Kg		94	80 - 120
Selenium	7.50	7.10		mg/Kg		95	80 - 120
Sodium	2500	2330		mg/Kg		93	80 - 120

Lab Sample ID: LCSD 140-51666/17-B
Matrix: Solid
Analysis Batch: 51972

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 3
Prep Batch: 51707

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	94.5		mg/Kg		94	80 - 120	2	30
Antimony	25.0	23.0		mg/Kg		92	80 - 120	1	30
Arsenic	5.00	4.55		mg/Kg		91	80 - 120	1	30
Calcium	2500	31.2	J	mg/Kg		1		3	
Cobalt	5.00	4.71		mg/Kg		94	80 - 120	1	30
Iron	50.0	49.2		mg/Kg		98	80 - 120	2	30
Lithium	5.00	4.57		mg/Kg		91	80 - 120	1	30
Manganese	5.00	4.81		mg/Kg		96	80 - 120	1	30
Molybdenum	25.0	23.6		mg/Kg		94	80 - 120	1	30
Potassium	2500	2370		mg/Kg		95	80 - 120	1	30
Selenium	7.50	7.31		mg/Kg		97	80 - 120	3	30
Sodium	2500	2350		mg/Kg		94	80 - 120	1	30

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

Lab Sample ID: MB 140-51690/15-B
Matrix: Solid
Analysis Batch: 52038

Client Sample ID: Method Blank
Prep Type: Step 4
Prep Batch: 51767

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		07/15/21 08:00	07/22/21 13:25	1
Antimony	ND		3.0	0.45	mg/Kg		07/15/21 08:00	07/22/21 13:25	1
Arsenic	ND		0.50	0.22	mg/Kg		07/15/21 08:00	07/22/21 13:25	1
Calcium	ND		250	2.2	mg/Kg		07/15/21 08:00	07/22/21 13:25	1
Cobalt	ND		2.5	0.053	mg/Kg		07/15/21 08:00	07/22/21 13:25	1
Iron	ND		5.0	2.9	mg/Kg		07/15/21 08:00	07/22/21 13:25	1
Lithium	ND		2.5	0.15	mg/Kg		07/15/21 08:00	07/22/21 13:25	1
Manganese	ND		0.75	0.13	mg/Kg		07/15/21 08:00	07/22/21 13:25	1
Molybdenum	ND		2.0	0.082	mg/Kg		07/15/21 08:00	07/22/21 13:25	1
Potassium	ND		250	26	mg/Kg		07/15/21 08:00	07/22/21 13:25	1
Selenium	ND		0.50	0.47	mg/Kg		07/15/21 08:00	07/22/21 13:25	1
Sodium	ND		250	130	mg/Kg		07/15/21 08:00	07/22/21 13:25	1

Lab Sample ID: LCS 140-51690/16-B
Matrix: Solid
Analysis Batch: 52038

Client Sample ID: Lab Control Sample
Prep Type: Step 4
Prep Batch: 51767

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	94.8		mg/Kg		95	80 - 120
Antimony	25.0	23.9		mg/Kg		96	80 - 130
Arsenic	5.00	4.86		mg/Kg		97	80 - 130
Calcium	2500	2400		mg/Kg		96	80 - 120
Cobalt	5.00	4.91		mg/Kg		98	80 - 120
Iron	50.0	48.6		mg/Kg		97	80 - 120
Lithium	5.00	4.66		mg/Kg		93	80 - 120
Manganese	5.00	4.90		mg/Kg		98	80 - 120
Molybdenum	25.0	25.0		mg/Kg		100	80 - 120
Potassium	2500	2380		mg/Kg		95	80 - 120
Selenium	7.50	ND		mg/Kg		4	
Sodium	2500	2390		mg/Kg		96	80 - 120

Lab Sample ID: LCSD 140-51690/17-B
Matrix: Solid
Analysis Batch: 52038

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 4
Prep Batch: 51767

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	94.5		mg/Kg		95	80 - 120	0	30
Antimony	25.0	24.1		mg/Kg		96	80 - 130	1	30
Arsenic	5.00	4.83		mg/Kg		97	80 - 130	1	30
Calcium	2500	2400		mg/Kg		96	80 - 120	0	30
Cobalt	5.00	4.93		mg/Kg		99	80 - 120	0	30
Iron	50.0	49.0		mg/Kg		98	80 - 120	1	30
Lithium	5.00	4.65		mg/Kg		93	80 - 120	0	30
Manganese	5.00	4.92		mg/Kg		98	80 - 120	0	30
Molybdenum	25.0	25.1		mg/Kg		100	80 - 120	0	30
Potassium	2500	2390		mg/Kg		96	80 - 120	0	30
Selenium	7.50	ND		mg/Kg		5		27	
Sodium	2500	2400		mg/Kg		96	80 - 120	0	30

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

Lab Sample ID: MB 140-51761/15-B ^5
Matrix: Solid
Analysis Batch: 52038

Client Sample ID: Method Blank
Prep Type: Step 5
Prep Batch: 51837

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		150	24	mg/Kg		07/17/21 08:14	07/22/21 15:11	5
Antimony	ND		45	4.2	mg/Kg		07/17/21 08:14	07/22/21 15:11	5
Arsenic	ND		7.5	1.9	mg/Kg		07/17/21 08:14	07/22/21 15:11	5
Calcium	11.0	J	3800	11	mg/Kg		07/17/21 08:14	07/22/21 15:11	5
Cobalt	ND		38	0.60	mg/Kg		07/17/21 08:14	07/22/21 15:11	5
Iron	ND		75	44	mg/Kg		07/17/21 08:14	07/22/21 15:11	5
Lithium	ND		38	2.2	mg/Kg		07/17/21 08:14	07/22/21 15:11	5
Manganese	ND		11	1.9	mg/Kg		07/17/21 08:14	07/22/21 15:11	5
Molybdenum	ND		30	1.3	mg/Kg		07/17/21 08:14	07/22/21 15:11	5
Potassium	2300	J	3800	430	mg/Kg		07/17/21 08:14	07/22/21 15:11	5
Selenium	ND		7.5	2.6	mg/Kg		07/17/21 08:14	07/22/21 15:11	5

Lab Sample ID: LCS 140-51761/16-B ^5
Matrix: Solid
Analysis Batch: 52038

Client Sample ID: Lab Control Sample
Prep Type: Step 5
Prep Batch: 51837

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	300	ND		mg/Kg		4	
Antimony	75.0	69.4		mg/Kg		93	80 - 120
Arsenic	15.0	10.3		mg/Kg		69	60 - 100
Calcium	7500	1890	J	mg/Kg		25	20 - 50
Cobalt	15.0	0.623	J	mg/Kg		4	1 - 60
Iron	150	ND		mg/Kg		-0.8	
Lithium	15.0	15.5	J	mg/Kg		103	80 - 150
Manganese	15.0	ND		mg/Kg		12	1 - 60
Molybdenum	75.0	52.9		mg/Kg		70	60 - 100
Potassium	7500	9720		mg/Kg		130	80 - 180
Selenium	22.5	23.3		mg/Kg		103	80 - 140

Lab Sample ID: LCSD 140-51761/17-B ^5
Matrix: Solid
Analysis Batch: 52038

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 5
Prep Batch: 51837

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	300	ND		mg/Kg		2		62	
Antimony	75.0	68.0		mg/Kg		91	80 - 120	2	30
Arsenic	15.0	10.1		mg/Kg		68	60 - 100	2	30
Calcium	7500	1850	J	mg/Kg		25	20 - 50	2	30
Cobalt	15.0	ND		mg/Kg		4	1 - 60	8	30
Iron	150	ND		mg/Kg		0.5		1094	
Lithium	15.0	15.3	J	mg/Kg		102	80 - 150	2	30
Manganese	15.0	2.38	J	mg/Kg		16	1 - 60	30	30
Molybdenum	75.0	52.5		mg/Kg		70	60 - 100	1	30
Potassium	7500	9510		mg/Kg		127	80 - 180	2	30
Selenium	22.5	23.0		mg/Kg		102	80 - 140	1	30

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

Lab Sample ID: MB 140-51802/15-A
Matrix: Solid
Analysis Batch: 52038

Client Sample ID: Method Blank
Prep Type: Step 6
Prep Batch: 51802

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		07/16/21 12:00	07/22/21 17:00	1
Antimony	ND		3.0	0.28	mg/Kg		07/16/21 12:00	07/22/21 17:00	1
Arsenic	ND		0.50	0.15	mg/Kg		07/16/21 12:00	07/22/21 17:00	1
Calcium	ND		250	2.1	mg/Kg		07/16/21 12:00	07/22/21 17:00	1
Cobalt	ND		2.5	0.046	mg/Kg		07/16/21 12:00	07/22/21 17:00	1
Iron	ND		5.0	2.9	mg/Kg		07/16/21 12:00	07/22/21 17:00	1
Lithium	ND		2.5	0.15	mg/Kg		07/16/21 12:00	07/22/21 17:00	1
Manganese	ND		0.75	0.25	mg/Kg		07/16/21 12:00	07/22/21 17:00	1
Molybdenum	ND		2.0	0.099	mg/Kg		07/16/21 12:00	07/22/21 17:00	1
Potassium	ND		250	26	mg/Kg		07/16/21 12:00	07/22/21 17:00	1
Selenium	ND		0.50	0.17	mg/Kg		07/16/21 12:00	07/22/21 17:00	1
Sodium	ND		250	130	mg/Kg		07/16/21 12:00	07/22/21 17:00	1

Lab Sample ID: LCS 140-51802/16-A
Matrix: Solid
Analysis Batch: 52038

Client Sample ID: Lab Control Sample
Prep Type: Step 6
Prep Batch: 51802

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	96.6		mg/Kg		97	80 - 120
Antimony	25.0	24.7		mg/Kg		99	80 - 120
Arsenic	5.00	4.73		mg/Kg		95	80 - 120
Calcium	2500	2410		mg/Kg		96	80 - 120
Cobalt	5.00	4.94		mg/Kg		99	80 - 120
Iron	50.0	49.4		mg/Kg		99	80 - 120
Lithium	5.00	4.52		mg/Kg		90	80 - 120
Manganese	5.00	4.94		mg/Kg		99	80 - 120
Molybdenum	25.0	25.1		mg/Kg		100	80 - 120
Potassium	2500	2420		mg/Kg		97	80 - 120
Selenium	7.50	7.56		mg/Kg		101	80 - 120
Sodium	2500	2420		mg/Kg		97	80 - 120

Lab Sample ID: LCSD 140-51802/17-A
Matrix: Solid
Analysis Batch: 52038

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 6
Prep Batch: 51802

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	98.0		mg/Kg		98	80 - 120	1	30
Antimony	25.0	25.0		mg/Kg		100	80 - 120	1	30
Arsenic	5.00	4.84		mg/Kg		97	80 - 120	2	30
Calcium	2500	2450		mg/Kg		98	80 - 120	2	30
Cobalt	5.00	5.02		mg/Kg		100	80 - 120	2	30
Iron	50.0	50.3		mg/Kg		101	80 - 120	2	30
Lithium	5.00	4.64		mg/Kg		93	80 - 120	2	30
Manganese	5.00	5.02		mg/Kg		100	80 - 120	2	30
Molybdenum	25.0	25.5		mg/Kg		102	80 - 120	2	30
Potassium	2500	2470		mg/Kg		99	80 - 120	2	30
Selenium	7.50	7.61		mg/Kg		102	80 - 120	1	30
Sodium	2500	2460		mg/Kg		99	80 - 120	2	30

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

Lab Sample ID: MB 140-51862/15-A
Matrix: Solid
Analysis Batch: 52062

Client Sample ID: Method Blank
Prep Type: Step 7
Prep Batch: 51862

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		07/20/21 08:00	07/23/21 12:35	1
Antimony	ND		3.0	0.14	mg/Kg		07/20/21 08:00	07/23/21 12:35	1
Arsenic	ND		0.50	0.13	mg/Kg		07/20/21 08:00	07/23/21 12:35	1
Calcium	ND		250	2.6	mg/Kg		07/20/21 08:00	07/23/21 12:35	1
Cobalt	ND		2.5	0.026	mg/Kg		07/20/21 08:00	07/23/21 12:35	1
Iron	ND		5.0	4.1	mg/Kg		07/20/21 08:00	07/23/21 12:35	1
Lithium	ND		2.5	0.15	mg/Kg		07/20/21 08:00	07/23/21 12:35	1
Manganese	ND		0.75	0.11	mg/Kg		07/20/21 08:00	07/23/21 12:35	1
Molybdenum	ND		2.0	0.082	mg/Kg		07/20/21 08:00	07/23/21 12:35	1
Potassium	ND		250	10	mg/Kg		07/20/21 08:00	07/23/21 12:35	1
Selenium	ND		0.50	0.17	mg/Kg		07/20/21 08:00	07/23/21 12:35	1
Sodium	ND		250	43	mg/Kg		07/20/21 08:00	07/23/21 12:35	1

Lab Sample ID: LCS 140-51862/16-A
Matrix: Solid
Analysis Batch: 52062

Client Sample ID: Lab Control Sample
Prep Type: Step 7
Prep Batch: 51862

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	98.3		mg/Kg		98	80 - 120
Antimony	25.0	24.5		mg/Kg		98	80 - 125
Arsenic	5.00	4.94		mg/Kg		99	80 - 120
Calcium	2500	2480		mg/Kg		99	80 - 120
Cobalt	5.00	5.02		mg/Kg		100	80 - 125
Iron	50.0	51.6		mg/Kg		103	80 - 120
Lithium	5.00	4.90		mg/Kg		98	80 - 120
Manganese	5.00	5.18		mg/Kg		104	80 - 120
Molybdenum	25.0	25.7		mg/Kg		103	80 - 125
Potassium	2500	2500		mg/Kg		100	80 - 120
Selenium	7.50	7.19		mg/Kg		96	80 - 120
Sodium	2500	2520		mg/Kg		101	80 - 120

Lab Sample ID: LCSD 140-51862/17-A
Matrix: Solid
Analysis Batch: 52062

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 7
Prep Batch: 51862

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	97.4		mg/Kg		97	80 - 120	1	30
Antimony	25.0	24.6		mg/Kg		98	80 - 125	0	30
Arsenic	5.00	4.95		mg/Kg		99	80 - 120	0	30
Calcium	2500	2500		mg/Kg		100	80 - 120	1	30
Cobalt	5.00	5.05		mg/Kg		101	80 - 125	1	30
Iron	50.0	51.8		mg/Kg		104	80 - 120	1	30
Lithium	5.00	4.95		mg/Kg		99	80 - 120	1	30
Manganese	5.00	5.21		mg/Kg		104	80 - 120	1	30
Molybdenum	25.0	25.8		mg/Kg		103	80 - 125	0	30
Potassium	2500	2520		mg/Kg		101	80 - 120	1	30
Selenium	7.50	7.17		mg/Kg		96	80 - 120	0	30
Sodium	2500	2540		mg/Kg		101	80 - 120	0	30

Metals

Prep Batch: 51236

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Total/NA	Solid	3050B	
140-23290-2	L-BH-03M	Total/NA	Solid	3050B	
140-23290-3	L-BH-03D	Total/NA	Solid	3050B	
140-23290-4	L-BH-02S	Total/NA	Solid	3050B	
140-23290-5	L-BH-02M	Total/NA	Solid	3050B	
140-23290-6	L-BH-02D	Total/NA	Solid	3050B	
140-23290-7	L-BH-01S	Total/NA	Solid	3050B	
140-23290-8	L-BH-01M	Total/NA	Solid	3050B	
140-23290-9	L-BH-01D	Total/NA	Solid	3050B	
MB 140-51236/21-A	Method Blank	Total/NA	Solid	3050B	
LCS 140-51236/22-A	Lab Control Sample	Total/NA	Solid	3050B	
140-23290-6 MS	L-BH-02D	Total/NA	Solid	3050B	
140-23290-6 MSD	L-BH-02D	Total/NA	Solid	3050B	

Analysis Batch: 51553

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Total/NA	Solid	6010B	51236
140-23290-2	L-BH-03M	Total/NA	Solid	6010B	51236
140-23290-3	L-BH-03D	Total/NA	Solid	6010B	51236
140-23290-4	L-BH-02S	Total/NA	Solid	6010B	51236
140-23290-5	L-BH-02M	Total/NA	Solid	6010B	51236
140-23290-6	L-BH-02D	Total/NA	Solid	6010B	51236
140-23290-7	L-BH-01S	Total/NA	Solid	6010B	51236
140-23290-8	L-BH-01M	Total/NA	Solid	6010B	51236
140-23290-9	L-BH-01D	Total/NA	Solid	6010B	51236
MB 140-51236/21-A	Method Blank	Total/NA	Solid	6010B	51236
LCS 140-51236/22-A	Lab Control Sample	Total/NA	Solid	6010B	51236
140-23290-6 MS	L-BH-02D	Total/NA	Solid	6010B	51236
140-23290-6 MSD	L-BH-02D	Total/NA	Solid	6010B	51236

Prep Batch: 51614

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Total/NA	Solid	Total	
140-23290-2	L-BH-03M	Total/NA	Solid	Total	
140-23290-3	L-BH-03D	Total/NA	Solid	Total	
140-23290-4	L-BH-02S	Total/NA	Solid	Total	
140-23290-5	L-BH-02M	Total/NA	Solid	Total	
140-23290-6	L-BH-02D	Total/NA	Solid	Total	
140-23290-7	L-BH-01S	Total/NA	Solid	Total	
140-23290-8	L-BH-01M	Total/NA	Solid	Total	
140-23290-9	L-BH-01D	Total/NA	Solid	Total	
MB 140-51614/18-A	Method Blank	Total/NA	Solid	Total	
LCS 140-51614/19-A	Lab Control Sample	Total/NA	Solid	Total	
LCSD 140-51614/20-A	Lab Control Sample Dup	Total/NA	Solid	Total	

SEP Batch: 51615

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 1	Solid	Exchangeable	
140-23290-2	L-BH-03M	Step 1	Solid	Exchangeable	
140-23290-3	L-BH-03D	Step 1	Solid	Exchangeable	
140-23290-4	L-BH-02S	Step 1	Solid	Exchangeable	

Metals (Continued)

SEP Batch: 51615 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-5	L-BH-02M	Step 1	Solid	Exchangeable	
140-23290-6	L-BH-02D	Step 1	Solid	Exchangeable	
140-23290-7	L-BH-01S	Step 1	Solid	Exchangeable	
140-23290-8	L-BH-01M	Step 1	Solid	Exchangeable	
140-23290-9	L-BH-01D	Step 1	Solid	Exchangeable	
MB 140-51615/18-B ^4	Method Blank	Step 1	Solid	Exchangeable	
LCS 140-51615/19-B ^5	Lab Control Sample	Step 1	Solid	Exchangeable	
LCSD 140-51615/20-B ^5	Lab Control Sample Dup	Step 1	Solid	Exchangeable	

SEP Batch: 51653

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 2	Solid	Carbonate	
140-23290-2	L-BH-03M	Step 2	Solid	Carbonate	
140-23290-3	L-BH-03D	Step 2	Solid	Carbonate	
140-23290-4	L-BH-02S	Step 2	Solid	Carbonate	
140-23290-5	L-BH-02M	Step 2	Solid	Carbonate	
140-23290-6	L-BH-02D	Step 2	Solid	Carbonate	
140-23290-7	L-BH-01S	Step 2	Solid	Carbonate	
140-23290-8	L-BH-01M	Step 2	Solid	Carbonate	
140-23290-9	L-BH-01D	Step 2	Solid	Carbonate	
MB 140-51653/15-B ^3	Method Blank	Step 2	Solid	Carbonate	
LCS 140-51653/16-B ^5	Lab Control Sample	Step 2	Solid	Carbonate	
LCSD 140-51653/17-B ^5	Lab Control Sample Dup	Step 2	Solid	Carbonate	

Prep Batch: 51654

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 1	Solid	3010A	51615
140-23290-2	L-BH-03M	Step 1	Solid	3010A	51615
140-23290-3	L-BH-03D	Step 1	Solid	3010A	51615
140-23290-4	L-BH-02S	Step 1	Solid	3010A	51615
140-23290-5	L-BH-02M	Step 1	Solid	3010A	51615
140-23290-6	L-BH-02D	Step 1	Solid	3010A	51615
140-23290-7	L-BH-01S	Step 1	Solid	3010A	51615
140-23290-8	L-BH-01M	Step 1	Solid	3010A	51615
140-23290-9	L-BH-01D	Step 1	Solid	3010A	51615
MB 140-51615/18-B ^4	Method Blank	Step 1	Solid	3010A	51615
LCS 140-51615/19-B ^5	Lab Control Sample	Step 1	Solid	3010A	51615
LCSD 140-51615/20-B ^5	Lab Control Sample Dup	Step 1	Solid	3010A	51615

SEP Batch: 51666

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 3	Solid	Non-Crystalline	
140-23290-2	L-BH-03M	Step 3	Solid	Non-Crystalline	
140-23290-3	L-BH-03D	Step 3	Solid	Non-Crystalline	
140-23290-4	L-BH-02S	Step 3	Solid	Non-Crystalline	
140-23290-5	L-BH-02M	Step 3	Solid	Non-Crystalline	
140-23290-6	L-BH-02D	Step 3	Solid	Non-Crystalline	
140-23290-7	L-BH-01S	Step 3	Solid	Non-Crystalline	
140-23290-8	L-BH-01M	Step 3	Solid	Non-Crystalline	
140-23290-9	L-BH-01D	Step 3	Solid	Non-Crystalline	
MB 140-51666/15-B	Method Blank	Step 3	Solid	Non-Crystalline	

Metals (Continued)

SEP Batch: 51666 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 140-51666/16-B	Lab Control Sample	Step 3	Solid	Non-Crystalline	
LCSD 140-51666/17-B	Lab Control Sample Dup	Step 3	Solid	Non-Crystalline	

Prep Batch: 51667

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 2	Solid	3010A	51653
140-23290-2	L-BH-03M	Step 2	Solid	3010A	51653
140-23290-3	L-BH-03D	Step 2	Solid	3010A	51653
140-23290-4	L-BH-02S	Step 2	Solid	3010A	51653
140-23290-5	L-BH-02M	Step 2	Solid	3010A	51653
140-23290-6	L-BH-02D	Step 2	Solid	3010A	51653
140-23290-7	L-BH-01S	Step 2	Solid	3010A	51653
140-23290-8	L-BH-01M	Step 2	Solid	3010A	51653
140-23290-9	L-BH-01D	Step 2	Solid	3010A	51653
MB 140-51653/15-B ^3	Method Blank	Step 2	Solid	3010A	51653
LCS 140-51653/16-B ^5	Lab Control Sample	Step 2	Solid	3010A	51653
LCSD 140-51653/17-B ^5	Lab Control Sample Dup	Step 2	Solid	3010A	51653

SEP Batch: 51690

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 4	Solid	Metal Hydroxide	
140-23290-2	L-BH-03M	Step 4	Solid	Metal Hydroxide	
140-23290-3	L-BH-03D	Step 4	Solid	Metal Hydroxide	
140-23290-4	L-BH-02S	Step 4	Solid	Metal Hydroxide	
140-23290-5	L-BH-02M	Step 4	Solid	Metal Hydroxide	
140-23290-6	L-BH-02D	Step 4	Solid	Metal Hydroxide	
140-23290-7	L-BH-01S	Step 4	Solid	Metal Hydroxide	
140-23290-8	L-BH-01M	Step 4	Solid	Metal Hydroxide	
140-23290-9	L-BH-01D	Step 4	Solid	Metal Hydroxide	
MB 140-51690/15-B	Method Blank	Step 4	Solid	Metal Hydroxide	
LCS 140-51690/16-B	Lab Control Sample	Step 4	Solid	Metal Hydroxide	
LCSD 140-51690/17-B	Lab Control Sample Dup	Step 4	Solid	Metal Hydroxide	

Prep Batch: 51707

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 3	Solid	3010A	51666
140-23290-2	L-BH-03M	Step 3	Solid	3010A	51666
140-23290-3	L-BH-03D	Step 3	Solid	3010A	51666
140-23290-4	L-BH-02S	Step 3	Solid	3010A	51666
140-23290-5	L-BH-02M	Step 3	Solid	3010A	51666
140-23290-6	L-BH-02D	Step 3	Solid	3010A	51666
140-23290-7	L-BH-01S	Step 3	Solid	3010A	51666
140-23290-8	L-BH-01M	Step 3	Solid	3010A	51666
140-23290-9	L-BH-01D	Step 3	Solid	3010A	51666
MB 140-51666/15-B	Method Blank	Step 3	Solid	3010A	51666
LCS 140-51666/16-B	Lab Control Sample	Step 3	Solid	3010A	51666
LCSD 140-51666/17-B	Lab Control Sample Dup	Step 3	Solid	3010A	51666

SEP Batch: 51761

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 5	Solid	Organic-Bound	

Metals (Continued)

SEP Batch: 51761 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-2	L-BH-03M	Step 5	Solid	Organic-Bound	
140-23290-3	L-BH-03D	Step 5	Solid	Organic-Bound	
140-23290-4	L-BH-02S	Step 5	Solid	Organic-Bound	
140-23290-5	L-BH-02M	Step 5	Solid	Organic-Bound	
140-23290-6	L-BH-02D	Step 5	Solid	Organic-Bound	
140-23290-7	L-BH-01S	Step 5	Solid	Organic-Bound	
140-23290-8	L-BH-01M	Step 5	Solid	Organic-Bound	
140-23290-9	L-BH-01D	Step 5	Solid	Organic-Bound	
MB 140-51761/15-B ^5	Method Blank	Step 5	Solid	Organic-Bound	
LCS 140-51761/16-B ^5	Lab Control Sample	Step 5	Solid	Organic-Bound	
LCSD 140-51761/17-B ^5	Lab Control Sample Dup	Step 5	Solid	Organic-Bound	

Prep Batch: 51767

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 4	Solid	3010A	51690
140-23290-2	L-BH-03M	Step 4	Solid	3010A	51690
140-23290-3	L-BH-03D	Step 4	Solid	3010A	51690
140-23290-4	L-BH-02S	Step 4	Solid	3010A	51690
140-23290-5	L-BH-02M	Step 4	Solid	3010A	51690
140-23290-6	L-BH-02D	Step 4	Solid	3010A	51690
140-23290-7	L-BH-01S	Step 4	Solid	3010A	51690
140-23290-8	L-BH-01M	Step 4	Solid	3010A	51690
140-23290-9	L-BH-01D	Step 4	Solid	3010A	51690
MB 140-51690/15-B	Method Blank	Step 4	Solid	3010A	51690
LCS 140-51690/16-B	Lab Control Sample	Step 4	Solid	3010A	51690
LCSD 140-51690/17-B	Lab Control Sample Dup	Step 4	Solid	3010A	51690

SEP Batch: 51802

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 6	Solid	Acid/Sulfide	
140-23290-2	L-BH-03M	Step 6	Solid	Acid/Sulfide	
140-23290-3	L-BH-03D	Step 6	Solid	Acid/Sulfide	
140-23290-4	L-BH-02S	Step 6	Solid	Acid/Sulfide	
140-23290-5	L-BH-02M	Step 6	Solid	Acid/Sulfide	
140-23290-6	L-BH-02D	Step 6	Solid	Acid/Sulfide	
140-23290-7	L-BH-01S	Step 6	Solid	Acid/Sulfide	
140-23290-8	L-BH-01M	Step 6	Solid	Acid/Sulfide	
140-23290-9	L-BH-01D	Step 6	Solid	Acid/Sulfide	
MB 140-51802/15-A	Method Blank	Step 6	Solid	Acid/Sulfide	
LCS 140-51802/16-A	Lab Control Sample	Step 6	Solid	Acid/Sulfide	
LCSD 140-51802/17-A	Lab Control Sample Dup	Step 6	Solid	Acid/Sulfide	

Prep Batch: 51837

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 5	Solid	3010A	51761
140-23290-2	L-BH-03M	Step 5	Solid	3010A	51761
140-23290-3	L-BH-03D	Step 5	Solid	3010A	51761
140-23290-4	L-BH-02S	Step 5	Solid	3010A	51761
140-23290-5	L-BH-02M	Step 5	Solid	3010A	51761
140-23290-6	L-BH-02D	Step 5	Solid	3010A	51761
140-23290-7	L-BH-01S	Step 5	Solid	3010A	51761

Metals (Continued)

Prep Batch: 51837 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-8	L-BH-01M	Step 5	Solid	3010A	51761
140-23290-9	L-BH-01D	Step 5	Solid	3010A	51761
MB 140-51761/15-B ^5	Method Blank	Step 5	Solid	3010A	51761
LCS 140-51761/16-B ^5	Lab Control Sample	Step 5	Solid	3010A	51761
LCSD 140-51761/17-B ^5	Lab Control Sample Dup	Step 5	Solid	3010A	51761

Prep Batch: 51862

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 7	Solid	Residual	
140-23290-2	L-BH-03M	Step 7	Solid	Residual	
140-23290-3	L-BH-03D	Step 7	Solid	Residual	
140-23290-4	L-BH-02S	Step 7	Solid	Residual	
140-23290-5	L-BH-02M	Step 7	Solid	Residual	
140-23290-6	L-BH-02D	Step 7	Solid	Residual	
140-23290-7	L-BH-01S	Step 7	Solid	Residual	
140-23290-8	L-BH-01M	Step 7	Solid	Residual	
140-23290-9	L-BH-01D	Step 7	Solid	Residual	
MB 140-51862/15-A	Method Blank	Step 7	Solid	Residual	
LCS 140-51862/16-A	Lab Control Sample	Step 7	Solid	Residual	
LCSD 140-51862/17-A	Lab Control Sample Dup	Step 7	Solid	Residual	

Analysis Batch: 51972

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 1	Solid	6010B SEP	51654
140-23290-1	L-BH-03S	Step 2	Solid	6010B SEP	51667
140-23290-1	L-BH-03S	Step 3	Solid	6010B SEP	51707
140-23290-2	L-BH-03M	Step 1	Solid	6010B SEP	51654
140-23290-2	L-BH-03M	Step 2	Solid	6010B SEP	51667
140-23290-2	L-BH-03M	Step 3	Solid	6010B SEP	51707
140-23290-3	L-BH-03D	Step 1	Solid	6010B SEP	51654
140-23290-3	L-BH-03D	Step 2	Solid	6010B SEP	51667
140-23290-3	L-BH-03D	Step 3	Solid	6010B SEP	51707
140-23290-4	L-BH-02S	Step 1	Solid	6010B SEP	51654
140-23290-4	L-BH-02S	Step 2	Solid	6010B SEP	51667
140-23290-4	L-BH-02S	Step 3	Solid	6010B SEP	51707
140-23290-5	L-BH-02M	Step 1	Solid	6010B SEP	51654
140-23290-5	L-BH-02M	Step 2	Solid	6010B SEP	51667
140-23290-5	L-BH-02M	Step 3	Solid	6010B SEP	51707
140-23290-6	L-BH-02D	Step 1	Solid	6010B SEP	51654
140-23290-6	L-BH-02D	Step 2	Solid	6010B SEP	51667
140-23290-6	L-BH-02D	Step 3	Solid	6010B SEP	51707
140-23290-7	L-BH-01S	Step 1	Solid	6010B SEP	51654
140-23290-7	L-BH-01S	Step 2	Solid	6010B SEP	51667
140-23290-7	L-BH-01S	Step 3	Solid	6010B SEP	51707
140-23290-8	L-BH-01M	Step 1	Solid	6010B SEP	51654
140-23290-8	L-BH-01M	Step 2	Solid	6010B SEP	51667
140-23290-8	L-BH-01M	Step 3	Solid	6010B SEP	51707
140-23290-9	L-BH-01D	Step 1	Solid	6010B SEP	51654
140-23290-9	L-BH-01D	Step 2	Solid	6010B SEP	51667
140-23290-9	L-BH-01D	Step 3	Solid	6010B SEP	51707
MB 140-51615/18-B ^4	Method Blank	Step 1	Solid	6010B SEP	51654

Metals (Continued)

Analysis Batch: 51972 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 140-51653/15-B ^3	Method Blank	Step 2	Solid	6010B SEP	51667
MB 140-51666/15-B	Method Blank	Step 3	Solid	6010B SEP	51707
LCS 140-51615/19-B ^5	Lab Control Sample	Step 1	Solid	6010B SEP	51654
LCS 140-51653/16-B ^5	Lab Control Sample	Step 2	Solid	6010B SEP	51667
LCS 140-51666/16-B	Lab Control Sample	Step 3	Solid	6010B SEP	51707
LCSD 140-51615/20-B ^5	Lab Control Sample Dup	Step 1	Solid	6010B SEP	51654
LCSD 140-51653/17-B ^5	Lab Control Sample Dup	Step 2	Solid	6010B SEP	51667
LCSD 140-51666/17-B	Lab Control Sample Dup	Step 3	Solid	6010B SEP	51707

Analysis Batch: 52038

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 4	Solid	6010B SEP	51767
140-23290-1	L-BH-03S	Step 5	Solid	6010B SEP	51837
140-23290-1	L-BH-03S	Step 6	Solid	6010B SEP	51802
140-23290-1	L-BH-03S	Step 6	Solid	6010B SEP	51802
140-23290-2	L-BH-03M	Step 4	Solid	6010B SEP	51767
140-23290-2	L-BH-03M	Step 5	Solid	6010B SEP	51837
140-23290-2	L-BH-03M	Step 6	Solid	6010B SEP	51802
140-23290-2	L-BH-03M	Step 6	Solid	6010B SEP	51802
140-23290-3	L-BH-03D	Step 4	Solid	6010B SEP	51767
140-23290-3	L-BH-03D	Step 5	Solid	6010B SEP	51837
140-23290-3	L-BH-03D	Step 6	Solid	6010B SEP	51802
140-23290-3	L-BH-03D	Step 6	Solid	6010B SEP	51802
140-23290-4	L-BH-02S	Step 4	Solid	6010B SEP	51767
140-23290-4	L-BH-02S	Step 5	Solid	6010B SEP	51837
140-23290-4	L-BH-02S	Step 6	Solid	6010B SEP	51802
140-23290-4	L-BH-02S	Step 6	Solid	6010B SEP	51802
140-23290-5	L-BH-02M	Step 4	Solid	6010B SEP	51767
140-23290-5	L-BH-02M	Step 5	Solid	6010B SEP	51837
140-23290-5	L-BH-02M	Step 6	Solid	6010B SEP	51802
140-23290-5	L-BH-02M	Step 6	Solid	6010B SEP	51802
140-23290-6	L-BH-02D	Step 4	Solid	6010B SEP	51767
140-23290-6	L-BH-02D	Step 5	Solid	6010B SEP	51837
140-23290-6	L-BH-02D	Step 6	Solid	6010B SEP	51802
140-23290-6	L-BH-02D	Step 6	Solid	6010B SEP	51802
140-23290-7	L-BH-01S	Step 4	Solid	6010B SEP	51767
140-23290-7	L-BH-01S	Step 5	Solid	6010B SEP	51837
140-23290-7	L-BH-01S	Step 6	Solid	6010B SEP	51802
140-23290-7	L-BH-01S	Step 6	Solid	6010B SEP	51802
140-23290-8	L-BH-01M	Step 4	Solid	6010B SEP	51767
140-23290-8	L-BH-01M	Step 5	Solid	6010B SEP	51837
140-23290-8	L-BH-01M	Step 6	Solid	6010B SEP	51802
140-23290-8	L-BH-01M	Step 6	Solid	6010B SEP	51802
140-23290-9	L-BH-01D	Step 4	Solid	6010B SEP	51767
140-23290-9	L-BH-01D	Step 5	Solid	6010B SEP	51837
140-23290-9	L-BH-01D	Step 6	Solid	6010B SEP	51802
140-23290-9	L-BH-01D	Step 6	Solid	6010B SEP	51802
MB 140-51690/15-B	Method Blank	Step 4	Solid	6010B SEP	51767
MB 140-51761/15-B ^5	Method Blank	Step 5	Solid	6010B SEP	51837
MB 140-51802/15-A	Method Blank	Step 6	Solid	6010B SEP	51802
LCS 140-51690/16-B	Lab Control Sample	Step 4	Solid	6010B SEP	51767

Metals (Continued)

Analysis Batch: 52038 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 140-51761/16-B ^5	Lab Control Sample	Step 5	Solid	6010B SEP	51837
LCS 140-51802/16-A	Lab Control Sample	Step 6	Solid	6010B SEP	51802
LCSD 140-51690/17-B	Lab Control Sample Dup	Step 4	Solid	6010B SEP	51767
LCSD 140-51761/17-B ^5	Lab Control Sample Dup	Step 5	Solid	6010B SEP	51837
LCSD 140-51802/17-A	Lab Control Sample Dup	Step 6	Solid	6010B SEP	51802

Analysis Batch: 52062

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 7	Solid	6010B SEP	51862
140-23290-1	L-BH-03S	Step 7	Solid	6010B SEP	51862
140-23290-2	L-BH-03M	Step 7	Solid	6010B SEP	51862
140-23290-2	L-BH-03M	Step 7	Solid	6010B SEP	51862
140-23290-3	L-BH-03D	Step 7	Solid	6010B SEP	51862
140-23290-3	L-BH-03D	Step 7	Solid	6010B SEP	51862
140-23290-4	L-BH-02S	Step 7	Solid	6010B SEP	51862
140-23290-4	L-BH-02S	Step 7	Solid	6010B SEP	51862
140-23290-5	L-BH-02M	Step 7	Solid	6010B SEP	51862
140-23290-5	L-BH-02M	Step 7	Solid	6010B SEP	51862
140-23290-6	L-BH-02D	Step 7	Solid	6010B SEP	51862
140-23290-6	L-BH-02D	Step 7	Solid	6010B SEP	51862
140-23290-7	L-BH-01S	Step 7	Solid	6010B SEP	51862
140-23290-7	L-BH-01S	Step 7	Solid	6010B SEP	51862
140-23290-8	L-BH-01M	Step 7	Solid	6010B SEP	51862
140-23290-8	L-BH-01M	Step 7	Solid	6010B SEP	51862
140-23290-9	L-BH-01D	Step 7	Solid	6010B SEP	51862
140-23290-9	L-BH-01D	Step 7	Solid	6010B SEP	51862
MB 140-51862/15-A	Method Blank	Step 7	Solid	6010B SEP	51862
LCS 140-51862/16-A	Lab Control Sample	Step 7	Solid	6010B SEP	51862
LCSD 140-51862/17-A	Lab Control Sample Dup	Step 7	Solid	6010B SEP	51862

Analysis Batch: 52192

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Step 7	Solid	6010B SEP	51862
140-23290-1	L-BH-03S	Total/NA	Solid	6010B	51614
140-23290-2	L-BH-03M	Step 7	Solid	6010B SEP	51862
140-23290-2	L-BH-03M	Step 7	Solid	6010B SEP	51862
140-23290-2	L-BH-03M	Total/NA	Solid	6010B	51614
140-23290-3	L-BH-03D	Step 7	Solid	6010B SEP	51862
140-23290-3	L-BH-03D	Step 7	Solid	6010B SEP	51862
140-23290-3	L-BH-03D	Total/NA	Solid	6010B	51614
140-23290-4	L-BH-02S	Step 7	Solid	6010B SEP	51862
140-23290-4	L-BH-02S	Total/NA	Solid	6010B	51614
140-23290-5	L-BH-02M	Step 7	Solid	6010B SEP	51862
140-23290-5	L-BH-02M	Step 7	Solid	6010B SEP	51862
140-23290-5	L-BH-02M	Total/NA	Solid	6010B	51614
140-23290-6	L-BH-02D	Step 7	Solid	6010B SEP	51862
140-23290-6	L-BH-02D	Step 7	Solid	6010B SEP	51862
140-23290-6	L-BH-02D	Total/NA	Solid	6010B	51614
140-23290-7	L-BH-01S	Step 7	Solid	6010B SEP	51862
140-23290-7	L-BH-01S	Total/NA	Solid	6010B	51614
140-23290-8	L-BH-01M	Step 7	Solid	6010B SEP	51862

Metals (Continued)

Analysis Batch: 52192 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-8	L-BH-01M	Step 7	Solid	6010B SEP	51862
140-23290-8	L-BH-01M	Total/NA	Solid	6010B	51614
140-23290-9	L-BH-01D	Step 7	Solid	6010B SEP	51862
140-23290-9	L-BH-01D	Total/NA	Solid	6010B	51614
MB 140-51614/18-A	Method Blank	Total/NA	Solid	6010B	51614
LCS 140-51614/19-A	Lab Control Sample	Total/NA	Solid	6010B	51614
LCSD 140-51614/20-A	Lab Control Sample Dup	Total/NA	Solid	6010B	51614

Analysis Batch: 52210

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Total/NA	Solid	6010B	51614
140-23290-1	L-BH-03S	Total/NA	Solid	6010B	51614
140-23290-2	L-BH-03M	Total/NA	Solid	6010B	51614
140-23290-2	L-BH-03M	Total/NA	Solid	6010B	51614
140-23290-3	L-BH-03D	Total/NA	Solid	6010B	51614
140-23290-3	L-BH-03D	Total/NA	Solid	6010B	51614
140-23290-4	L-BH-02S	Total/NA	Solid	6010B	51614
140-23290-4	L-BH-02S	Total/NA	Solid	6010B	51614
140-23290-5	L-BH-02M	Total/NA	Solid	6010B	51614
140-23290-5	L-BH-02M	Total/NA	Solid	6010B	51614
140-23290-5	L-BH-02M	Total/NA	Solid	6010B	51614
140-23290-6	L-BH-02D	Total/NA	Solid	6010B	51614
140-23290-6	L-BH-02D	Total/NA	Solid	6010B	51614
140-23290-7	L-BH-01S	Total/NA	Solid	6010B	51614
140-23290-7	L-BH-01S	Total/NA	Solid	6010B	51614
140-23290-8	L-BH-01M	Total/NA	Solid	6010B	51614
140-23290-8	L-BH-01M	Total/NA	Solid	6010B	51614
140-23290-9	L-BH-01D	Total/NA	Solid	6010B	51614
140-23290-9	L-BH-01D	Total/NA	Solid	6010B	51614
MB 140-51614/18-A	Method Blank	Total/NA	Solid	6010B	51614
LCS 140-51614/19-A	Lab Control Sample	Total/NA	Solid	6010B	51614
LCSD 140-51614/20-A	Lab Control Sample Dup	Total/NA	Solid	6010B	51614

Analysis Batch: 52216

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Sum of Steps 1-7	Solid	6010B SEP	
140-23290-2	L-BH-03M	Sum of Steps 1-7	Solid	6010B SEP	
140-23290-3	L-BH-03D	Sum of Steps 1-7	Solid	6010B SEP	
140-23290-4	L-BH-02S	Sum of Steps 1-7	Solid	6010B SEP	
140-23290-5	L-BH-02M	Sum of Steps 1-7	Solid	6010B SEP	
140-23290-6	L-BH-02D	Sum of Steps 1-7	Solid	6010B SEP	
140-23290-7	L-BH-01S	Sum of Steps 1-7	Solid	6010B SEP	
140-23290-8	L-BH-01M	Sum of Steps 1-7	Solid	6010B SEP	
140-23290-9	L-BH-01D	Sum of Steps 1-7	Solid	6010B SEP	

General Chemistry

Analysis Batch: 50473

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-1	L-BH-03S	Total/NA	Solid	Moisture	
140-23290-2	L-BH-03M	Total/NA	Solid	Moisture	

General Chemistry (Continued)

Analysis Batch: 50473 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-23290-3	L-BH-03D	Total/NA	Solid	Moisture	
140-23290-4	L-BH-02S	Total/NA	Solid	Moisture	
140-23290-5	L-BH-02M	Total/NA	Solid	Moisture	
140-23290-6	L-BH-02D	Total/NA	Solid	Moisture	
140-23290-7	L-BH-01S	Total/NA	Solid	Moisture	
140-23290-8	L-BH-01M	Total/NA	Solid	Moisture	
140-23290-9	L-BH-01D	Total/NA	Solid	Moisture	

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: L-BH-03S
Lab Sample ID: 140-23290-1
Date Collected: 05/24/21 08:45
Matrix: Solid
Date Received: 05/28/21 10:00

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			52216	07/29/21 21:07	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			50473	06/04/21 08:31	BKD	TAL KNX
	Instrument ID: NOEQUIP									

Client Sample ID: L-BH-03S
Lab Sample ID: 140-23290-1
Date Collected: 05/24/21 08:45
Matrix: Solid
Date Received: 05/28/21 10:00
Percent Solids: 80.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.532 g	50 mL	51236	06/28/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			51553	07/07/21 15:29	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		10			52192	07/28/21 17:42	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52210	07/29/21 11:53	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		5			52210	07/29/21 13:25	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5 g	25 mL	51615	07/12/21 08:00	JTB	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	51654	07/13/21 08:00	JTB	TAL KNX
Step 1	Analysis	6010B SEP		4			51972	07/21/21 12:47	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5 g	25 mL	51653	07/12/21 12:12	JTB	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	51667	07/13/21 08:00	JTB	TAL KNX
Step 2	Analysis	6010B SEP		3			51972	07/21/21 14:36	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5 g	25 mL	51666	07/13/21 08:00	JTB	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	51707	07/14/21 08:00	JTB	TAL KNX
Step 3	Analysis	6010B SEP		1			51972	07/21/21 16:37	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5 g	25 mL	51690	07/14/21 08:00	JTB	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	51767	07/15/21 08:00	JTB	TAL KNX
Step 4	Analysis	6010B SEP		1			52038	07/22/21 14:03	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5 g	75 mL	51761	07/15/21 08:00	JTB	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	51837	07/17/21 08:14	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			52038	07/22/21 15:51	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		1			52038	07/22/21 17:39	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: L-BH-03S
Lab Sample ID: 140-23290-1
Date Collected: 05/24/21 08:45
Matrix: Solid
Date Received: 05/28/21 10:00
Percent Solids: 80.7

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			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		5			52038	07/22/21 19:14	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		10			52062	07/23/21 13:57	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		1			52062	07/23/21 15:15	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		5			52192	07/28/21 14:55	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: L-BH-03M
Lab Sample ID: 140-23290-2
Date Collected: 05/24/21 10:00
Matrix: Solid
Date Received: 05/28/21 10:00

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			52216	07/29/21 21:07	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			50473	06/04/21 08:31	BKD	TAL KNX
	Instrument ID: NOEQUIP									

Client Sample ID: L-BH-03M
Lab Sample ID: 140-23290-2
Date Collected: 05/24/21 10:00
Matrix: Solid
Date Received: 05/28/21 10:00
Percent Solids: 91.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.531 g	50 mL	51236	06/28/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			51553	07/07/21 15:50	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		10			52192	07/28/21 17:47	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52210	07/29/21 11:59	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		5			52210	07/29/21 13:30	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5 g	25 mL	51615	07/12/21 08:00	JTB	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	51654	07/13/21 08:00	JTB	TAL KNX
Step 1	Analysis	6010B SEP		4			51972	07/21/21 13:06	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: L-BH-03M
Lab Sample ID: 140-23290-2
Date Collected: 05/24/21 10:00
Matrix: Solid
Date Received: 05/28/21 10:00
Percent Solids: 91.1

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 g	25 mL	51653	07/12/21 12:10	JTB	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	51667	07/13/21 08:00	JTB	TAL KNX
Step 2	Analysis	6010B SEP		3			51972	07/21/21 14:56	KNC	TAL KNX
	Instrument ID:	DUO								
Step 3	SEP	Non-Crystalline			5 g	25 mL	51666	07/13/21 08:00	JTB	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	51707	07/14/21 08:00	JTB	TAL KNX
Step 3	Analysis	6010B SEP		1			51972	07/21/21 16:56	KNC	TAL KNX
	Instrument ID:	DUO								
Step 4	SEP	Metal Hydroxide			5 g	25 mL	51690	07/14/21 08:00	JTB	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	51767	07/15/21 08:00	JTB	TAL KNX
Step 4	Analysis	6010B SEP		1			52038	07/22/21 14:23	KNC	TAL KNX
	Instrument ID:	DUO								
Step 5	SEP	Organic-Bound			5 g	75 mL	51761	07/15/21 08:00	JTB	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	51837	07/17/21 08:14	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			52038	07/22/21 16:11	KNC	TAL KNX
	Instrument ID:	DUO								
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		1			52038	07/22/21 17:59	KNC	TAL KNX
	Instrument ID:	DUO								
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		5			52038	07/22/21 19:19	KNC	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		10			52062	07/23/21 14:01	KNC	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		1			52062	07/23/21 15:20	KNC	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		2			52192	07/28/21 15:00	KNC	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		5			52192	07/28/21 15:05	KNC	TAL KNX
	Instrument ID:	DUO								

Client Sample ID: L-BH-03D
Lab Sample ID: 140-23290-3
Date Collected: 05/24/21 11:45
Matrix: Solid
Date Received: 05/28/21 10:00

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			52216	07/29/21 21:07	DKW	TAL KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Moisture		1			50473	06/04/21 08:31	BKD	TAL KNX
	Instrument ID:	NOEQUIP								

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: L-BH-03D
Date Collected: 05/24/21 11:45
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-3
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
Total/NA	Prep	3050B			0.527 g	50 mL	51236	06/28/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			51553	07/07/21 15:55	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		10			52192	07/28/21 17:51	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52210	07/29/21 12:04	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		5			52210	07/29/21 13:34	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5 g	25 mL	51615	07/12/21 08:00	JTB	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	51654	07/13/21 08:00	JTB	TAL KNX
Step 1	Analysis	6010B SEP		4			51972	07/21/21 13:11	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5 g	25 mL	51653	07/12/21 12:10	JTB	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	51667	07/13/21 08:00	JTB	TAL KNX
Step 2	Analysis	6010B SEP		3			51972	07/21/21 15:01	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5 g	25 mL	51666	07/13/21 08:00	JTB	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	51707	07/14/21 08:00	JTB	TAL KNX
Step 3	Analysis	6010B SEP		1			51972	07/21/21 17:01	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5 g	25 mL	51690	07/14/21 08:00	JTB	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	51767	07/15/21 08:00	JTB	TAL KNX
Step 4	Analysis	6010B SEP		1			52038	07/22/21 14:28	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5 g	75 mL	51761	07/15/21 08:00	JTB	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	51837	07/17/21 08:14	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			52038	07/22/21 16:16	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		1			52038	07/22/21 18:04	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		5			52038	07/22/21 19:24	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		10			52062	07/23/21 14:06	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		1			52062	07/23/21 15:25	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: L-BH-03D
Lab Sample ID: 140-23290-3
Date Collected: 05/24/21 11:45
Matrix: Solid
Date Received: 05/28/21 10:00
Percent Solids: 85.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		2			52192	07/28/21 15:24	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		5			52192	07/28/21 15:29	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: L-BH-02S
Lab Sample ID: 140-23290-4
Date Collected: 05/25/21 09:00
Matrix: Solid
Date Received: 05/28/21 10:00

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			52216	07/29/21 21:07	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			50473	06/04/21 08:31	BKD	TAL KNX
	Instrument ID: NOEQUIP									

Client Sample ID: L-BH-02S
Lab Sample ID: 140-23290-4
Date Collected: 05/25/21 09:00
Matrix: Solid
Date Received: 05/28/21 10:00
Percent Solids: 78.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.532 g	50 mL	51236	06/28/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			51553	07/07/21 16:00	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		10			52192	07/28/21 17:56	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52210	07/29/21 12:09	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		5			52210	07/29/21 13:39	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5 g	25 mL	51615	07/12/21 08:00	JTB	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	51654	07/13/21 08:00	JTB	TAL KNX
Step 1	Analysis	6010B SEP		4			51972	07/21/21 13:16	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5 g	25 mL	51653	07/12/21 12:10	JTB	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	51667	07/13/21 08:00	JTB	TAL KNX
Step 2	Analysis	6010B SEP		3			51972	07/21/21 15:06	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5 g	25 mL	51666	07/13/21 08:00	JTB	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	51707	07/14/21 08:00	JTB	TAL KNX
Step 3	Analysis	6010B SEP		1			51972	07/21/21 17:06	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: L-BH-02S

Lab Sample ID: 140-23290-4

Date Collected: 05/25/21 09:00
Date Received: 05/28/21 10:00

Matrix: Solid
Percent Solids: 78.4

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 g	25 mL	51690	07/14/21 08:00	JTB	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	51767	07/15/21 08:00	JTB	TAL KNX
Step 4	Analysis	6010B SEP		1			52038	07/22/21 14:32	KNC	TAL KNX
	Instrument ID:	DUO								
Step 5	SEP	Organic-Bound			5 g	75 mL	51761	07/15/21 08:00	JTB	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	51837	07/17/21 08:14	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			52038	07/22/21 16:21	KNC	TAL KNX
	Instrument ID:	DUO								
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		1			52038	07/22/21 18:09	KNC	TAL KNX
	Instrument ID:	DUO								
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		5			52038	07/22/21 19:29	KNC	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		10			52062	07/23/21 14:11	KNC	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		1			52062	07/23/21 15:30	KNC	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		5			52192	07/28/21 15:34	KNC	TAL KNX
	Instrument ID:	DUO								

Client Sample ID: L-BH-02M

Lab Sample ID: 140-23290-5

Date Collected: 05/25/21 10:25
Date Received: 05/28/21 10:00

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			52216	07/29/21 21:07	DKW	TAL KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Moisture		1			50473	06/04/21 08:31	BKD	TAL KNX
	Instrument ID:	NOEQUIP								

Client Sample ID: L-BH-02M

Lab Sample ID: 140-23290-5

Date Collected: 05/25/21 10:25
Date Received: 05/28/21 10:00

Matrix: Solid
Percent Solids: 74.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.511 g	50 mL	51236	06/28/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			51553	07/07/21 16:05	KNC	TAL KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		10			52192	07/28/21 18:01	KNC	TAL KNX
	Instrument ID:	DUO								

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: L-BH-02M
Date Collected: 05/25/21 10:25
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-5
Matrix: Solid
Percent Solids: 74.5

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 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52210	07/29/21 12:15	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		2			52210	07/29/21 13:58	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		5			52210	07/29/21 14:03	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5 g	25 mL	51615	07/12/21 08:00	JTB	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	51654	07/13/21 08:00	JTB	TAL KNX
Step 1	Analysis	6010B SEP		4			51972	07/21/21 13:21	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5 g	25 mL	51653	07/12/21 12:10	JTB	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	51667	07/13/21 08:00	JTB	TAL KNX
Step 2	Analysis	6010B SEP		3			51972	07/21/21 15:11	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5 g	25 mL	51666	07/13/21 08:00	JTB	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	51707	07/14/21 08:00	JTB	TAL KNX
Step 3	Analysis	6010B SEP		1			51972	07/21/21 17:10	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5 g	25 mL	51690	07/14/21 08:00	JTB	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	51767	07/15/21 08:00	JTB	TAL KNX
Step 4	Analysis	6010B SEP		1			52038	07/22/21 14:37	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5 g	75 mL	51761	07/15/21 08:00	JTB	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	51837	07/17/21 08:14	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			52038	07/22/21 16:26	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		1			52038	07/22/21 18:13	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		5			52038	07/22/21 19:48	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		10			52062	07/23/21 14:16	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		1			52062	07/23/21 15:49	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		2			52192	07/28/21 15:39	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: L-BH-02M
Lab Sample ID: 140-23290-5
Date Collected: 05/25/21 10:25
Matrix: Solid
Date Received: 05/28/21 10:00
Percent Solids: 74.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		5			52192	07/28/21 15:44	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: L-BH-02D
Lab Sample ID: 140-23290-6
Date Collected: 05/25/21 10:25
Matrix: Solid
Date Received: 05/28/21 10:00

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			52216	07/29/21 21:07	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			50473	06/04/21 08:31	BKD	TAL KNX
	Instrument ID: NOEQUIP									

Client Sample ID: L-BH-02D
Lab Sample ID: 140-23290-6
Date Collected: 05/25/21 10:25
Matrix: Solid
Date Received: 05/28/21 10:00
Percent Solids: 81.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.516 g	50 mL	51236	06/28/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			51553	07/07/21 16:10	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		10			52192	07/28/21 18:06	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52210	07/29/21 12:20	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		5			52210	07/29/21 14:08	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5 g	25 mL	51615	07/12/21 08:00	JTB	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	51654	07/13/21 08:00	JTB	TAL KNX
Step 1	Analysis	6010B SEP		4			51972	07/21/21 13:26	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5 g	25 mL	51653	07/12/21 12:10	JTB	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	51667	07/13/21 08:00	JTB	TAL KNX
Step 2	Analysis	6010B SEP		3			51972	07/21/21 15:16	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5 g	25 mL	51666	07/13/21 08:00	JTB	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	51707	07/14/21 08:00	JTB	TAL KNX
Step 3	Analysis	6010B SEP		1			51972	07/21/21 17:15	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: L-BH-02D

Lab Sample ID: 140-23290-6

Date Collected: 05/25/21 10:25
Date Received: 05/28/21 10:00

Matrix: Solid
Percent Solids: 81.6

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 g	25 mL	51690	07/14/21 08:00	JTB	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	51767	07/15/21 08:00	JTB	TAL KNX
Step 4	Analysis	6010B SEP		1			52038	07/22/21 14:42	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5 g	75 mL	51761	07/15/21 08:00	JTB	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	51837	07/17/21 08:14	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			52038	07/22/21 16:31	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		1			52038	07/22/21 18:18	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		5			52038	07/22/21 19:53	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		10			52062	07/23/21 14:21	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		1			52062	07/23/21 15:54	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		2			52192	07/28/21 15:48	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		5			52192	07/28/21 15:54	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: L-BH-01S

Lab Sample ID: 140-23290-7

Date Collected: 05/26/21 08:10
Date Received: 05/28/21 10:00

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			52216	07/29/21 21:07	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			50473	06/04/21 08:31	BKD	TAL KNX
	Instrument ID: NOEQUIP									

Client Sample ID: L-BH-01S

Lab Sample ID: 140-23290-7

Date Collected: 05/26/21 08:10
Date Received: 05/28/21 10:00

Matrix: Solid
Percent Solids: 76.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.534 g	50 mL	51236	06/28/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			51553	07/07/21 16:24	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: L-BH-01S
Date Collected: 05/26/21 08:10
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-7
Matrix: Solid
Percent Solids: 76.3

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 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		10			52192	07/28/21 18:10	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52210	07/29/21 12:26	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		5			52210	07/29/21 14:13	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5 g	25 mL	51615	07/12/21 08:00	JTB	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	51654	07/13/21 08:00	JTB	TAL KNX
Step 1	Analysis	6010B SEP		4			51972	07/21/21 13:31	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5 g	25 mL	51653	07/12/21 12:10	JTB	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	51667	07/13/21 08:00	JTB	TAL KNX
Step 2	Analysis	6010B SEP		3			51972	07/21/21 15:21	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5 g	25 mL	51666	07/13/21 08:00	JTB	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	51707	07/14/21 08:00	JTB	TAL KNX
Step 3	Analysis	6010B SEP		1			51972	07/21/21 17:20	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5 g	25 mL	51690	07/14/21 08:00	JTB	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	51767	07/15/21 08:00	JTB	TAL KNX
Step 4	Analysis	6010B SEP		1			52038	07/22/21 14:47	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5 g	75 mL	51761	07/15/21 08:00	JTB	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	51837	07/17/21 08:14	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			52038	07/22/21 16:36	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		1			52038	07/22/21 18:23	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		5			52038	07/22/21 19:58	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		10			52062	07/23/21 14:25	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		1			52062	07/23/21 16:00	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		5			52192	07/28/21 15:58	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: L-BH-01M
Lab Sample ID: 140-23290-8
Date Collected: 05/26/21 09:25
Matrix: Solid
Date Received: 05/28/21 10:00

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			52216	07/29/21 21:07	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			50473	06/04/21 08:31	BKD	TAL KNX
	Instrument ID: NOEQUIP									

Client Sample ID: L-BH-01M
Lab Sample ID: 140-23290-8
Date Collected: 05/26/21 09:25
Matrix: Solid
Date Received: 05/28/21 10:00
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	3050B			0.533 g	50 mL	51236	06/28/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			51553	07/07/21 16:28	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		10			52192	07/28/21 18:15	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52210	07/29/21 12:31	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		5			52210	07/29/21 14:18	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5 g	25 mL	51615	07/12/21 08:00	JTB	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	51654	07/13/21 08:00	JTB	TAL KNX
Step 1	Analysis	6010B SEP		4			51972	07/21/21 13:36	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5 g	25 mL	51653	07/12/21 12:10	JTB	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	51667	07/13/21 08:00	JTB	TAL KNX
Step 2	Analysis	6010B SEP		3			51972	07/21/21 15:26	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5 g	25 mL	51666	07/13/21 08:00	JTB	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	51707	07/14/21 08:00	JTB	TAL KNX
Step 3	Analysis	6010B SEP		1			51972	07/21/21 17:25	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5 g	25 mL	51690	07/14/21 08:00	JTB	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	51767	07/15/21 08:00	JTB	TAL KNX
Step 4	Analysis	6010B SEP		1			52038	07/22/21 14:51	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5 g	75 mL	51761	07/15/21 08:00	JTB	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	51837	07/17/21 08:14	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			52038	07/22/21 16:41	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		1			52038	07/22/21 18:28	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: L-BH-01M

Lab Sample ID: 140-23290-8
Date Collected: 05/26/21 09:25
Matrix: Solid
Date Received: 05/28/21 10:00
Percent Solids: 86.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		5			52038	07/22/21 20:03	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		10			52062	07/23/21 14:30	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		1			52062	07/23/21 16:05	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		2			52192	07/28/21 16:03	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		5			52192	07/28/21 16:08	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: L-BH-01D

Lab Sample ID: 140-23290-9
Date Collected: 05/26/21 11:05
Matrix: Solid
Date Received: 05/28/21 10:00

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			52216	07/29/21 21:07	DKW	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			50473	06/04/21 08:31	BKD	TAL KNX
	Instrument ID: NOEQUIP									

Client Sample ID: L-BH-01D

Lab Sample ID: 140-23290-9
Date Collected: 05/26/21 11:05
Matrix: Solid
Date Received: 05/28/21 10:00
Percent Solids: 88.2

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.542 g	50 mL	51236	06/28/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			51553	07/07/21 16:48	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		10			52192	07/28/21 18:20	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52210	07/29/21 12:36	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		5			52210	07/29/21 14:22	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: L-BH-01D
Lab Sample ID: 140-23290-9
Date Collected: 05/26/21 11:05
Matrix: Solid
Date Received: 05/28/21 10:00
Percent Solids: 88.2

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 g	25 mL	51615	07/12/21 08:00	JTB	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	51654	07/13/21 08:00	JTB	TAL KNX
Step 1	Analysis	6010B SEP		4			51972	07/21/21 13:40	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5 g	25 mL	51653	07/12/21 12:10	JTB	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	51667	07/13/21 08:00	JTB	TAL KNX
Step 2	Analysis	6010B SEP		3			51972	07/21/21 15:31	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5 g	25 mL	51666	07/13/21 08:00	JTB	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	51707	07/14/21 08:00	JTB	TAL KNX
Step 3	Analysis	6010B SEP		1			51972	07/21/21 17:30	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5 g	25 mL	51690	07/14/21 08:00	JTB	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	51767	07/15/21 08:00	JTB	TAL KNX
Step 4	Analysis	6010B SEP		1			52038	07/22/21 14:56	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5 g	75 mL	51761	07/15/21 08:00	JTB	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	51837	07/17/21 08:14	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			52038	07/22/21 16:46	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		1			52038	07/22/21 18:33	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		5			52038	07/22/21 20:07	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		10			52062	07/23/21 14:35	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		1			52062	07/23/21 16:10	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		5			52192	07/28/21 16:22	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-51236/21-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			0.500 g	50 mL	51236	06/28/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			51553	07/07/21 11:36	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Golder Associates Inc. Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: Method Blank — Lab Sample ID: MB 140-51614/18-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 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52192	07/28/21 16:44	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52210	07/29/21 10:53	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-51615/18-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 g	25 mL	51615	07/12/21 08:00	JTB	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	51654	07/13/21 08:00	JTB	TAL KNX
Step 1	Analysis	6010B SEP		4			51972	07/21/21 12:08	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-51653/15-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 g	25 mL	51653	07/12/21 12:10	JTB	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	51667	07/13/21 08:00	JTB	TAL KNX
Step 2	Analysis	6010B SEP		3			51972	07/21/21 13:55	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-51666/15-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 g	25 mL	51666	07/13/21 08:00	JTB	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	51707	07/14/21 08:00	JTB	TAL KNX
Step 3	Analysis	6010B SEP		1			51972	07/21/21 15:58	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-51690/15-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 g	25 mL	51690	07/14/21 08:00	JTB	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	51767	07/15/21 08:00	JTB	TAL KNX
Step 4	Analysis	6010B SEP		1			52038	07/22/21 13:25	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Golder Associates Inc. Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: Method Blank — Lab Sample ID: MB 140-51761/15-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 g	75 mL	51761	07/15/21 08:00	JTB	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	51837	07/17/21 08:14	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			52038	07/22/21 15:11	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-51802/15-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			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		1			52038	07/22/21 17:00	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-51862/15-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			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		1			52062	07/23/21 12:35	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-51236/22-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			0.500 g	50 mL	51236	06/25/21 10:16	JTB	TAL KNX
Total/NA	Analysis	6010B		1			51553	07/07/21 11:40	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-51614/19-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 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52192	07/28/21 16:49	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52210	07/29/21 10:58	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Golder Associates Inc. Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-51615/19-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 g	25 mL	51615	07/12/21 08:00	JTB	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	51654	07/13/21 08:00	JTB	TAL KNX
Step 1	Analysis	6010B SEP		5			51972	07/21/21 12:13	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-51653/16-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 g	25 mL	51653	07/12/21 12:10	JTB	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	51667	07/13/21 08:00	JTB	TAL KNX
Step 2	Analysis	6010B SEP		5			51972	07/21/21 14:00	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-51666/16-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 g	25 mL	51666	07/13/21 08:00	JTB	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	51707	07/14/21 08:00	JTB	TAL KNX
Step 3	Analysis	6010B SEP		1			51972	07/21/21 16:03	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-51690/16-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 g	25 mL	51690	07/14/21 08:00	JTB	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	51767	07/15/21 08:00	JTB	TAL KNX
Step 4	Analysis	6010B SEP		1			52038	07/22/21 13:30	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-51761/16-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 g	75 mL	51761	07/15/21 08:00	JTB	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	51837	07/17/21 08:14	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			52038	07/22/21 15:16	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-51802/16-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			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		1			52038	07/22/21 17:05	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-51862/16-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			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		1			52062	07/23/21 12:40	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-51614/20-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
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52192	07/28/21 16:54	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1 g	50 mL	51614	07/12/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			52210	07/29/21 11:03	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-51615/20-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 1	SEP	Exchangeable			5 g	25 mL	51615	07/12/21 08:00	JTB	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	51654	07/13/21 08:00	JTB	TAL KNX
Step 1	Analysis	6010B SEP		5			51972	07/21/21 12:18	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-51653/17-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 g	25 mL	51653	07/12/21 12:10	JTB	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	51667	07/13/21 08:00	JTB	TAL KNX
Step 2	Analysis	6010B SEP		5			51972	07/21/21 14:05	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Golder Associates Inc. Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-51666/17-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 g	25 mL	51666	07/13/21 08:00	JTB	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	51707	07/14/21 08:00	JTB	TAL KNX
Step 3	Analysis	6010B SEP		1			51972	07/21/21 16:08	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-51690/17-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 g	25 mL	51690	07/14/21 08:00	JTB	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	51767	07/15/21 08:00	JTB	TAL KNX
Step 4	Analysis	6010B SEP		1			52038	07/22/21 13:35	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-51761/17-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 g	75 mL	51761	07/15/21 08:00	JTB	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	51837	07/17/21 08:14	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			52038	07/22/21 15:21	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-51802/17-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			5.00 g	250 mL	51802	07/16/21 12:00	JTB	TAL KNX
Step 6	Analysis	6010B SEP		1			52038	07/22/21 17:10	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-51862/17-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			1.00 g	50 mL	51862	07/20/21 08:00	JTB	TAL KNX
Step 7	Analysis	6010B SEP		1			52062	07/23/21 12:45	KNC	TAL KNX
	Instrument ID: DUO									

Lab Chronicle

Client: Golder Associates Inc. Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Client Sample ID: L-BH-02D
Date Collected: 05/25/21 10:25
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-6 MS
Matrix: Solid
Percent Solids: 81.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.544 g	50 mL	51236	06/28/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			51553	07/07/21 16:14	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: L-BH-02D
Date Collected: 05/25/21 10:25
Date Received: 05/28/21 10:00

Lab Sample ID: 140-23290-6 MSD
Matrix: Solid
Percent Solids: 81.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.511 g	50 mL	51236	06/28/21 08:00	JTB	TAL KNX
Total/NA	Analysis	6010B		1			51553	07/07/21 16:19	KNC	TAL KNX
	Instrument ID: DUO									

Laboratory References:

TAL KNX = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Accreditation/Certification Summary

Client: Golder Associates Inc. Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Laboratory: Eurofins TestAmerica, Knoxville

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
	AFCEE	N/A	
ANAB	Dept. of Defense ELAP	L2311	02-13-22
ANAB	Dept. of Energy	L2311.01	02-13-22
ANAB	ISO/IEC 17025	L2311	02-13-22
Arkansas DEQ	State	88-0688	06-17-21 *
California	State	2423	06-30-22
Colorado	State	TN00009	02-28-22
Connecticut	State	PH-0223	09-30-21
Florida	NELAP	E87177	06-30-22
Georgia (DW)	State	906	12-11-22
Hawaii	State	NA	12-11-21
Kansas	NELAP	E-10349	10-31-21
Kentucky (DW)	State	90101	12-31-21
Louisiana	NELAP	83979	06-30-22
Louisiana (DW)	State	LA019	12-31-21
Maryland	State	277	03-31-22
Michigan	State	9933	12-11-22
Nevada	State	TN00009	08-01-21
New Hampshire	NELAP	299919	01-17-22
New Jersey	NELAP	TN001	06-30-22
New York	NELAP	10781	03-31-22
North Carolina (DW)	State	21705	07-31-21
North Carolina (WW/SW)	State	64	12-31-21
Ohio VAP	State	CL0059	06-02-23
Oklahoma	State	9415	08-31-21
Oregon	NELAP	TNI0189	01-01-22
Pennsylvania	NELAP	68-00576	12-31-21
Tennessee	State	02014	12-11-22
Texas	NELAP	T104704380-18-12	08-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	US Federal Programs	P330-19-00236	08-20-22
Utah	NELAP	TN00009	07-31-21
Virginia	NELAP	460176	09-14-21
Washington	State	C593	01-19-22
West Virginia (DW)	State	9955C	01-02-22
West Virginia DEP	State	345	04-30-22
Wisconsin	State	998044300	08-31-21

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: Golder Associates Inc.
Job ID: 140-23290-1
Project/Site: Labadie Energy Center - Missouri

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	TAL KNX
6010B	SEP Metals (ICP) - Total	SW846	TAL KNX
6010B SEP	SEP Metals (ICP)	SW846	TAL KNX
Moisture	Percent Moisture	EPA	TAL KNX
3010A	Preparation, Total Metals	SW846	TAL KNX
3050B	Preparation, Metals	SW846	TAL KNX
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 = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Eurofins TestAmerica, Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921
Phone: 865-291-3000 Fax: 865-584-4315

Chain of Custody Record

eurofins | Environment Testing America

Client Information	Sampler: Brendan Talbert	Lab PM: Henry, Ryan	Carrier Tracking No(s):	COC No: 140-9342-2809.2
Client Contact: Jeffrey Ingram	Phone:	E-Mail: williamr.henry@eurofinset.com	State of Origin:	Page: Page 1 of 2 1 of 1
Company: Golder Associates Inc.	PWSID:			Job #:
Address: 13515 Barrett Parkway Drive Suite 260	Due Date Requested:			
City: Ballwin	TAT Requested (days):			
State, Zip: MO, 63021	Compliance Project: Δ Yes Δ No			
Phone: 314-984-8800(Tel) 636-724-9323(Fax)	PO #: Purchase Order not required			
Email: Jeffrey_Ingram@golder.com	WO #:			
Project Name: ~~Duck Creek Power Station - Illinois~~ Labadie MNA	Project #: ~~14000015~~ 14006342			
Site: Labadie Energy Center	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	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)	6010B_SEP - SEP Metals	6010B - Total Metals	Total Number of containers	Special Instructions/Note:
Preservation Code:							N	N		
L-~~BH~~ BH-03S	5-24-21	0845	G	S	N	N	1	1		
L-~~BH~~ BH-03M	"	1000	"	"	"	"	1	1		
L-~~BH~~ BH-03D	"	1145	"	"	"	"	1	1		
L-BH-02S	5-25-21	0900	G	S	N	N	1	1		
L-BH-02M	"	1025	"	"	"	"	1	1		
L-BH-02D	"	1025	"	"	"	"	1	1		
L-BH-01S	5-26-21	0810	G	S	N	N	1	1		
L-BH-01M	"	0925	"	"	"	"	1	1		
L-BH-01D	"	1105	"	"	"	"	1	1		

140-23290 Chain of Custody

DRAFT

Possible Hazard Identification
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

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)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by: Brendan Talbert	Date/Time: 5-27-21 1700	Company: Golder	Received by: [signature] Date/Time: 5-28-21 10:00 Company: ETKNX
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: 11/01/2020

EUROFINS/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 : S(7) 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, notify lab to adjust
20. For rad samples was sample activity info. Provided?			/	☐ Project missing info

Comments/Actions Taken

CUSTODY SEALS INTACT
RECEIVED AT RT 0.4/CTD S/C
BY 5.28.21
1 COOLER BOX# 787675016039 PO

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 #: PM Instructions:

Sample Receiving Associate: Date: 5.28.21

QA026R32.doc, 062719

APPENDIX C

Groundwater Modeling Report

GOLDER
MEMBER OF WSP

TECHNICAL MEMORANDUM

DATE September 29, 2021 **Project No.** 153140603

TO Ameren Missouri
1901 Chouteau Avenue, St. Louis, Missouri 63103

CC

FROM Jeffrey Ingram, Joanna Moreno, Mark Haddock RG, PE **EMAIL JIngram@Golder.com**

GROUNDWATER MODELING SUMMARY FOR LCPA MONITORED NATURAL ATTENUATION EVALUATION

1.0 INTRODUCTION

Golder Associates Inc. (Golder) is pleased to provide this Technical Memorandum summarizing modeling results for closure scenarios at the Ameren Missouri (Ameren) Labadie Energy Center (LEC) in Franklin County, Missouri. As part of the Monitored Natural Attenuation (MNA) Evaluation, the fate and transport of metals after closure of the bottom ash basin (LCPA) was investigated through modeling and this memo summarizes these tasks conducted in support of the MNA Evaluation.

1.1 Groundwater Modeling Objectives

The objectives of the modeling analysis are as follows:

- Use and update the previously generated groundwater model for the LEC and synthesize the most recent hydrogeologic data into an integrated conceptual and numerical framework for evaluation of remedial strategies at the Site.
- Use the groundwater model to predict future metal concentrations (molybdenum) after capping and closing the LCPA surface impoundment along with the addition of the groundwater pump, treat and re-injection system.

2.0 GROUNDWATER MODEL DEVELOPMENT

In 2019, a groundwater model and draft report was prepared by Gredell Engineering, Inc (Gredell, 2019), to provide a preliminary predictive analysis for groundwater flow at the LEC for the CMA evaluation. In 2021, this groundwater model was updated by XDD Environmental, LLC (XDD), to provide predictive analysis for groundwater flow at the LEC for the design of a pump, treat, and re-injection system for LCPA Corrective Action. For this evaluation, the XDD model was updated to model the fate and transport of molybdenum under different corrective action scenarios.

Updates to the model include the addition of bedrock to the south and below the alluvial aquifer to incorporate regional groundwater flow, inclusion of a constant head boundary within the bedrock aquifer, changes to hydraulic conductivity and recharge properties for groundwater flow and transport calibration purposes, and approximate geometry of the LCPA. Discussions and figures displaying the updates are provided in the following sections.

There have been many groundwater samples, CCR pore-water samples, and groundwater elevation measurements collected at the Site and these sampling locations which were used to generate the model input data are shown in Figure 1. The area covered by the groundwater flow model is shown in Figure 2. The purpose of this groundwater model summary is to document model setup, calibration and prediction results, and related data. The focus of the Technical Memorandum is on the groundwater flow as well as the fate and transport of metals after closure of the LCPA with a treatment system installed.

2.1 Conceptual Model and General Setting

The geology immediately surrounding the Facility is comprised of two distinctly different geological terrains; (1) floodplain deposits of the Missouri River Valley and (2) older sedimentary bedrock formations. Most of the Facility, including all the plant infrastructure and the LCPA, lies within the Missouri River Valley on floodplain and alluvial soil deposits. The Mississippi River Valley in this region is an approximately 2- to 3-mile-wide area of floodplain with alluvial deposits that are the result of the water flow and deposition from the Missouri River. Based on boring logs, the alluvial deposits are typically comprised of sands and gravels with lesser amounts of silts and clays, with an overall fining upward sequence. With depth, silt and clay deposits are less abundant and the sands and gravels typically coarsen. The depth of the alluvial deposits near the Surface Impoundment ranges from approximately 90 to 130 feet below ground surface (350 to 385 feet above mean sea level (MSL).

Bluffs to the south, as well as bedrock underlying the floodplain alluvial deposits, are comprised of relatively horizontal Ordovician-aged limestones, sandstones and dolomites. In progression from youngest to oldest, these deposits consist of the Plattin Group, Joachim Dolomite, St. Peter Sandstone, Powell Dolomite, and the Cotter/Jefferson City Dolomites (Starbuck, 2010; Gredell and Reitz & Jens, 2011).

Groundwater flow is generally from the south topographic high in the bluffs toward the Missouri River in the North/North-east. Some groundwater flow beneath and parallel with the Missouri River likely also occurs. In addition, some upward flow into the alluvium occurs from bedrock, which is recharged regionally outside the model area to the south.

The water level in the Missouri River varies daily, particularly during floods, which typically occur annually in the spring and during major storm events in the watershed basin. Floods can range from minor flooding that may only last days to major flooding which can last months.

2.2 Selection of Computer Code

The numerical computer code MODFLOW – developed by the United States Geological Survey (USGS) – was selected for much of this analysis 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 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 2017, Rumbaugh and Rumbaugh 2011).

2.3 Model Domain, Grid, and Layering

The finite-difference model grid size and location are shown in Figure 3. The model grid was oriented 36 degrees from north as the primary groundwater flow direction is north-northeasterly from the bluffs towards the Missouri River. The grid contains 360 rows and 170 columns. The grid sizes are uniform horizontally (100 ft by 100 ft). The model is divided into seven layers with the top of the model reflecting ground surface topography (USGS, 2018). The lower 6 layers are horizontal, based on the elevations from the initial model (Gredell, 2019). Overall, the model is divided into 7 different layers, and hydraulic conductivity values in each layer vary, due to the geologic conditions onsite. Figures 4 and 5 displays the distribution of the different geological units within the different model layers in vertical cross-sectional view across the model.

The model area (excluding inactive cells) is approximately 36,000 feet east-west along the x-axis by 17,000 feet north-south along the y-axis at the widest points. The southwest corner of the model grid (model coordinates 0,0) corresponds with NAD 83 Missouri East coordinates 981161 north and 721788 West. Vertically, the model base is at elevation 350 feet above mean sea level (feet MSL) and ranges up to approximately 800 feet MSL in the highest bluff area to the south.

2.4 Model Input Data

The model input data consisted of geologic layering, hydraulic properties of these layers, surface recharge, river/stream properties, landfill geometry data, and calibration data (hydraulic heads, concentration data). Many of the parameters are used from the initial GW model (Gredell, 2019) as well as those updated by XDD in 2021. These inputs are described in more detail in the following sections.

2.4.1 Hydraulic Properties

Hydraulic conductivity testing has been completed within the ash materials as well as in the native materials present below the CCR units. These tests were used to generate ranges of appropriate hydraulic conductivities for the model and calibration tests were used to refine these values as completed by Gredell (2019), and XDD. The hydraulic properties used for this modeling effort as well as the reported ranges from site conductivity testing are provided below in **Table 1**.

Table 1 – Hydraulic Properties of Geological Units Applied in the Model

Geologic Unit	Hydraulic Conductivity		Vertical Anisotropy Ratio	Reported Range		Data Sources
	feet per day	cm/sec		feet per day	cm/sec	
Ash (CCR)	0.085	$3.0x10^{-05}$	1	0.024 to 1417.3	$8.3x10^{-06}$ to 0.5	Gredell 2019, Reitz & Jens et al 2017

Berm Materials	0.0028	$1.0x10^{-06}$	1	0.0028	$1.0x10^{-06}$	Gredell 2019
Shallow Alluvium	28.34*	$1.0x10^{-02}$	0.1	28.3 to 85.0	$3.0x10^{-02}$ to $1.0x10^{-02}$	Gredell 2019, Gredell et al. 2011, Golder 2017a.
Intermediate Alluvium	42.5*	$2.4x10^{-02}$	0.1	31.2 to 141.7	$1.1x10^{-02}$ to $5.0x10^{-02}$	Gredell 2019, Gredell et al. 2011, Golder 2017a.
Deep Alluvium	600**	$1.5x10^{-01}$	0.1	36.9 to 1,701	$1.3x10^{-02}$ to $6x10^{-01}$	Gredell 2019, Fetter C.W. 2000, Calibrated Values
Bedrock	0.005**	$1.5x10^{-07}$	0.1	$2.8x10^{-05}$ to 28.35	$1.0x10^{-02}$ to $1.0x10^{-08}$	Fetter, C.W. 2011, Calibrated Values

Notes:

1) ft – feet.
2) cm/sec – centimeters per second.
3) Vertical Anisotropy Ratio is the ratio of vertical to horizontal hydraulic conductivity
4) CCR – Coal Combustion Residuals.
5) Specific storage (1/ft) is $2.3x10^{-4}$ for each unit based on Gredell, 2019.
6) Specific yield is 0.25 for each unit.
7) * - indicates that a different value is used than in the Gredell, 2019 report, provided by XDD.
8) ** - indicates a value different than the previous models, based on model calibrations.
9) No hydraulic conductivity testing has been completed within the deep alluvium units onsite. Value based on calibration results.

2.4.2 Model Recharge

Recharge rates were applied to the highest active layer of the model. Recharge in the model represents (a) natural infiltration, i.e.,the amount of precipitation that recharges the aquifer, which is generally the precipitation rate minus losses due to runoff, evapotranspiration, and changes in soil moisture, and (b) recharge generated by site activities.

During flow and transport calibration, these values were refined, and the model is subdivided into a total of 10 different recharge zones as displayed in Figure 6. Of these 10 zones, five (5) are associated with the LCPA and represent the different recharge rates and historical active CCR impoundment conditions applied to the transient fate and transport modeling. The remaining 6 (six) recharge zone are associated with recharge rates outside of the CCR unit including the bedrock bluffs area, the bottoms area, the embankment berm areas, and surface water areas.

2.5 Model Boundary Conditions

The following sections describe the boundary conditions used in the model, including constant head boundaries, drains, no flow boundaries, and river boundaries. Figure 7 displays the model boundary conditions used in the model.

2.5.1 No Flow Boundaries

By default, no flow boundaries are assumed at the bottom of the lowest layer and along the edge of each layer, unless another boundary condition is specified. Additionally, for this groundwater model, no flow boundaries were placed to the north of the Missouri River and south of the approximate elevation 495 ft MSL groundwater contour in the bedrock aquifer (Golder 2015) as displayed in Figure 7.

2.5.1.1 Constant Head Boundaries

Constant head boundaries were assigned within the bedrock aquifer at the approximately 495 feet MSL groundwater contour. This is based on the potentiometric surface mapping within the bedrock aquifer completed in 2014 – 2015 (Golder, 2015) and is displayed in Figure 7.

2.5.1.2 River Boundary Conditions

River boundary conditions are a head-dependent boundary condition, where the model computes the difference in head between the river cell where the boundary is defined and underlying or adjacent model cells. River boundary cells were used for the Missouri River, Labadie and Fiddle Creeks, the Ponded areas on the western side of the LCPA, the LCPB, and the LCL1. All river boundary conditions are modeled in Layers 1 & 2, and information on each of the river boundary areas is provided below:

- **Missouri River** – The Missouri River is the northernmost feature in the groundwater model as displayed in Figure 7. For the steady state calibration model, the river stage was set to elevation 457.61 feet MSL at the water intake area of the river, and then decreased/increased from there up and down river based on the average gradient of the Missouri River of 0.000183 ft/ft. This gradient was calculated using daily elevations and river miles between the Washington, Labadie, and St. Charles staging gauges. For the transient model, the average river elevation of 456.97 feet MSL was used (Gredell, 2019). The riverbed has a simulated thickness of 1 foot and a hydraulic conductivity of 4.25 feet per day ($1.5x10^{-3}$ cm/sec, from Gredell, 2019).
- **LCPA Surface Impoundment** –The LCPA has a "riverbed" thickness of 5 feet, with a vertical hydraulic conductivity equal to that of the CCR materials (0.085 ft/day, $3.0x10^{-05}$ cm/sec). The "river" section of the LCPA is only along the western edge, where historically water has been ponded within the surface impoundment during operation.
- **LCPB Surface Impoundment** - The LCPB is a lined CCR unit, has a "riverbed" thickness of 1 foot, with a vertical hydraulic conductivity equal approximately to the liner system of $1.0x10^{-08}$ ft/day or $3.5x10^{-12}$ cm/sec.
- **Labadie and Fiddle Creeks** – Labadie Creek is located on the western edge of Ameren's property and Fiddle Creek is located along the eastern edge of the Labadie Bottoms. The model simulates these creeks as a river boundary condition in the areas that the creeks are present in the Labadie Bottoms area. The creeks have a modeled "riverbed" thickness of 2 feet, with a vertical hydraulic conductivity of 0.28 ft/day ($9.9x10^{-05}$ cm/sec). The width of the different features was based on aerial imagery and is 25 feet. The stage the creeks is based on the corresponding Missouri River levels, and digital elevation maps.

2.5.1.3 Drain Boundary Conditions

Drain boundaries were used in the bluff areas to represent localized creeks and drainage ditches in low lying areas. The drain elevation was set equal to the approximate ground surface and the conductivity of the drains were equal to the vertical hydraulic conductivity used for bedrock.

2.5.2 Groundwater Treatment Wells

As a part of ongoing Corrective Action activities at the site, Ameren commissioned the design of a groundwater pump, treat, and re-inject system. The modeled design consists of 24 injection and 24 extraction wells, modeled in layers 2-6 as applicable. These wells are proposed to be located on the northwestern side of the LCPA and LCPB as well as between the LCPA and LCPB Units. These wells were incorporated to simulate the pump and treat system in the model. These features are only used in the transient modeling scenario.

2.6 Flow Calibration

Model calibration consists of successive refinement of estimated model properties and input data within expected ranges to improve the fit between observed and model-simulated flows and elevations. A steady state flow model calibration was carried out for September 27, 2018, for which 93 groundwater elevations within the alluvial aquifer were available as targets. In addition, 6 pore-water elevations within the LCPA were used from February-March 2018. This combination was used because there were more targets available in September 2018 in the alluvial aquifer and the river levels were more representative of average conditions. Additionally, pore-water elevations were only collected in February-March 2018 before the temporary piezometers were abandoned, however, pond elevations in the LCPA were within 0.5 feet in both March and September 2018. Therefore, these levels were deemed representative of pond conditions in September 2018.

Manual and automated parameter estimation approaches were used to derive reasonable estimates of hydraulic conductivities and natural recharge rates that produce groundwater elevations close to the observed data. The resulting estimated parameter values fall within expected ranges (Table 1). The results are summarized in Figure 8. The average head residual is less than 0.25 feet and the normalized root mean square error in the model is 8.9%. The calibrated model was found to be acceptable for current purposes.

2.7 Transport Model Analysis

This section describes the transport modeling analyses conducted for the LCPA contaminant source area. The LCPB, LCL1 were not modeled as a source area because they are all lined with geomembrane liners, while the LCPA is unlined. Based on drilling data and historical images, the LCPA has historically been managed with the ash materials contained in the southern and eastern portions of the CCR unit while the ponded area has been historically managed in the western portion of the unit. In 1993, the LCPB was built to the east of the LCPA and fly ash was then managed in the LCPB and not the LCPA, although the outfall for the LCPB discharged into the southeastern portion of the LCPA during its operation. Table 2 provides the dates and a brief description of the stress periods used in the Transient Model.

Table 2: Description of Stress Periods

Stress Period	Start Date	End Date	Length (Days)	Description
1	1/1/1970	12/31/1992	8765	Beginning of LEC with LCPA as only active CCR Unit.
2	1/1/1993	9/28/2019	9402	LCPB now active along with the LCPA. LCPA no longer receives fly ash management water, therefore, molybdenum concentrations and recharge values go down.
3	9/28/2019	12/29/2020	459	Closure construction on the LPCA. No more active addition of CCR materials to LCPA. Recharge equal to that of surrounding alluvial aquifer.
4	12/30/2020	12/31/2022	732	LCPA closed with geomembrane liner system. No groundwater treatment system in place
5	1/1/2023	8/1/2120	35652	LCPA closed along with active treatment system.

Molybdenum was selected as the primary constituent for transport analysis because it is the only Appendix IV parameter that is present at a Statistically Significant Level in accordance with the CCR Rule. The primary Molybdenum transport mechanisms are advection and mixing due to natural and pond recharge, advection and mixing under varying natural hydraulic gradients controlled by river water elevations and buffering and/or precipitation due to interaction between Molybdenum in porewater and aquifer solids.

Transport model setup details include:

Aquifer bulk densities based on results from Golder 2017a:

- CCR Materials:1.2 g/mL
- Sandy Alluvial Materials: 1.4 g/mL
- Bedrock: 2.6 g/mL

- Uniform effective porosity of 0.20 based on Gredell, 2019.
- Longitudinal, transverse and vertical dispersivity were assumed to have values of 15, 1.5, and 0.15 ft, respectively. Values were calculated using the EPA on-line tool for estimating longitudinal dispersity (available at: https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/longdisp.html)
- Linear sorption represented by a partition coefficient (Kd) in the aquifer of 0.15 mL/g. This value was determined via calibration and is based on a range calculated from onsite data that consisted of 7 non-detect values, 1 value at 1.88 mL/g, and a final value of 31.1 mL/g. This is consistent with the range provided in Allison and Allison (2005).
- Molybdenum concentrations as shown below in Table 3.

Table 3: Molybdenum Concentration Data Ranges

Parameter	Reported Range	Model Values	Data Source
Molybdenum Concentrations (µg/L)			
Missouri River	Minimum: 1.9	3.123	Haley and Aldrich 2018
	Maximum: 6.2		
	Mean: 3.123		
Bedrock Aquifer	Minimum: Non-Detect (<0.85)	3.945	AECOM, 2014
	Maximum: 14.5		
	Mean: 3.945		
Background (BMW-1S, BMW-2S, BMW-1D, and BMW-2D)	Minimum: Non-Detect (<0.26)	1.588	Golder 2017-2021 (a-c)
	Maximum: 7.0 J		
	Mean: 1.588 J		
Ponded portion of LCPA	52.0	52.0	2018 NPDES Report
Fly Ash / Mixed Ash	Site Minimum: 83.7	LCPA only / LCPA + LCPB	Golder 2018b, EPRI, 2011
	Site Maximum: 2,370	North central: 1,250 / 230	
	Site Mean: 827.1	South central: 2,100 / 230	
	EPRI minimum: non-detect	Northeastern: 2,100 / 150	
	EPRI Maximum: 60,800	Southeastern: 5,100 / 500	

Molybdenum data from 2013 to June 2021 were included as calibration targets in the model using 115 locations within the alluvial aquifer. The transport model calibration results are summarized in Figure 9. The average molybdenum concentration residual is less than 21 µg/L and the normalized root mean square error is 8.1%. It should be noted that observed molybdenum concentrations varied from non-detect (1/2 method detection limit at 0.25) – 1,410 µg/L in the alluvial aquifer. The calibrated model was found to be acceptable for current purposes.

Predictive simulations were used to assess future plume movement under existing and capped-pond conditions with the installation of a groundwater treatment system along the northwestern side of the LCPA and LCPB as well as between the two units. The predicted future molybdenum concentrations in groundwater were found to be sensitive to the assumed partition coefficient, the dispersivity, and the hydraulic conductivity parameters. Predicted groundwater concentrations are provided in Figures 10-11.

As displayed in Figure 10, monitoring wells within the detection and assessment (compliance) monitoring well network that are present at a SSL, including UMW-3D, UMW-4D, UMW-5D, UMW-6D, and UMW-7D are predicted to be below the GWPS within 2 – 13 years of the treatment system start of operation. The model calculated attenuation rate from these wells is approximately 10 to 162 micrograms (µg/L) per year, with an average decrease in concentration of approximately 80 µg/L per year.

Figure 11 displays the model predicted decrease in molybdenum concentrations in the corrective action well network that are currently at concentrations above the GWPS (LMW-8S, AM-1D, TP-2D, TP-2M, TP-3D, TP-3M,

AMW-8, MW-33D, MW-34D, MW-35D). These monitoring wells are located outside of the treatment capture zone and are predicted to reach concentrations below the GWPS within 2 - 39 years. The model calculated attenuation rate from these wells is approximately 4.5 to 24.2 µg/L per year, with an average decrease in concentration of approximately 14 µg/L per year.

3.0 GROUNDWATER MODELING SUMMARY

Using standard numerical groundwater modeling procedures, Golder has updated both a steady state model and developed a transient groundwater flow model for the site that are calibrated to site data. The modeling results were used to inform the groundwater monitoring natural attenuation evaluation by providing predicted molybdenum concentrations at monitoring wells downgradient of the LCPA, where molybdenum is present at a Statistically Significant Level (SSL). The predicted molybdenum concentrations will be used for further geochemical evaluation in the Labadie MNA Evaluation Report.

4.0 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 a 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 Golder 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.

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Tables:

Table 1 – Hydraulic Properties of Geological Units Applied in the Model

Table 2 - Description of Stress Periods

Figures:

Figure 1 – Groundwater Sampling and Water Level Elevation Collection Points

Figure 2 – Groundwater Model Domain

Figure 3 – Groundwater Model Grid and Cross Section Location Map

Figure 4 - A-A’ Cross-Section and Hydraulic Conductivities

Figure 5 – B-B’ Cross Section and Hydraulic Conductivities

Figure 6 – Recharge Distribution

Figure 7 – Boundary Conditions

Figure 8 - Scatter Diagram for Predicted and Observed Hydraulic Heads – Steady State Conditions

Figure 9 – Scatter Diagram for Predicted and Observed Molybdenum Concentrations – Transient Conditions

Figure 10 – Model Predicted Molybdenum Concentrations Over Time – Detection and Assessment Monitoring Well Network

Figure 11 - Model Predicted Molybdenum Concentrations Over Time – Corrective Action Monitoring Well Network

KEY MAP

720000

990000

Missouri River

TP-5S
TP-5M
TP-5D
TP-4S
TP-4M
TP-4D
TP-1S
TP-1M
TP-1D
TP-3S
TP-3M
TP-3D
MW-33[D]
MW-30
MW-32
MW-31
MW-04
MW-29
MW-34[D]
MW-03
MW-28
MW-01
MW-02
MW-05
MW-06
AM-1S
AM-1D
S-1
MW-27
TMW-3
TMW-2
MW-07
ASD-4
AMW-8
MW-08
MW-09
LMW-4S
LMW-5S
MW-26
MW-10
TP-2S
TP-2M
TP-2D
S-2
LCL1
MW-11
LCPB
AMW-9
TMW-1
MW-12
LMW-3S
LCPB-3
LMW-6S
MW-13
PZ-5S
PZ-5D
ASD-5
MW-14
MW-25
LCPB-1
S-3
MW-15
UMW-4D
MW-16
LCPB-2
LMW-7S
MW-35[D]
AMW-7
ASD-3
MW-17
LMW-2S
UMW-5D
MW-19
UMW-3D
S-4
AW-1
MW-24
PZ-4S
LCPA-3
ASD-2
MW-20
MW-18
LMW-8S
PZ-4D
UMW-6D
MW-21
PZ-6S
LCPA-1
PZ-6D
MW-23
PZ-3S
PZ-3D
LCPA-2
ASD-1
MW-22
LMW-1S
UMW-7D
UMW-2D
LCPA
PZ-1S
PZ-1D
UMW-8D
UMW-9D
PZ-2S
PZ-2D
UMW-1D
BMW-1S
BMW-1D
BMW-2S
BMW-2D

DRAFT

bing

LEGEND

- Approximate Property Boundary

Labadie Energy Center CCR Units

- LCPA - Bottom Ash Surface Impoundment
- LCPB - Fly Ash Surface Impoundment
- LCL1 - Utility Waste Landfill Cell 1
- Calibration Target Point

0 1,000 2,000 3,000 4,000

Feet

NOTE(S)

1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2.) MNA - MONITORED NATURAL ATTENUATION.
3.) ASD - ALTERNATIVE SOURCE DEMONSTRATION.
4.) EACH LCPA POREWATER SAMPLING LOCATION HAS A SHALLOW AND DEEP INTERVAL.
5.) EACH ASD SAMPLING LOCATION HAS A SHALLOW, MIDDLE, AND DEEP INTERVAL.

REFERENCE(S)

1.) ZAHNER AND ASSOCIATES, INC. 2016. LOT CONSOLIDATION PLAT OF "LABADIE ENERGY CENTER" - PREPARED FOR AMEREN MISSOURI. REVISED JUNE 15, 2016.
2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2,401 FEET.

CLIENT
AMEREN MISSOURI
LCPA SURFACE IMPOUNDMENT LABADIE ENERGY CENTER

PROJECT
GROUNDWATER MONITORING PROGRAM
MONITORED NATURAL ATTENUATION

TITLE
GROUNDWATER SAMPLING AND WATER LEVEL ELEVATION COLLECTION POINTS

CONSULTANT
GOLDER

YYYY-MM-DD	2021-09-27
DESIGNED	JSI
PREPARED	BTT
REVIEWED	EMS
APPROVED	JM

PROJECT NO.	CONTROL	REV.	FIGURE
153140603	1240	1.0	1

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

1 in

0

KEY MAP

720000

750000

990000

Missouri River

LCL1

LCPB

LCPA

DRAFT

DRAFT

bing

LEGEND

- Approximate Property Boundary
- Groundwater Model Domain

Labadie Energy Center CCR Units

- LCPA - Bottom Ash Surface Impoundment
- LCPB - Fly Ash Surface Impoundment
- LCL1 - Utility Waste Landfill Cell 1

0 2,000 4,000 6,000 8,000

Feet

NOTE(S)

1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2.) MNA - MONITORED NATURAL ATTENUATION.

REFERENCE(S)

1.) ZAHNER AND ASSOCIATES, INC. 2016. LOT CONSOLIDATION PLAT OF "LABADIE ENERGY CENTER" - PREPARED FOR AMEREN MISSOURI. REVISED JUNE 15, 2016.
2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2,401 FEET.

CLIENT
AMEREN MISSOURI
LCPA SURFACE IMPOUNDMENT LABADIE ENERGY CENTER

PROJECT
GROUNDWATER MONITORING PROGRAM
MONITORED NATURAL ATTENUATION

TITLE
GROUNDWATER MODEL DOMAIN

CONSULTANT
GOLDER

YYYY-MM-DD	2021-09-27
DESIGNED	JSI
PREPARED	JSI
REVIEWED	BTT
APPROVED	JM

PROJECT NO.	CONTROL	REV.	FIGURE
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KEY MAP

720000

990000

A

B

B'

A'

Missouri River

LCPA

LCPB

LCL1

100'

100'

N

DRAFT

DRAFT

bing

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750000

990000

720000

750000

LEGEND

- Approximate Property Boundary
- Groundwater Model Domain

Labadie Energy Center CCR Units

- LCPA - Bottom Ash Surface Impoundment
- LCPB - Fly Ash Surface Impoundment
- LCL1 - Utility Waste Landfill Cell 1

0 2,000 4,000 6,000 8,000

Feet

NOTE(S)

1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2.) MNA - MONITORED NATURAL ATTENUATION.

REFERENCE(S)

1.) ZAHNER AND ASSOCIATES, INC. 2016. LOT CONSOLIDATION PLAT OF "LABADIE ENERGY CENTER" - PREPARED FOR AMEREN MISSOURI. REVISED JUNE 15, 2016.
2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2,401 FEET.

CLIENT
AMEREN MISSOURI
LCPA SURFACE IMPOUNDMENT LABADIE ENERGY CENTER

PROJECT
GROUNDWATER MONITORING PROGRAM
MONITORED NATURAL ATTENUATION

Ameren

TITLE
GROUNDWATER MODEL GRID AND CROSS SECTION LOCATION MAP

CONSULTANT

GOLDER

YYYY-MM-DD	2021-09-27
DESIGNED	JSI
PREPARED	JSI
REVIEWED	BTT
APPROVED	JM

PROJECT NO.	CONTROL	REV.	FIGURE
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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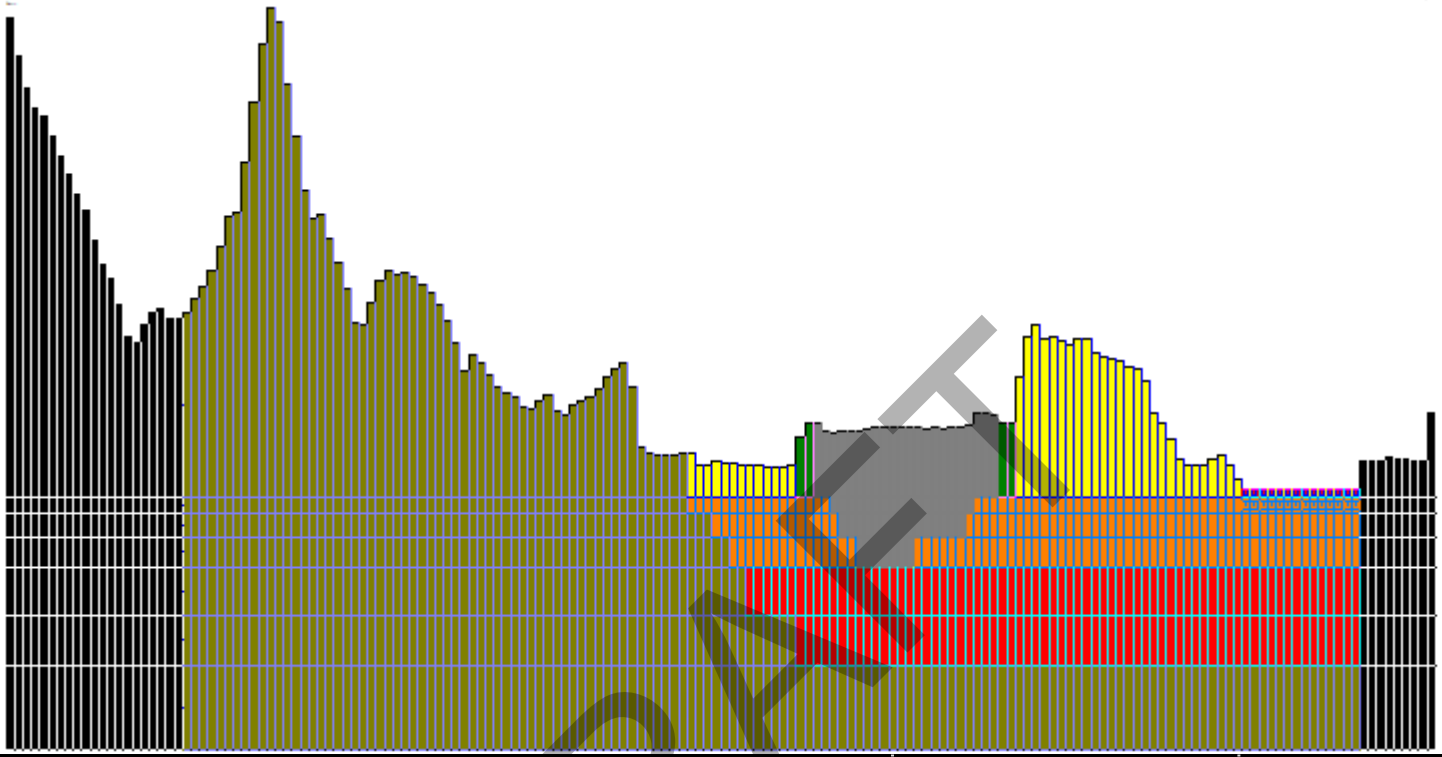
A' - South



A - North

Color	Layer	Kx, Ky		Kz		Vertical Anisotropy
		cm/sec	ft/day	cm/sec	ft/day	
	Compacted Berm Materials	1.0E-06	0.0028	1.0E-06	0.0028	1
	CCR Materials	3.0E-05	0.085	3.0E-05	0.085	1
	Shallow Zone of the Alluvial Aquifer	1.0E-02	28.346	1.0E-03	2.8346	0.1
	Intermediate Zone of the Alluvial Aquifer	1.5E-02	42.5	1.5E-03	4.25	0.1
	Deep Zone of the Alluvial Aquifer	1.5E-01	425.2	1.5E-02	42.52	0.1
	Bedrock	1.8E-06	0.005	1.8E-07	0.0005	0.1
	No Flow Areas	Not Applicable				
	Surface Water					

NOTE(S)

1) Cross-section has a 20X vertical exaggeration.
2) Cm/sec = centimeters per second.
3) Ft/day = feet per day.
4) See Figure 3 for cross section locations.
5) Cross-section along column 99.

CLIENT
AMEREN MISSOURI
LCPA SURFACE IMPOUNDMENT, LABADIE ENERGY CENTER

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-09-26
PREPARED	JSI
DESIGN	JSI
REVIEW	BTT
APPROVED	JM

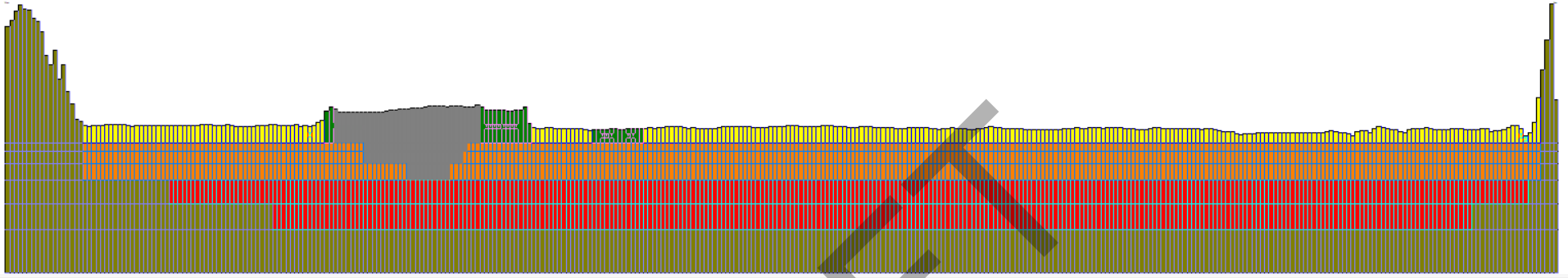
PROJECT
GROUNDWATER MONITORING PROGRAM
MONITORED NATURAL ATTENUATION

TITLE
A-A' CROSS-SECTION AND HYDRAULIC CONDUCTIVITIES

PROJECT No. **153140603**
REV. **0.0**
FIGURE **04**

B - West

B' - East



Color	Layer	Kx, Ky		Kz		Vertical Anisotropy
		cm/sec	ft/day	cm/sec	ft/day	
	Compacted Berm Materials	1.0E-06	0.0028	1.0E-06	0.0028	1
	CCR Materials	3.0E-05	0.085	3.0E-05	0.085	1
	Shallow Zone of the Alluvial Aquifer	1.0E-02	28.346	1.0E-03	2.8346	0.1
	Intermediate Zone of the Alluvial Aquifer	1.5E-02	42.5	1.5E-03	4.25	0.1
	Deep Zone of the Alluvial Aquifer	1.5E-01	425.2	1.5E-02	42.52	0.1
	Bedrock	1.8E-06	0.005	1.8E-07	0.0005	0.1
	No Flow Areas	Not Applicable				
	Surface Water					

NOTE(S)

1) Cross-section has a 20X vertical exaggeration.
2) Cm/sec = centimeters per second.
3) Ft/day = feet per day.
4) See Figure 3 for cross section locations.
5) Cross-section along Row 65.

CLIENT
AMEREN MISSOURI
LCPA SURFACE IMPOUNDMENT, LABADIE ENERGY CENTER

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-09-26
PREPARED	JSI
DESIGN	JSI
REVIEW	BTT
APPROVED	JM

PROJECT
GROUNDWATER MONITORING PROGRAM
MONITORED NATURAL ATTENUATION

TITLE
B-B' CROSS-SECTION AND HYDRAULIC CONDUCTIVITIES

PROJECT No. **153140603**
REV. **0.0**
FIGURE **05**

KEY MAP

720000

990000

720000

760000

750000

990000

Color	Layer	Stress Period 1 LCPA Only -Active		Stress Period 2 LCPA and LCPB -Active		Stress Period 3 Closure Construction		Stress Period 4 Capped and Closed		Stress Period 5 Capped & Treatment	
		In/yr	ft/day	In/yr	ft/day	in/yr	ft/day	in/yr	ft/day	in/yr	ft/day
	Alluvial Area	5.7	0.0013	5.7	0.0013	5.7	0.0013	5.7	0.0013	5.7	0.0013
	Compacted Berms	2.6	0.0006	2.6	0.0006	2.6	0.0006	2.6	0.0006	2.6	0.0006
	LCPA - North Central	175.2	0.04	109.5	0.025	5.7	0.0013	0.5	0.000112	0.5	0.000112
	LCPA - Southeastern	175.2	0.04	131.4	0.03	5.7	0.0013	0.5	0.000112	0.5	0.000112
	LCPA - Northeastern	175.2	0.04	131.4	0.03	5.7	0.0013	0.5	0.000112	0.5	0.000112
	LCPA - South Central	175.2	0.04	131.4	0.03	5.7	0.0013	0.5	0.000112	0.5	0.000112
	Infiltration Basin	5.7	0.0013	5.7	0.0013	5.7	0.0013	5.7	0.0013	131.4	0.0300
	Bedrock	1.1	0.00026	1.1	0.00026	1.1	0.00026	1.1	0.00026	1.1	0.00026
	No Flow Areas	Not Applicable									
	Surface Water										

LEGEND

- Approximate Property Boundary
- Groundwater Model Domain

0 2,000 4,000 6,000 8,000

Feet

NOTE(S)

1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2.) MNA - MONITORED NATURAL ATTENUATION.

REFERENCE(S)

1.) ZAHNER AND ASSOCIATES, INC. 2016. LOT CONSOLIDATION PLAT OF "LABADIE ENERGY CENTER" - PREPARED FOR AMEREN MISSOURI. REVISED JUNE 15, 2016.
2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2,401 FEET.

CLIENT
AMEREN MISSOURI
LABADIE ENERGY CENTER

PROJECT
LABADIE MNA EVALUATION

TITLE
RECHARGE DISTRIBUTION

CONSULTANT
GOLDER

YYYY-MM-DD	2021-09-27
DESIGNED	JSI
PREPARED	JSI
REVIEWED	BTT
APPROVED	JM

PROJECT NO.	CONTROL	REV.	FIGURE
153140603	1240	1.0	6

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

0 1in

PATH: C:\Users\jingram\Golder Associates\153140\601.02 - Ameren CCR GW Monitoring Program 2020 - AP\5 Technical Work\000-LEC\6.8 - GW\Model\8 - Reporting\Figures\MXD\F5 - Recharges.mxd PRINTED ON: 2021-09-29 AT: 5:21:49 PM

KEY MAP

720000

990000

720000

750000

990000

LEGEND

- Approximate Property Boundary
- Groundwater Model Domain
- Constant Head Boundary (CHB) - Layers 1-7
- Drain Cell - Layer 1
- No Flow Areas - Layers 1
- River - Surface Water Features - Layer 1 (Layers 1 and 2 for Missouri River)

0 2,000 4,000 6,000 8,000

Feet

NOTE(S)

1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2.) MNA - MONITORED NATURAL ATTENUATION.

REFERENCE(S)

1.) ZAHNER AND ASSOCIATES, INC. 2016. LOT CONSOLIDATION PLAT OF "LABADIE ENERGY CENTER" - PREPARED FOR AMEREN MISSOURI. REVISED JUNE 15, 2016.
2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2,401 FEET.

CLIENT
AMEREN MISSOURI
LCPA SURFACE IMPOUNDMENT LABADIE ENERGY CENTER

PROJECT
GROUNDWATER MONITORING PROGRAM
MONITORED NATURAL ATTENUATION

TITLE
BOUNDARY CONDITIONS

CONSULTANT
GOLDER

YYYY-MM-DD	2021-09-27
DESIGNED	JSI
PREPARED	JSI
REVIEWED	BTT
APPROVED	JM

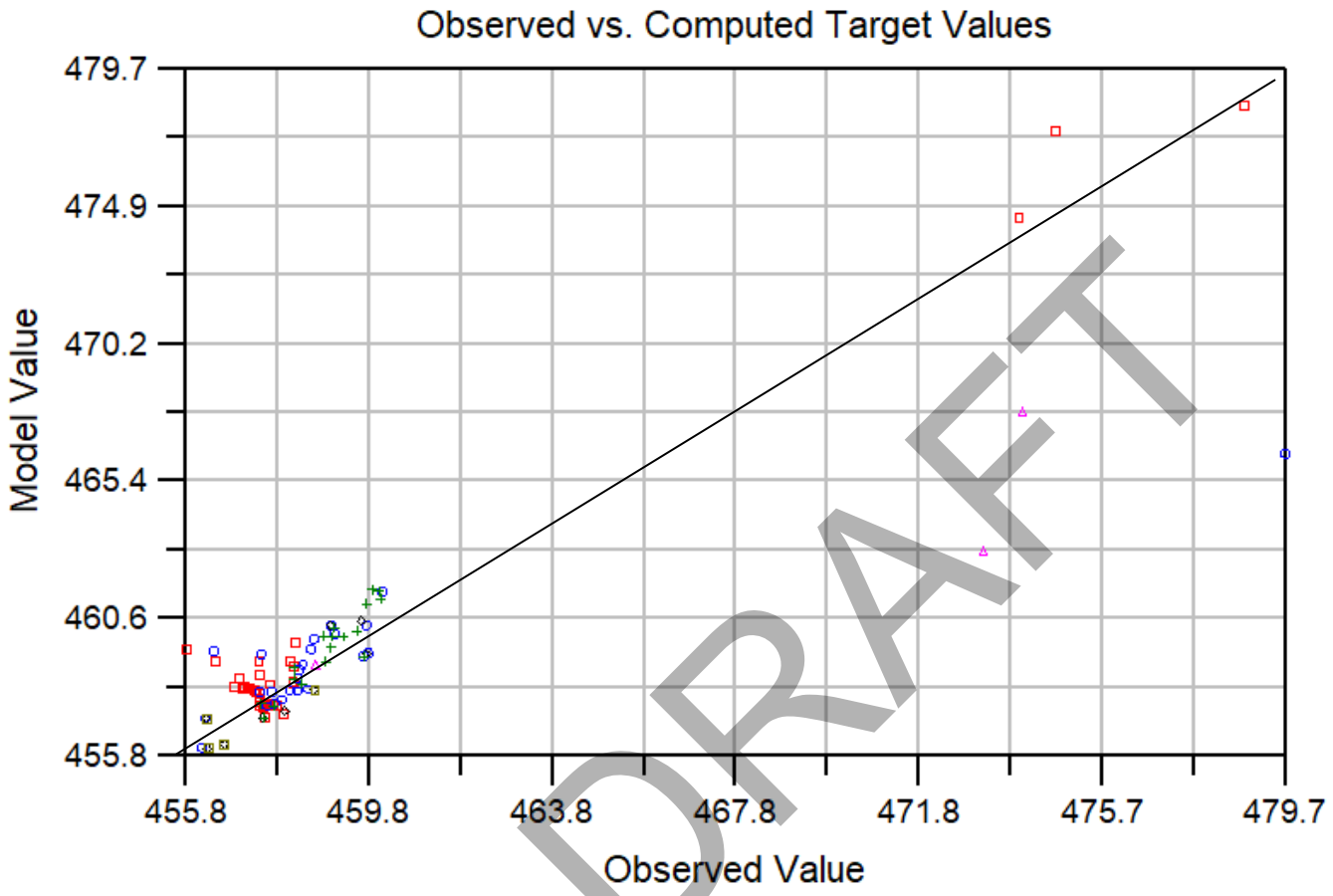
PROJECT NO.	CONTROL	REV.	FIGURE
153140603	1240	1.0	7

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

1 in

0

PATH: C:\Users\jingram\Golder Associates\153140603 02 - Ameren CCR GW Monitoring Program 2020 - APP5 Technical Work\0001-LEC\5.8_GWVModel\8 - Reporting\Figures\MXD\F6 - Boundary Condition.mxd PRINTED ON: 2021-09-28 AT: 10:59:42 PM



Residual Mean	= -0.24
Residual Standard Dev.	= 2.11
Absolute Residual Mean	= 1.07
Residual Sum of Squares	=4.19e+002
RMS Error	=2.12
Minimum Residual	= -3.72
Maximum Residual	= 13.43
Range of Observations	= 23.97
Scaled Res. Std. Dev.	= 0.088
Scaled Abs. Mean	= 0.044
Scaled RMS	= 0.089
Number of Observations	= 93

NOTE(S)

1) Values from water levels collected September 27, 2018, when the LCPA was in active conditions.

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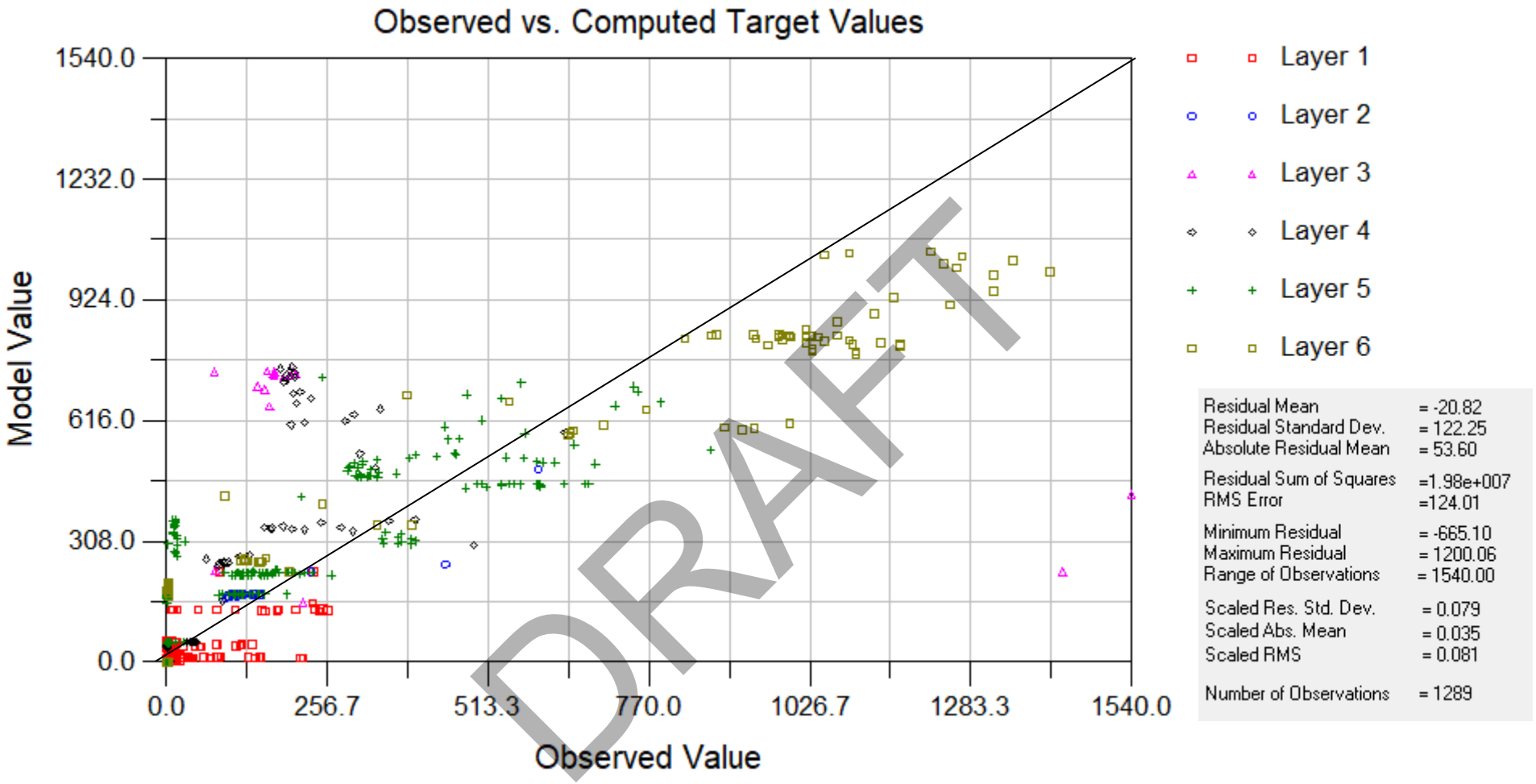
YYYY-MM-DD	2021-09-26
PREPARED	JSI
DESIGN	JSI
REVIEW	BTT
APPROVED	JM

PROJECT
GROUNDWATER MONITORING PROGRAM
MONITORED NATURAL ATTENUATION

TITLE
SCATTER DIAGRAM FOR PREDICTED AND OBSERVED HYDRAULIC HEADS – STEADY STATE CONDITIONS

PROJECT No.	REV.	FIGURE
153140603	**0.0**	**8**



NOTE(S)

1) Values from groundwater samples collected between 2015 and 2021.

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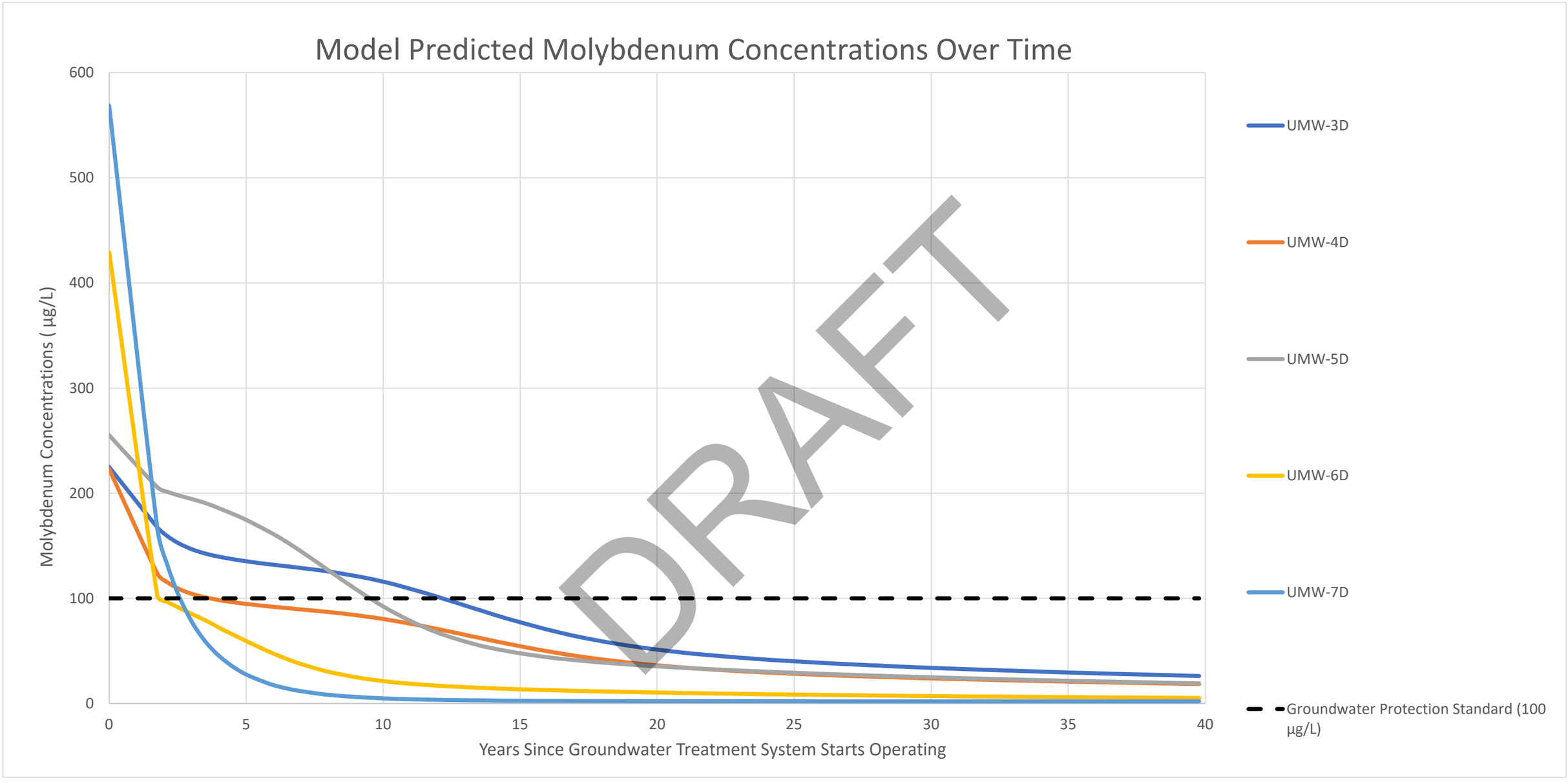
MEMBER OF WSP

YYYY-MM-DD	2021-09-26
PREPARED	JSI
DESIGN	JSI
REVIEW	BTT
APPROVED	JM

TITLE
SCATTER DIAGRAM FOR PREDICTED AND OBSERVED MOLYBDENUM CONCENTRATIONS – TRANSIENT CONDITIONS

PROJECT No.	REV.	FIGURE
153140603	**0.0**	**9**



Notes:
1) µg/L - Micrograms per liter.

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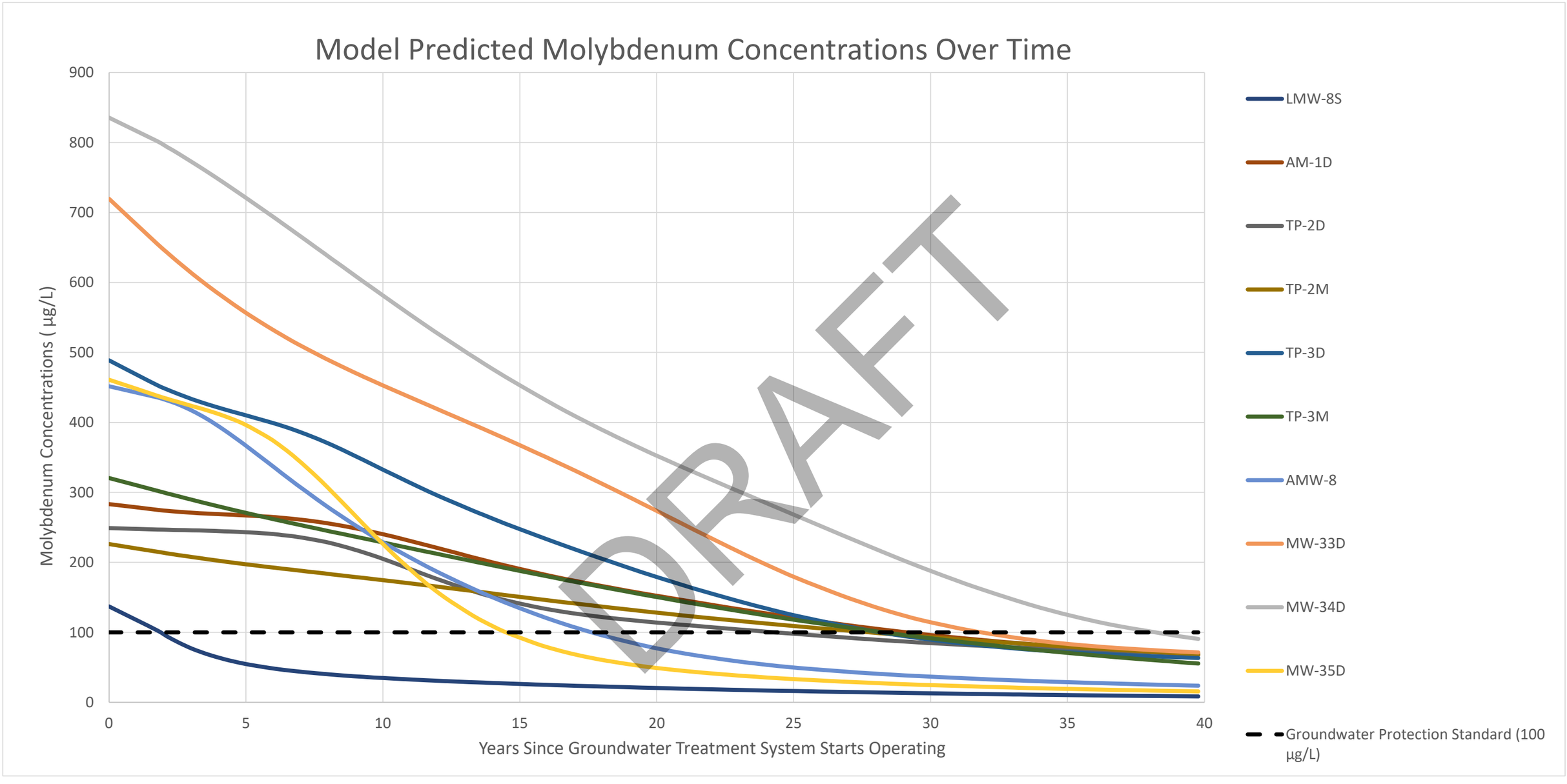
PROJECT
GROUNDWATER MONITORING PROGRAM
MONITORED NATURAL ATTENUATION

TITLE
Model Predicted Molybdenum Concentrations Over Time
Detection and Assessment Monitoring Well Network

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	10



Notes:
1) µg/L - Micrograms per liter.

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PROJECT
GROUNDWATER MONITORING PROGRAM
MONITORED NATURAL ATTENUATION

TITLE
Model Predicted Molybdenum Concentrations Over Time
Corrective Action Monitoring Well Network

PROJECT NO.	PHASE	REV.	FIGURE
153140603	0001D	A	11

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