REPORT

CCR ASSESSMENT OF CORRECTIVE MEASURES

Martin Lake Steam Electric Station - A1 Area Landfill
Panola County, Texas

Submitted to:

Luminant Generation Company LLC

Submitted by:

Golder Associates Inc.
2201 Double Creek Dr, Suite 4004, Round Rock, Texas, USA 78664

+1 512 671-3434

19121403

September 2019

LUMINANT

Table of Contents

1.0 INTRODUCTION 1

2.0 REGIONAL AND SITE SETTING 2

2.1 Regional Geology 2

2.2 Regional Hydrogeology 2

2.3 Site Hydrogeology and CCR Monitoring Well Network 2

3.0 NATURE AND EXTENT EVALUATION 4

3.1 Groundwater Monitoring Summary 4

3.2 Assessment Monitoring SSL Evaluation 4

3.3 Field Investigation 7

3.3.1 General 7

3.3.2 Soil Sample Collection 7

3.3.3 Monitoring Well Installation 8

3.3.4 Groundwater Sampling 8

3.4 Evaluation of Groundwater Data 9

3.4.1 Geochemical Modeling Approach 9

3.4.2 Summary of Groundwater Results 9

3.5 Evaluation of Soil 11

3.5.1 Mineralogical Composition 11

3.5.2 Chemical Composition and Sequential Extraction 11

3.6 Summary of Site Characterization 13

4.0 ASSESSMENT OF CORRECTIVE MEASURES 15

4.1 Corrective Measures Objectives and Evaluation Criteria 15

4.2 Potential Source Control Response Technologies 16

4.2.1 Closure in Place/Capping 16

4.2.2 Removal and Off-site Disposal 16

4.2.3 Screening of Potential Source Control Response Technologies 17

LUMINANT

4.3 Potential Groundwater Response Technologies 17
4.3.1 Monitored Natural Attenuation 17
4.3.2 Groundwater Extraction and Treatment 18
4.3.3 Vertical Hydraulic Barrier 19
4.3.4 Permeable Reactive Barrier 20
4.3.5 In-situ Chemical Treatment 21
4.3.6 Phytoremediation 21
4.3.7 Screening of Potential Groundwater Response Technologies 22
4.4 Potential Corrective Measures Alternatives 22
4.5 Remedy Selection 22
5.0 REFERENCES 23

TABLES

Table 1 Appendix IV Groundwater Analytical Data Summary
Table 2 Screening of Potential Source Control Response Technologies
Table 3 Screening of Potential Groundwater Response Technologies
Table 4 Evaluation of Corrective Measures Alternatives

FIGURES

Figure 1 Site Location Map
Figure 2 Detailed Site Plan
Figure 3 Geologic Cross Section A-A'
Figure 4 Geologic Cross Section B-B'
Figure 5 Geologic Cross Section C-C'
Figure 6 Geologic Cross Section D-D'
Figure 7 Potentiometric Surface Map
Figure 8 Extent of Appendix IV Constituents Detected at SSLs Above GWPSs
Figure 9a Major Groundwater Chemistry
Figure 9b Select Relative Abundance in Groundwater
Figure 10a Historical Trends of Arsenic in Groundwater
Figure 10b Historical Trends of Barium in Groundwater
Figure 10c Historical Trends of Cobalt in Groundwater
Figure 10d Historical Trends of Lithium in Groundwater
Figure 11 Pourbaix Speciation of Cobalt in Groundwater

APPENDICES

Appendix A Boring Logs
Appendix B Laboratory Analytical Reports
Appendix C Groundwater Sampling Records

LUMINANT

1.0 INTRODUCTION

Golder Associates Inc. (Golder) has prepared this assessment of corrective measures (ACM) report on behalf of Luminant Generation Company LLC (Luminant) for the A1 Area Landfill (A1 LF) located at the Martin Lake Steam Electric Station (MLSES) in Panola County, Texas (hereafter, the "Site"). The ACM was prepared in accordance with §257.96 of the Coal Combustion Residual (CCR) Rule and was required due to the presence of concentrations of selected Appendix IV constituents in the uppermost Site aquifer at statistically significant levels (SSLs) above the groundwater protection standards (GWPS) established for the constituents at the Site. This ACM Report will be placed in the MLSES operating record in accordance with §257.105(h)(10).

This report also incorporates the results of a site investigation conducted at the A1 LF in May and June 2019. The objectives of the site investigation were:

- delineate the nature and extent of the selected Appendix IV constituents to their respective GWPS;
- update the statistical evaluations of the Appendix IV constituents to include data collected during 2019 to confirm that SSL exceedances continue to occur at the Site;
- collect data to evaluate potential future alternate source demonstrations (ASDs) for the Appendix IV constituents; and
- assess the potential for monitored natural attenuation (MNA) to be successful at the Site for the Appendix IV constituents.

The MLSES is located approximately 5 miles southeast of Tatum in Rusk County, Texas (Figure 1). The MLSES is expected to remain in operation for the foreseeable future, depending on future power demands.

The A1 LF is located approximately 2.5 miles southeast of the MLSES (Figure 1). The A1 LF is an above grade landfill that considered an existing CCR Landfill under the CCR Rule. CCR is transported to the landfill in rail cars, off loaded and placed within the active areas at the landfill. The A1 LF was registered with the Texas Commission on Environmental Quality (TCEQ) as a Class 2 non-hazardous industrial waste landfill in 1980 under SWR No. 31277 and has been receiving CCR since that time.

The A1 LF is located within reclaimed areas of the former Beckville Lignite Mine (a subsection of the Martin Lake Lignite Mine). The landfill is surrounded by earthen embankments constructed of mine spoil that extend approximately 10 to 20 feet or more above surrounding grade (PBW 2016). The A1 LF is lined with a 1-foot thick compacted clay bottom liner consisting of clay-rich mine spoil scarified and re-compacted to achieve an in-place permeability of $1x10^{-7}$ cm/sec or less. The bottom liner is underlain by low-permeability, clay-rich mine spoil 70 to 100 feet or more in thickness. The earthen embankments are provided with a 3-foot thick compacted clay liner.

Progressive capping/closure of the A-1 LF is performed as placement of CCR in the landfill reaches design elevations. Existing capped areas have been capped/closed using a 3-foot thick compacted clay cap (in-place permeability of $1x10^{-7}$ cm/sec or less) covered with a minimum 2-foot thick vegetative cover layer.

LUMINANT

2.0 REGIONAL AND SITE SETTING

2.1 Regional Geology

The A1 Area Landfill is located in the outcrop area of the Eocene-aged undifferentiated Wilcox Group (Barnes, 1965). The Wilcox Group in the vicinity of the Site consists mostly of unconsolidated to moderately consolidated clay and silt, with various amounts of interbedded sand and lignite. The depositional environment is associated with fluvial-deltaic processes such as inter-channel crevasse splays, overbank deposits, and localized channel fills. The Wilcox Group is overlain by sands of the Carrizo Formation, which is present only at higher elevations in the area. The Carrizo Formation is not present at the Site.

2.2 Regional Hydrogeology

Groundwater within the upper 100 feet below ground surface (bgs) in the region typically flows under unconfined to semi-confined conditions. The direction and rate of groundwater movement in the Calvert Bluff Formation is affected by a number of physical features, including topography, surface drainage, and geology. The natural groundwater potentiometric surface in these shallow flow systems is generally a subdued replica of topography. In general, groundwater flow occurs from high potentiometric areas (recharge zones) toward valleys (discharge zones). Groundwater divides generally coincide with surface drainage divides. Reclaimed mine spoil is not typically used as a water production source. Water wells in the region are typically completed in channel sands of the Wilcox Group or in the Carrizo Formation.

2.3 Site Hydrogeology and CCR Monitoring Well Network

The CCR groundwater monitoring well network at the A1 Area Landfill was established in 2015 using Site monitoring wells BMW-11A-R, BMW-18, BMW-19, BMW-20, BMW-21, BMW-22, BMW-23, and BMW-24. Monitoring wells BMW-26, BMW-27, and BMW-28 were added to the CCR monitoring network in 2016, during the background sampling period. Nature and extent wells BMW-29, BMW-30, BMW-31, BMW-32, and BMW-33 were installed in May 2019 and were sampled, along with one pre-existing non-CCR well (BMW-25), in June 2019. Pre-existing mine monitoring wells A-I-2-OB, AI-17-SPOIL, and AIV-18-OB-95 were also sampled as nature and extent wells in July and August 2019. Boring logs for the CCR monitoring wells and nature and extent wells are provided in Appendix A. The uppermost GWBU occurs under unconfined conditions within the spoil zone. The CCR monitoring wells and nature and extent wells are completed in the spoil zone, except for nature and extent wells A-I-2-OB and AIV-18-OB-95, which are both completed in native Wilcox sands in the overburden interval at the mine. Geologic cross sections of the A1 Area Landfill are presented on Figures 3, 4, 5, and 6.

Prior to the installation of the nature and extent wells, the highest groundwater elevation in the CCR monitoring well network had been consistently observed at well BMW-11-AR, which is located near the northern corner of the A1 Area Landfill. When the initial nature and extent wells were sampled in June 2019, the highest groundwater elevation was observed at BMW-33 (401.69 feet above mean sea level (amsl)), which is located on the northeast side of the landfill. Based on the new water elevation information from the nature and extent wells, BMW-33 is considered an upgradient well relative to the A1 Area Landfill and the inferred direction of groundwater flow is to the east-southeast and west from the A1 Area Landfill, with a lesser flow component to the south. A groundwater potentiometric surface map of the A1 Area Landfill is provided on Figure 7.

Nature and extent wells AI-2-OB, AI-17-SPOIL, and AIV-18-OB-95 were initially selected for evaluation based on the previously inferred groundwater flow direction shown on historic CCR groundwater potentiometric surface maps (PBW 2017a) and the well locations relative to the A1 Area Landfill. Groundwater elevation data collected

LUMINANT

during the nature and extent evaluation indicate that wells AI-17-SPOIL and AIV-18-OB-95 are upgradient of the A1 Area Landfill and that well AI-2-OB is downgradient of the A1 Area Landfill. Based on the inferred groundwater flow direction, the locations of the CCR monitoring wells and nature and extent wells to the A1 Area Landfill are as follows:

Upgradient/Background Wells	Downgradient Wells	
BMW-11A-R	BMW-18	BMW-26
BMW-27	BMW-19	BMW-28
BMW-33	BMW-20	BMW-29
AI-17-SPOIL	BMW-21	BMW-30
AIV-18-OB-95	BMW-22	BMW-31
	BMW-23	BMW-32
	BMW-24	AI-2-OB
	BMW-25	

Rising- and falling-head aquifer tests (i.e., slug tests) were conducted in 2015 at monitoring wells BMW-21, BMW-23, and BMW-24 to evaluate lateral groundwater flow velocities of the uppermost GWBU. The test methods and results were documented in the CCR Groundwater System Certification Report for the Site (PBW 2017a). Based on the test results, the uppermost GWBU has an estimated horizontal hydraulic conductivity value of 3.05E-04 cm/sec and an estimated lateral groundwater flow velocity of 14 feet per year.

Golder performed a survey of water supply wells located in the vicinity of the A1 Area Landfill in May 2019 as part of a Texas Commission on Environmental Quality (TCEQ) Texas Risk Reduction Program (TRRP) assessment of the Site. A Drinking Water Survey Report (Golder, 2019) documenting the water well survey activities and findings was approved by the TCEQ in a letter dated August 2, 2019. No imminent threats to water wells or potentially affected drinking water wells were identified.

LUMINANT

3.0 NATURE AND EXTENT EVALUATION

3.1 Groundwater Monitoring Summary

Background monitoring of groundwater in the vicinity of the A1 Area Landfill began in October 2015 and was completed in December 2016. Samples collected during this period were analyzed for Appendix III and Appendix IV constituents to establish background concentrations pursuant to §257.94(b).

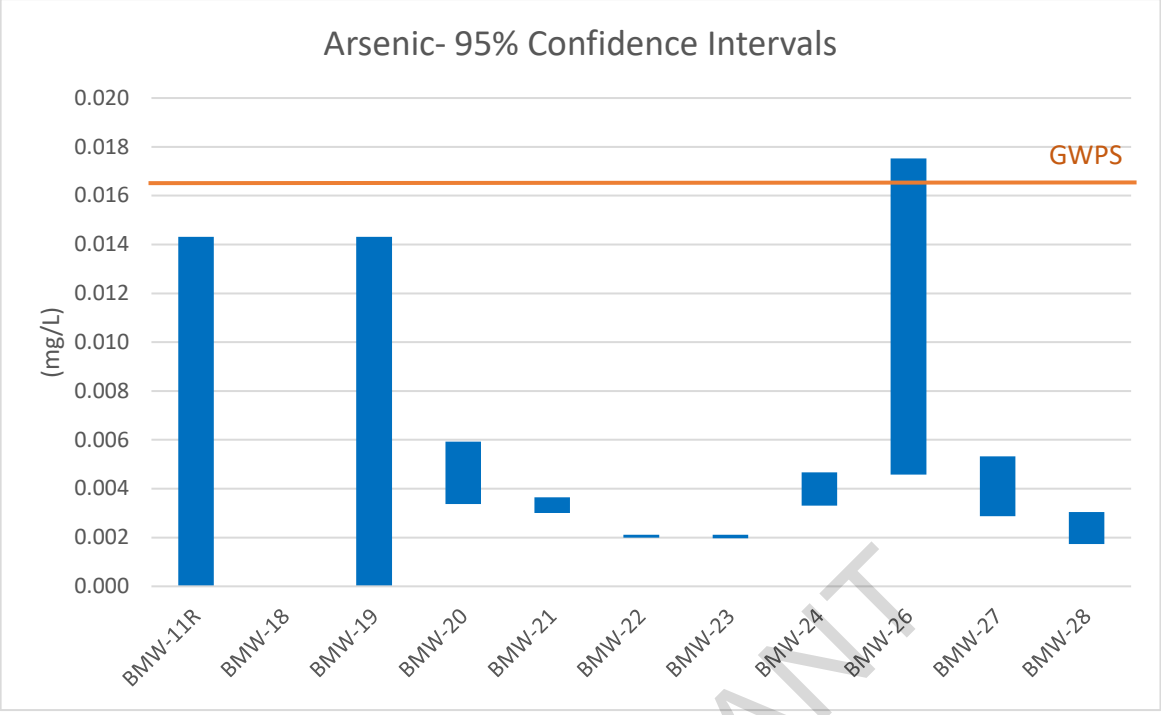
A detection monitoring program in accordance with §257.94 was initiated in September 2017. The evaluation of those data was completed in 2018 using procedures described in the Statistical Analysis Plan (PBW, 2017b) to identify statistically significant increases (SSIs) of Appendix III parameters above background concentrations. Based on the identification of SSIs for one or more Appendix III parameters, an assessment monitoring program was established pursuant to §257.94(e)(1).

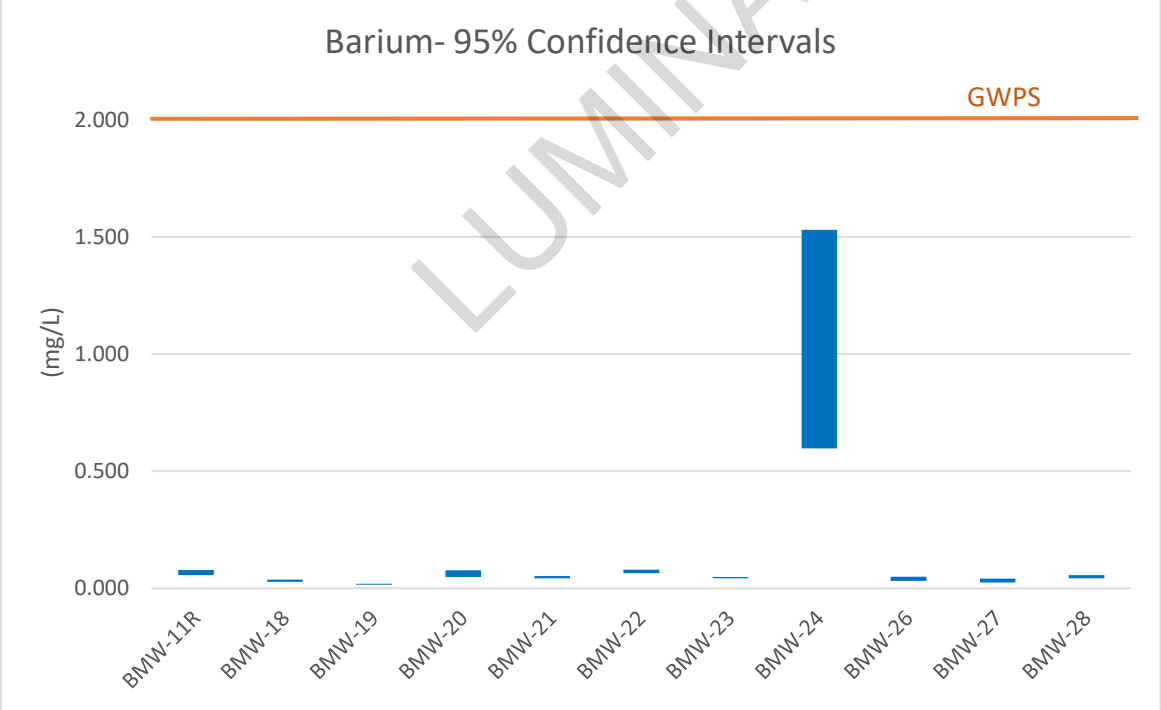
The initial assessment monitoring event was performed in June 2018 and a subsequent semi-annual assessment monitoring event was conducted in September 2018 in accordance with §257.95(a) and §257.95(d). Using the Appendix IV data collected during the assessment period through September 2018, SSLs above GWPSs were initially identified for arsenic (BMW-26), barium (BMW-24), cobalt (BMW-19, BMW-20 and BMW-27); and lithium (BMW-26 and BMW-28). An ACM was initiated on April 8, 2019 pursuant to §257.95(g). A justification letter for a 60-day extension due to site-specific circumstances that delayed work on the ACM was certified on July 3, 2019 in accordance with §257.96(a). Based on the extension, the deadline for completing the ACM is September 5, 2019.

3.2 Assessment Monitoring SSL Evaluation

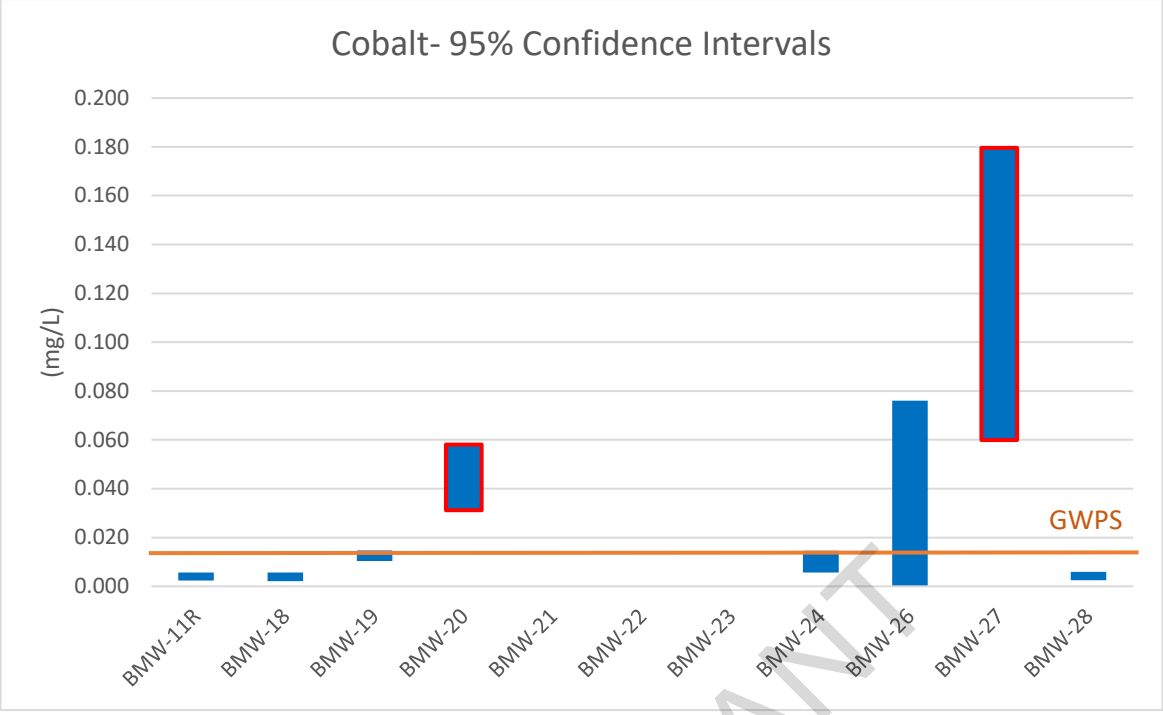
An additional assessment monitoring event was performed in May 2019. Groundwater sampling analytical results for all Appendix IV parameters from 2015 through 2019 are presented in Table 1. An updated statistical analysis of the Appendix IV results from downgradient CCR monitoring wells was conducted, including the May 2019 data, to evaluate if constituent concentrations detected in the samples remained at SSLs relative to the GWPSs. The updated statistical analysis was performed in accordance with the Statistical Analysis Plan for CCR Groundwater Monitoring (PBW, 2017b) and the USEPA Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities-Unified Guidance (USEPA 2009). Confidence intervals were calculated for any Appendix IV parameter that historically has had more than one exceedance of the GWPS in any well within the monitoring network. Plots of the confidence intervals for each of these Appendix IV parameters are presented below (red boxes indicate SSLs):

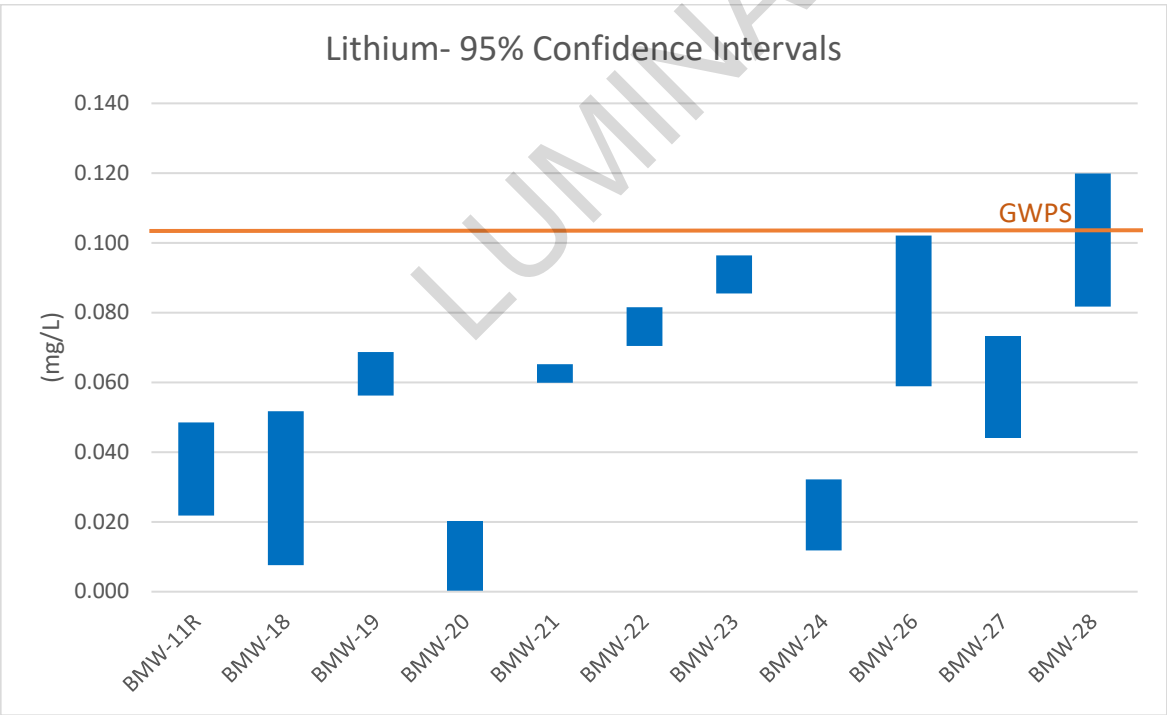
LUMINANT


Arsenic- 95% Confidence Intervals
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
(mg/L)
GWPS
BMW-11R
BMW-18
BMW-19
BMW-20
BMW-21
BMW-22
BMW-23
BMW-24
BMW-26
BMW-27
BMW-28


Barium- 95% Confidence Intervals
2.000
1.500
1.000
0.500
0.000
(mg/L)
GWPS
BMW-11R
BMW-18
BMW-19
BMW-20
BMW-21
BMW-22
BMW-23
BMW-24
BMW-26
BMW-27
BMW-28

LUMINANT





LUMINANT

The previous statistical analysis using data collected during the assessment monitoring period through September 2018 indicated SSLs for arsenic (BMW-26), barium (BMW-24), cobalt (BMW-19, BMW-20, and BMW-27) as identified in the February 2019 SSL notification; and lithium (BMW-26 and BMW-28). The updated statistical analysis identified only cobalt (BMW-20 and BMW-27) as having SSLs above GWPSs Based on the groundwater elevations measured in the nature and extent wells in June 2019, CCR well BMW-27 is now considered to be

upgradient of the A1 Area Landfill; therefore, the SSLs for cobalt identified in well BMW-27 are were characterized as background concentrations in the updated statistical analysis. Cobalt in well BMW-20 was the only occurrence of SSLs above GWPSs in the updated statistical analysis. Although only cobalt was observed at SSLs above the GWPS during the updated statistical analysis, the monitoring wells will continue to be monitored for arsenic, barium, and lithium to confirm that their concentrations remain below SSLs in the future in accordance with the CCR Rule. For the purposes of this ACM evaluation, concentrations are conservatively assumed to be present at SSLs above their respective GWPSs for the following constituents in the wells indicated based on the initial statistical analysis:

- Arsenic (BMW-26);
- Barium (BMW-24);
- Cobalt (BMW-19, BMW-20, and BMW-27); and
- Lithium (BMW-26 and BMW-28).

Figure 8 shows the extent of Appendix IV constituents detected at SSLs above GWPSs based on the initial and updated statistical analysis.

3.3 Field Investigation

3.3.1 General

Field investigation activities conducted as part of the ACM included collection of soil samples for mineralogical assessment and chemical analysis, installation and development of nature and extent monitoring wells, groundwater-level measurements, and groundwater sampling and analysis. Figure 2 presents the locations of soil borings and monitoring wells installed and sampled as part of the field investigation.

3.3.2 Soil Sample Collection

Soil borings were completed in May 2019 at proposed nature and extent monitoring well locations BMW-29, BMW-30, BMW-31, BMW-32, and BMW-33. Soil samples were collected within the target GWBU in each of the soil borings. Soil samples were submitted under chain-of-custody for laboratory analysis of the following parameters:

- 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 constituents of interest is influenced by the mineral phase(s) present in the aquifer (Hem 1985). The mineralogical testing laboratory (SGS Minerals Services) performed the analysis using quantitative (Rietveld) X-ray diffraction (XRD) (ME-LR-MIN-MET-MN-DO5) and a Bruker AXS D8 Advance Diffractometer.
- Total metals: Analysis of total metals was conducted to quantify the chemical composition of soil 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.
- Sequential extraction (SEP): This test consists of a seven-step metals extraction from solids as per Tessier et al. (1979) to identify the provenance of constituents of interest (i.e. the operationally-defined fraction that

LUMINANT

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.

3.3.3 Monitoring Well Installation

Five new nature and extent monitoring wells were completed (BMW-29, BMW-30, BMW-31, BMW-32, and BMW-33) in May 2019 in the uppermost GWBU. The wells were constructed of 2-inch diameter, schedule 40 PVC casing and 0.010-inch slotted screen. Annular materials consisted of a sand/gravel pack around the screened interval, a bentonite seal above the sand/gravel pack, and grout or bentonite chips to ground surface. Surface completions consisted of a concrete pad, protective steel casing stickup, and guard posts. The monitoring wells were developed by surging the wells several times and purging the wells using an inertial pump to remove fine-sized particles and to establish a hydraulic connection between the well and the formation.

3.3.4 Groundwater Sampling

Groundwater samples were collected from the CCR monitoring network in May 2019 and from the nature and extent wells in June 2019 through August 2019. Laboratory analytical reports are provided in Appendix B and groundwater sampling records, which include field-measured parameters, are presented in Appendix C.

Chemical/geochemical analysis of groundwater samples included field parameters, metals, nutrients, and major cations and anions. The rationale and methods used are 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 evaluate general geochemical conditions in the groundwater and support geochemical modeling.
- Metals and Regulated COIs: Analysis of Appendix III parameters and Appendix IV metals to better understand the geochemical composition of groundwater. Metals analysis allows for the delineation of a potential plume, evaluation of mineral saturation indices, and evaluation of background contributions from natural sources or anthropogenic sources.
- Major Cations, Anions, and Nutrients: 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.

LUMINANT

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

3.4 Evaluation of Groundwater Data

3.4.1 Geochemical Modeling Approach

Geochemical modeling was conducted to evaluate general groundwater 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 United States Geological Survey (USGS), PHREEQC, was used for these simulations (Parkhurst and Appelo 2013). PHREEQC version 3.4 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, was used as a basis for the thermodynamic constants required for modeling.

The Geochemist's Workbench Version 12 (Bethke 2015) 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 (e.g. cobalt) 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.

3.4.2 Summary of Groundwater Results

Groundwater quality data from background well BMW-11-A-R; monitoring wells BMW-18, BMW-19, BMW-20, BMW-21, BMW-22, BMW-23, BMW-24, BMW-26, BMW-27 (now considered upgradient from the A1 Area Landfill), and BMW-28; and nature and extent monitoring wells BMW-25, BMW-29, BMW-30, BMW-31, BMW-32, BMW-33 were used for this evaluation. The water quality monitoring data are presented in Appendices B and C and can be summarized as follows:

General Chemistry Parameters

- pH: The pH of groundwater samples collected from CCR monitoring network and nature and extent wells ranged from 6.6 to 7.2 in May 2019. Historically, the pH in the CCR monitoring well network has ranged from 5.3 to 7.3. However, other than some values that appear to be outliers or are due to seasonality, the pH of groundwater in the CCR network has been consistently between 6.0 and 7.2.
- ORP (Redox): Field-measured redox values, corrected to Eh (+200mV), ranged from +123 to +184 mV in the groundwater samples in the CCR monitoring well network in May 2019. The Eh of groundwater in the nature and extent monitoring wells ranged from +168 mV to +190 mV, indicating that redox conditions were similar to those in the CCR monitoring network wells.
- Total Dissolved Solids (TDS): Groundwater TDS concentrations were variable in May 2019 in the CCR monitoring and nature and extent well network. The lowest TDS concentration (327 mg/L) was observed in nature and extent monitoring well BMW-31 and the highest TDS concentration (3,610 mg/L) was observed in CCR monitoring wells BMW-28. Groundwater in CCR monitoring well BMW-28, while having the highest TDS, does not have a SSL of any Appendix IV constituent as of May 2019.
- Major ion chemistry: A Piper plot was generated for groundwater samples to facilitate the identification of water types and source contributions (Figure 9a). Except for upgradient wells BMW-18, BMW-19 and nature and extent well BMW-31, all background, downgradient, and nature and extent wells demonstrate a similar major ion relative abundance. Based on the molar ratios of calcium, chloride, and sulfate (Figure 9b), all

LUMINANT

wells show major ion compositions ranging between those from BMW-11AR (upgradient) and BMW-31 (nature and extent).

- Iron: Oxidized iron (Fe^{+3}) concentrations were variable, ranging from 0.0633 mg/L (BMW-28) to 35.1 mg/L (BMW-24) in May 2019 (Appendix B). Reduced iron (Fe^{+2}) was non-detect (<0.05 mg/L) in all groundwater samples but two: BMW-23 (0.0937 mg/L) and nature and extent well BMW-29 (0.342 mg/L). Based on the oxidized iron concentrations in groundwater, it is likely ferrihydrite, an iron oxide mineral, is present at the A1 LF, indicating the potential for attenuation of metals and metalloids from groundwater.
- Nutrients: Nitrate (nitrate as N) was present in groundwater at monitoring wells at variable levels, ranging from non-detect (< 0.1 mg/L as N) to 1.35 mg/L as N at BMW-19 in May 2019 (Appendix B). Nitrate was not detected in nature and extent wells. Phosphate concentrations in groundwater ranged from non-detect (0.03 mg/L) to 0.202 mg/L in CCR monitoring and nature and extent wells. No spatial trend was apparent in the nitrate or phosphate distribution in groundwater.

Constituents Identified in February 2019 SSL Notification

- Arsenic: Historically, arsenic concentrations in groundwater surrounding the A1 LF have ranged from non-detect (<0.002 mg/L) to 0.0428 mg/L in CCR monitoring well BMW-19 (June 2018; Figure 10a). Only CCR monitoring wells BMW-19 and BMW-26 have ever exceeded the GWPS. Prior to, and after, the highest groundwater arsenic concentration measured in BMW-19 in June 2018, arsenic concentrations were at or near detection limits in BMW-19 (<0.005 mg/), indicating that the elevated value likely represented an outlier. Arsenic concentrations in groundwater at BMW-26 exceeded the GWPS on four of 12 sampling occasions since October 2016. Based on the evaluation of 95% confidence intervals, no CCR monitoring wells contain arsenic at a concentration above the SSL as of May 2019. Also, , all arsenic concentrations in CCR monitoring wells were below the GWPS as of May 2019.
- Barium: Historically, barium concentrations in groundwater have only exceeded the GWPS of 2.0 mg/L in CCR monitoring well BMW-19 (Figure 10b) on one occasion. Since October 2015, the barium concentration in groundwater at BMW-19 has ranged from 0.181 mg/L to 2.19 mg/L and, as of May 2019, was observed at 0.221 mg/L. No other nature and extent or CCR monitoring wells have ever reported barium concentrations in groundwater exceeding the GWPS. Based on the evaluation of 95% confidence intervals, barium in groundwater is not at an SSL in groundwater at BMW-19, or in any other CCR monitoring well.
- Cobalt: Cobalt concentrations in groundwater samples collected from the nature and extent monitoring wells ranged from non-detect (<0.003 mg/L) to just above non-detect (0.00705 mg/L) in May 2019 (Table 1). The highest observed cobalt concentration in a groundwater occurred at monitoring well BMW-24 (0.00643 mg/L; Figure 10c). All other CCR monitoring wells did not contain cobalt concentrations above the detection limit in May 2019. Historically, cobalt concentrations have ranged from non-detect (<0.003 mg/l) to 0.2550 mg/L in CCR monitoring well BMW-22. The highest cobalt concentration in this well was observed in June 2017, and since then levels have been generally stable or decreasing. CCR monitoring well BMW-24 shows substantial variation between sampling events, of +/- 0.2 mg/L in some cases. Based on an evaluation of 95% confidence intervals, CCR monitoring wells BMW-20 and BMW-27 contain cobalt at a SSL above the GWPS of 0.0124 mg/L (Section 3.2). Cobalt is likely present in groundwater as the divalent cation Co^{+2} while, based on the pH and Eh of groundwater, ferrihydrite, an iron hydroxide mineral phase known to adsorb cobalt, is expected to be present and stable (Figure 11).

LUMINANT

- Lithium: Lithium has exceeded the GWPS (0.103 mg/L) since October 2015 in groundwater from four wells: BMW-18, BMW-23, BMW-26, and BMW-28 (Figure 10d). In May 2019, lithium concentrations in groundwater in the CCR monitoring wells network were only above the GWPS in one well: BMW-28. Based on the evaluation of the 95% confidence intervals, the GWPS exceedances for lithium at BMW-24 are not at an SSL above the GWPS for lithium, nor at any other CCR monitoring well at the A1 LF.

3.5 Evaluation of Soil

3.5.1 Mineralogical Composition

Quantitative X-ray diffraction (XRD) with Rietveld refinement was used to identify and quantify minerals in five overburden samples collected during the drilling activities - one sample from each of the soil borings completed in June 2019 (BMW-29, BMW-30, BMW-31, BMW-32, and BMW-33). These samples were obtained to better understand the mineralogical composition of the aquifer system and identify any minerals that would potentially influence attenuation of constituents of interest. In contrast, the presence of certain minerals could also indicate a potential for naturally-occurring release of metals into groundwater, for instance due to oxidation of sulfide minerals.

The mineralogical analysis identified the materials in boreholes samples at the A1 LF predominantly consist of quartz with varying amounts of the silicate minerals K-feldspar, albite, chlorite, muscovite, biotite, kaolinite, vermiculite, and montmorillonite, plus calcite. Trace amounts of titanomagnetite and ilmenite were encountered in one sample as well. Some of the aluminum phyllosilicates identified in the samples (i.e., kaolinite, vermiculite and montmorillonite) reflect the presence of clays at the A1 LF. Analytical reports for the XRD samples are provided in Appendix B.

3.5.2 Chemical Composition and Sequential Extraction

Chemical analysis and sequential extractions were used to determine the chemical composition of the soil and the distribution of constituents of interest over various operationally-defined fractions comprising the soil. Testing was completed as described in Section 3.3.2 on soil samples obtained from three borehole locations (Figure 2) and the analytical reports for the soil analyses are provided in Appendix B.

Soil sample locations were chosen to gain a better understanding of the underlying geological conditions of the area surrounding the A1 LF, mostly adjacent to or downgradient of a CCR monitoring well. In addition, this information allows for a better understanding of naturally-occurring metal contributions to groundwater or the potential for sequestration of constituents from groundwater.

A description of the individual fractions determined by sequential extraction is presented in Section 3.3.2. 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 Appendix B. 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 presented in Appendix B are summarized as follows:

LUMINANT

General Chemistry Parameters

- Aluminum: Aluminum is not a constituent of interest (COI) at the site but it has been well studied as a sorbing medium in soils (e.g., Karamalidis and Dzombak 2011). Total aluminum in soils ranged from 29,526 to 53,368 mg/kg, and the environmentally-available fraction ranged from just 1,208 mg/kg (BMW-30) to 3,286 mg/kg (BMW-29). Aluminum in the soil at the site is, therefore, largely (~84% to 94%) present in the residual, or silicate-bound fraction. This fraction is likely at least partially represented by hydrous aluminum phyllosilicates minerals or clays intermixed in the silica sand matrix. Clays represent an important sorptive reservoir for numerous trace metals and metalloids (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 three core samples analyzed, varying from 5,814 mg/kg (BMW-30) to 24,578 mg/kg (BMW-29). In nearly all samples (except BMW-29 and BMW-31), the sulfide and residual fractions accounted for the largest proportion of total iron (59% to 79%) and, as such, most of the iron is not environmentally available. The remainder of the iron in the samples is present in the amorphous metal and metal hydroxide phase with a small amount <0.6% also occurring in the carbonate fraction. The metal hydroxide fraction, 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 used as a proxy for determine the potential for attenuation of cobalt or other COIs.

Constituents Identified in February 2019 SSL Notification

- Arsenic: Total arsenic in soil ranged from 3.0 to 4.12 mg/kg while the environmentally-available fraction ranged from 1.38 mg/kg in BMW-31 to 2.27 mg/kg in BMW-29, representing from 46% to 65% of total arsenic. Arsenic in the non-environmentally available fraction (acid/sulfide and residual fractions) ranged from 35% to 54% of total arsenic, indicating the presence of a reservoir of naturally-occurring arsenic in soils. All of the arsenic that was present in the environmentally-available fraction was associated with the amorphous metal and metal hydroxide fractions, indicating potential attenuation of arsenic from groundwater.
- Barium: Total barium in soil ranged from 376 to 597 mg/kg while the environmentally-available fraction ranged from 9.9 mg/kg in BMW-30 to 52 mg/kg in BMW-31, representing from 3% to 14% of total barium. The majority of barium (83% to 96%) was present in the silicate mineral or residual fraction, as such indicating the presence of a considerable reservoir of naturally-occurring barium in soils. Of the barium that occurred in the environmentally-available fraction, the majority was associated with metal hydroxides, indicating potential attenuation of barium from groundwater.
- Cobalt: Total cobalt in soil ranged from 1.7 to 20 mg/kg while the environmentally-available fraction ranged from 0.66 mg/kg in BMW-32 to 18.8 mg/kg in BMW-31, representing from 39% to 94% of total cobalt. Environmentally-available cobalt was present in all the fractions across the A1 LF site. In BMW-31, which contained the highest cobalt concentration measured in the soils samples, the amorphous metal and metal hydroxide fractions accounted for all of the environmentally-available cobalt, indicating its potential attenuation or incorporation into metal hydroxides, such as ferrihydrite.
- Lithium: Total lithium in soil ranged from 11.7 to 24.7 mg/kg, of which between only 12% and 27% of the lithium occurred in the environmentally-available fraction. Lithium that was environmentally available (1.7 to

LUMINANT

6.7 mg/kg), was all present in the metal hydroxide fraction. This distribution of lithium indicates the presence of naturally-occurring lithium contained within the non-environmentally available fractions as well as potential attenuation of lithium by metal hydroxide minerals.

The results from the soil analysis indicate the following:

- Naturally-occurring sources of arsenic, barium, cobalt, and lithium are present in the vicinity of the A1 LF; and
- Attenuation of arsenic, barium, cobalt, and lithium in groundwater is likely occurring in the vicinity of the A1 LF.

3.6 Summary of Site Characterization

Based on the above site characterization and nature and extent investigation, the following conclusions are drawn with respect to the target Appendix IV constituents:

- Arsenic: Recent data indicates that arsenic concentrations in all CCR monitoring wells and nature and extent wells are currently below the GWPS for arsenic. Based on the data collected to date, arsenic concentrations are no longer considered to be present at an SSL above the GWPS; however, arsenic concentrations in groundwater will continue to be monitored to confirm that arsenic levels remain below the GWPS in the future. For the purposes of this ACM evaluation, arsenic concentrations are conservatively assumed to be present at an SSL above the GWPS in well BMW-26 based on the February 2019 SSL notification.
- Barium: Recent data indicates that barium concentrations in all CCR monitoring wells and nature and extent wells are currently below the GWPS for barium. Based on the data collected to date, barium concentrations are no longer considered to be present at an SSL above the GWPS; however, barium concentrations in groundwater will continue to be monitored to confirm that barium levels remain below the GWPS in the future. For the purposes of this ACM evaluation, barium concentrations are conservatively assumed to be present at an SSL above the GWPS in well BMW-24 based on the February 2019 SSL notification..
- Cobalt: CCR monitoring wells in which, historically, cobalt exceeded the GWPS show stable or decreasing cobalt concentrations. Cobalt statistically exceeds the GWPS in two CCR monitoring wells (BMW-20 and BMW-27) while cobalt concentrations in groundwater at all nature and extent monitoring wells (including mine monitoring well A1-2-OB downgradient of BMW-33) are below the GWPS for cobalt. Therefore, cobalt in groundwater is likely limited to the immediate perimeter of the A1 LF and likely attenuates before reaching downgradient wells. The presence of clays and metal hydroxides in soils supports a strong potential for cobalt attenuation (Smith 1999), and attenuation of cobalt on metal hydroxides was confirmed by sequential extraction. Cobalt should, therefore, be considered for further evaluation as part of an ACM as a viable candidate for monitored natural attenuation based on the results of this initial assessment (USEPA 2007a, b).
- Lithium: Recent data indicates that lithium concentrations statistically no longer exceed the GWPS in groundwater at any monitoring or nature and extent well (including mine monitoring well A1-2-OB downgradient of BMW-32). Based on the data collected to date, lithium concentrations are no longer considered to be present at an SSL above the GWPS; however, lithium concentrations in groundwater will continue to be monitored to confirm that lithium levels remain below the GWPS in the future. For the

LUMINANT

purposes of this ACM evaluation, lithium concentrations are conservatively assumed to be present at an SSL above the GWPS in wells BMW-26 and BMW-28 based on the February 2019 SSL notification.

LUMINANT

4.0 ASSESSMENT OF CORRECTIVE MEASURES

In accordance with §257.96 and §257.97, an ACM was conducted for the A1 LF to address concentrations of the following Appendix IV constituents that are conservatively assumed to occur at SSLs above their respective GWPS based on the February 2019 SSL notification:

- arsenic concentrations in monitoring well BMW-26;
- barium concentrations in monitoring well BMW-24;
- cobalt concentrations in monitoring wells BMW-19, BMW-20, and BMW-27; and
- lithium concentrations in monitoring wells BMW-26 and BMW-28.

Potential response technologies were identified for Source Control (to reduce the potential for releases of constituents to groundwater) and Groundwater Response Actions (to reduce constituent concentrations below GWPS). The potential response technologies were then screened to identify options that are appropriate for further consideration in developing potential corrective measures alternatives for the Site. The results of the ACM are presented in this section.

4.1 Corrective Measures Objectives and Evaluation Criteria

As described in §257.96(a), the corrective measures must prevent further releases, remediate any releases and restore the affected area to original conditions. Potential corrective measures must meet the requirements specified in §257.97(b):

1) Be protective of human health and the environment;
2) Attain the groundwater protection standard as specified pursuant to § 257.95(h);
3) Control the source(s) of releases to reduce or eliminate, to the maximum extent feasible, further releases of constituents in appendix IV to this part into the environment;
4) Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, considering factors such as avoiding inappropriate disturbance of sensitive ecosystems;
5) Comply with standards for management of wastes as specified in § 257.98(d).

In accordance with §257.96(c), the assessment of potential corrective measures alternatives must include an evaluation of the following:

1) The performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination
2) The time required to begin and complete the remedy
3) Institutional requirements, such as state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy(s).

LUMINANT

4.2 Potential Source Control Response Technologies

One of the listed objectives in §257.97(b) for the corrective measures is to control the source of releases of Appendix IV constituents to the environment from the CCR Unit. In this section, potential source control response technologies are identified and screened for further consideration in developing potential corrective measures alternatives for the A1 LF.

4.2.1 Closure in Place/Capping

Source control can be achieved through construction of a low permeability cap on the surface of the landfill to close the CCR material in-place. Potential final cap options for the A1 LF include either:

- Compacted Clay Cap. This cap option utilizes a low permeability compacted clay liner (infiltration layer) covered by a vegetative soil layer and permanent vegetation.
- Geomembrane Cap. This cap option utilizes a low/high density polyethylene (LLDPE/HDPE) geomembrane liner covered by a vegetative soil layer and permanent vegetation.

The cap would be designed to isolate the CCR material in the landfill and minimize the potential for migration of CCR constituents to groundwater by controlling infiltration of precipitation through the CCR material in the landfill. Long-term cap maintenance (vegetation control, erosion repairs, etc.) would be required.

Capping is a proven method of source control and provides reliable, long-term containment to prevent, or significantly reduce exposure to the source material and migration of precipitation through the source area. Section 257.102(f)(1)(i) of the CCR Rule states that closure of an existing CCR landfill must be completed within six months of commencing closure activities. Section 257.102(f)(2)(ii)(C) of the CCR Rule states that CCR landfills may extend the timeframe to complete closure of the CCR unit multiple times, in one-year increments, with no more than a total of two one-year extensions obtained for any CCR landfill.

4.2.2 Removal and Off-site Disposal

Another option for source control at the A1 LF is excavation/removal of the CCR material in the landfill and transportation to and disposal in an existing or new off-site landfill. This option would involve either:

- Identifying an existing Luminant or commercial landfill that has the available capacity to receive the material from the A1 LF, or
- Siting, regulatory approval, designing, and constructing a new lined repository for the material from the A1 LF.

All material would be excavated from the A1 LF, loaded onto trucks, transported to the designated location, and placed in the selected repository. Once placement is complete, a cap would be constructed over the material. The new repository would require long term maintenance and monitoring.

Removal is an effective method of source control, since the CCR material would be removed from the Site and would no longer potentially impact groundwater once the removal is complete; however, removal of material is only implementable if a suitable repository location is identified. Assuming a suitable repository can be constructed within 10 miles of the A1 LF, it is estimated that it will take 25 to 30 years or more to excavate,

LUMINANT

transport and place the CCR from A1 LF in the new repository. Other significant limitations to removal as a source control option include:

- Much of the CCR in the A1 LF is currently protected by a low permeability soil cap. Excavation of CCR from the landfill would expose the material to precipitation/infiltration and increase the possibility of underlying groundwater contamination from the unit.
- Excavation of the CCR would result in increased risk of exposure to workers and the public to the CCR material itself and fugitive dust emissions during excavation, transportation, and placement at the new repository. It would also result in increased greenhouse gas emissions and carbon footprint.
- A very large number of truck trips (many hundreds of thousands of trips) would be required to transport the material to the new repository. The large volume of truck traffic would result in increased risk to the public due to accidents and potential spills of material during transport.

4.2.3 Screening of Potential Source Control Response Technologies

Following identification of potential source control technologies, Golder screened the potential options for further consideration in developing potential corrective measures alternatives for the A1 LF. The initial screening results for each potential source technology are summarized in Table 2. Based on the initial screening, the following potential source control technology was retained for future evaluation as part of the corrective measures alternatives for the A1 LF:

- Closure in Place/Capping

4.3 Potential Groundwater Response Technologies

For the purposes of this ACM, arsenic, barium, cobalt and lithium are conservatively assumed to be present in groundwater at the Site at SSLs above their respective GWPS based on the February 2019 SSL notification. In this section, potential groundwater response technologies to address these constituents are identified and screened for further consideration in developing potential corrective measures alternatives for the A1 LF.

4.3.1 Monitored Natural Attenuation

Monitored natural attenuation (MNA) refers to the reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific groundwater remediation objectives within a time frame that is reasonable compared to that offered by more active remediation methods (USEPA 2007a). MNA relies on a range of natural processes, including dispersion, dilution, sorption, (co)precipitation, radioactive decay, and abiotic degradation/transformation to achieve remediation objectives (ITRC 2010). Routine groundwater monitoring would be required to verify MNA is occurring at the Site.

Where necessary, MNA processes can be enhanced through the use of low-energy, in-situ techniques to stimulate or increase the attenuation of contaminants or reduce contaminate loading (ITRC 2010). Enhancement options include increasing the attenuation capacity of the aquifer, decreasing the mobility of contaminants, and/or increasing the stability of immobilized contaminants by increasing the ability of aquifer solids to remove

LUMINANT

contaminants from groundwater and/or manipulating the geochemistry to reduce remobilization of contaminants by desorption or dissolution of precipitates (ITRC 2010).

MNA has been demonstrated effective in reducing arsenic, barium and cobalt concentrations in groundwater (ITRC 2010; USEPA 2007b). Arsenic is removed through sorption to iron hydroxides or formation of insoluble sulfides and barium is removed through sorption to iron hydroxides and formation of insoluble sulfate and carbonate minerals (ITRC 2010). Cobalt is removed through adsorption to iron hydroxides and/or amorphous metals and the level of effectiveness is dependent on iron hydroxide availability as well as pH, alkalinity, and calcium levels (ITRC 2010). The removal mechanisms for lithium are not identified in the professional literature; however, as described in Section 3.4 - 3.6 of this report, the Site is a good candidate for MNA, since natural attenuation of arsenic, barium, cobalt and lithium is ongoing in the vicinity of the A1 LF.

MNA would be effective in remediating groundwater beneath and downgradient of the landfill. The estimated time to implement MNA is estimated to be approximately 2 to 3 years, including characterization, design, and construction. The estimated time to achieve GWPS for the target Appendix IV constituents is dependent on site-specific conditions and groundwater modeling is needed to better evaluate remedial timeframes.

4.3.2 Groundwater Extraction and Treatment

Groundwater extraction and treatment is one of the most widely implemented groundwater remediation technologies and is used to provide 1) hydraulic containment and 2) treatment (USEPA 1996). A groundwater extraction and treatment system consists of the following major components:

- A series of extraction wells or trenches strategically located to modify/interrupt the natural flow of groundwater;
- Extraction pumps installed in each well/trench to pump groundwater from the subsurface;
- A treatment system to remove constituents of concern from the extracted groundwater; and
- A point of discharge for the treated groundwater (surface water, re-injection to groundwater, etc.).

LUMINANT

For the A1 LF, a system of extraction wells would be installed along the downgradient edge of the landfill to provide hydraulic control of the Appendix IV constituent groundwater plumes. The extracted groundwater would be treated in an on-site treatment system and treated water would be discharged to Martin Lake or re-injected into the aquifer.

Potential groundwater treatment methods for the target Appendix IV constituents include the following:

- Arsenic – activated alumina, ion exchange, reverse osmosis, precipitative softening, coagulation/filtration and oxidation/filtration (USEPA 2019a);
- Barium - ion exchange, lime softening, reverse osmosis, and electrodialysis (USEPA 1992)
- Cobalt - ion exchange, adsorptive media, activated carbon, and chemical treatment with membrane filtration (USEPA 2019a).
- Lithium - reverse osmosis, precipitation/co-precipitation, and ion exchange. (USACE 2010).

Treatment methods for these constituents would need to be bench/pilot tested to evaluate their effectiveness prior to designing a full-scale system. Treatment will generate residual material (sludge, regenerate brine, etc.) containing concentrated levels of the target Appendix IV constituents that must managed.

Groundwater extraction and treatment would be effective in reducing contaminant concentrations in groundwater downgradient of the A1 LF through hydraulic containment, but would have little effect on groundwater conditions beneath the landfill. The estimated time to implement groundwater extraction and treatment is estimated to be approximately 3 to 4 years, including testing, design, and construction. The estimated time to achieve GWPS for the target Appendix IV constituents is dependent on site-specific conditions and groundwater modeling is needed to better evaluate remedial timeframes.

4.3.3 Vertical Hydraulic Barrier

A vertical, low permeability hydraulic barrier can be installed to provide a physical barrier to groundwater flow to contain the migration of contaminated groundwater. Vertical hydraulic barriers that have been demonstrated effective at controlling groundwater flow include the following (USEPA 1998):

- Slurry Wall. Slurry walls consist of a narrow, excavated trench that is filled with a soil-bentonite slurry mixture. The slurry shores and supports the trench walls and forms a low-permeability barrier in the trench. Key design considerations include wall depth, key depth, and material compatibility. Slurry trenches can be excavated to depths of 50 feet using standard excavators and over 80 feet using long-reach excavators or a crane mounted drag line/clamshell bucket. Geosynthetic materials can be placed in the trench in conjunction with the slurry wall to improve the hydraulic performance (decrease permeability) and chemical resistance.
- Soil-Mixed Wall. Soil-mixed walls form a hydraulic barrier through in-situ mixing of soil with amendments, such as bentonite and/or cement. Soil-mixed barrier walls can be installed to depths of over 100 feet. The walls are installed by sections or panels that overlap to achieve a continuous barrier.
- Grout Curtain. Grout curtain barriers are constructed by injecting grout into the subsurface in an overlapping injection pattern to form a continuous barrier. Grouted barriers can be installed using permeation grouting, jet grouting, or vibrating beam technologies. Grouted barriers must be designed and constructed to ensure hydrofracturing does not occur and the completed wall is effective at restricting groundwater flow.
- Sheet-pile Wall. Sheet-pile walls consist of steel, vinyl, or other materials driven into the subsurface using a hydraulic percussion hammer or vibratory hammer. Sheet-pile walls are common in civil engineering applications; however, their use in environmental applications has been more limited. One of the major concerns with sheet-walls in environmental applications is leakage through the vertical joints between piles; however, improvements in pile interlock designs have been made to improve joint sealing.

For a vertical hydraulic barrier to be effective, the bottom of the barrier must be “keyed” into a low-permeability confining layer. A detailed engineering analysis and design, likely including a bench/pilot test to identify most appropriate barrier materials, would be required for the construction of a vertical hydraulic barrier.

For the A1 LF, the vertical hydraulic barrier would be constructed along the downgradient edge of the landfill to provide hydraulic control of the target Appendix IV constituent groundwater plumes. A vertical hydraulic barrier physically interrupts the natural flow of groundwater; consequently, groundwater elevations upgradient of the barrier will rise, potentially to the point that groundwater could begin to flow around the edges of the barrier. To address this concern, a groundwater extraction and treatment system would be required upgradient of the barrier to control the groundwater levels. The groundwater extraction and treatment system used in conjunction with the

LUMINANT

vertical hydraulic barrier would be similar to the system described in Section 4.3.2; however, the required capacity of the system would be less since the rate of groundwater extraction would be limited to that required to control upgradient groundwater levels.

Construction of a vertical hydraulic barrier is expected to require significant effort and time. Prior to implementation of the barrier, pre-design field work, including site investigations and bench/pilot-scale barrier material testing would be required, followed by full-scale design and construction. The estimated time to implement a vertical hydraulic barrier with groundwater extraction and treatment is estimated to be approximately 5 to 8 years, including testing, design, and construction. The estimated time to achieve GWPS for the target Appendix IV constituents is dependent on site-specific conditions and groundwater modeling is needed to better evaluate remedial timeframes.

4.3.4 Permeable Reactive Barrier

A permeable reactive barrier (PRB) is an in-situ, permeable treatment zone that contains reactive media designed to intercept impacted groundwater and either immobilize contaminants or transform the contaminants to a more desirable state (ITRC 2011). A PRB is a passive treatment system that acts as a barrier to groundwater contamination but not groundwater flow. The PRB must intercept the flow of impacted groundwater and must be designed and constructed such that impacted groundwater cannot bypass the reactive media by flowing over, under, or around the PRB. A PRB must include the appropriate reactive media and the residence time within the PRB needs to sufficient to allow for effective treatment. The effectiveness of the reactive media will be reduced over time and the media will likely have to be replaced periodically. Groundwater monitoring is used to evaluate the performance/effectiveness of a PRB system.

There are two primary PRB configurations: continuous and funnel-and-gate. A continuous PRB features permeable reactive media across the entire length of the barrier. A funnel-and -gate PRB uses sections of vertical hydraulic barriers to direct groundwater flow through permeable reactive media sections that allow the groundwater to pass through while treating contaminants. In both configurations, the permeability of the reactive media must be greater than the aquifer to ensure flow is not diverted around the PRB media. For the A1 LF, PRB system would be constructed along the downgradient edge of the landfill to provide control of the cobalt and lithium groundwater plumes.

PRB systems are generally considered a proven technology, however, site conditions and the specific contaminants of interest affect the system performance. The potential applicability of a PRB system for the target Appendix IV constituents can be summarized as follows:

- Arsenic – potentially removed zero-valent iron (ZVI) or combination of ZVI and organic material (ITRC 2011);
- Barium – potentially precipitated as phosphate, sulfate or hydroxide (Arnseth 2018)
- Cobalt - potentially removed using sulfate-reducing media or combination of ZVI and organic material (Ludwig 2002; ITRC 2011);
- Lithium – potentially precipitated as phosphate using appetite media, (Arnseth 2018).

Other than arsenic, removal of the remaining target Appendix IV constituents using a PRB system has not been consistently demonstrated under full-scale conditions and bench/pilot-scale testing would be required to confirm the effectiveness of a PRB system at the Site. A groundwater model would be needed to evaluate the remedial timeframes.

LUMINANT

Similar to a vertical hydraulic barrier, construction of a PRB system is expected to require significant effort and time. Prior to implementation of the PRB, pre-design field work, including site investigations, groundwater modeling, and bench-scale soil mix testing would be required, followed by full-scale design and construction. The estimated time to implement a PRB system is estimated to be approximately 5 to 8 years, including testing, design, and construction. The estimated time to achieve GWPS for the target Appendix IV constituents is dependent on site-specific conditions and groundwater modeling is needed to better evaluate remedial timeframes.

4.3.5 In-situ Chemical Treatment

In-situ Chemical Treatment (ICT) involves the injection of a chemical reagent or other material into the groundwater aquifer to adjust the geochemistry to enhance the direct precipitation, co-precipitation, or related adsorption/precipitation of the target contaminants (USEPA 2019c). Direct precipitation occurs when a constituent exceeds its solubility in water and precipitates out of solution. Co-precipitation refers to the removal of a constituent through adsorption onto the precipitate of another chemical reaction.

Arsenic has the potential to be removed through reduction and precipitation or co-precipitation, barium has the potential to be precipitated as a sulfate and lithium has the potential to be precipitated as a phosphate under appropriate geochemical conditions (Arnseth 2018). Cobalt has the potential to be removed through adsorption and/or coprecipitation under reducing groundwater conditions (Goldemund and Robb 2018).

Injection wells would be installed into the aquifer along the downgradient edge of the A1 LF and the chemical reagents would be injected to provide control of the target Appendix IV constituent groundwater plumes.

ICT is considered an emerging remediation technology for the target Appendix IV constituents and the effectiveness of the technology on most of the constituents is uncertain. Bench/pilot-scale testing would be required to confirm the effectiveness of an ICT system at the Site. The estimated time to implement an ICT system is estimated to be approximately 5 to 8 years, including testing, design, and construction. The estimated time to achieve GWPS for the target Appendix IV constituents is dependent on site-specific conditions and groundwater modeling is needed to better evaluate remedial timeframes.

4.3.6 Phytoremediation

Phytoremediation refers to the use of plants to partially or substantially remediate selected contaminants in contaminated soil, sludge, sediment, ground water, surface water, and wastewater (USEPA 2001). The process utilizes a variety of plant biological processes and plant physical characteristics to aid in remediation; however, the primary plant process potentially applicable to the target Appendix IV constituents at the Site is phytoextraction, which is the uptake and accumulation of contaminants within aboveground portions of a plant. The contaminants are removed from the Site when the plants are harvested and managed off-site. No information concerning the effectiveness of phytoremediation for lithium removal was identified.

Phytoextraction occurs in the root zone of plants, which is typically relatively shallow, with the bulk of roots at shallower rather than deeper depths. This would limit the effectiveness of phytoextraction at the Site due to the depth of groundwater. Phytoremediation for arsenic and cobalt removal from groundwater has not been demonstrated under full-scale conditions and no information concerning the effectiveness of phytoremediation for barium and lithium removal was identified (USEPA 2001).

Implementation of a phytoremediation process at the Site would involve planting appropriate vegetation at intervals along the downgradient edge of the A1 LF and across the affected groundwater plume area. A

LUMINANT

comprehensive bench/pilot testing program would be required to select the most appropriate plants for removal of the target Appendix IV constituents from groundwater at the Site. Since the target Appendix IV constituents would likely accumulate in the plants, management of harvested plants in accordance with RCRA may be required.

The estimated time to implement an ICT system is estimated to be approximately 15 to 20 years, based on the success and rate of vegetation growth. The estimated time to achieve GWPS for the target Appendix IV constituents is dependent on site-specific conditions and groundwater modeling is needed to better evaluate remedial timeframes.

4.3.7 Screening of Potential Groundwater Response Technologies

Following identification of potential groundwater response technologies, Golder screened the potential options for further consideration in developing potential corrective measures alternatives for the A1 LF. The screening results for each potential source technology are summarized in Table 3. Based on the initial screening, the following potential groundwater response technologies were retained for future evaluation as part of the corrective measures alternatives for the A1 LF:

- Monitored Natural Attenuation
- Groundwater Extraction and Treatment
- Vertical Hydraulic Barrier

4.4 Potential Corrective Measures Alternatives

Based on the response technology screening discussed above, Golder assembled the following potential corrective measures alternatives that could be both effective and implementable at the Site:

- Closure-in-Place/Capping with Monitored Natural Attenuation
- Closure-in-Place/Capping with Groundwater Extraction and Treatment
- Closure-in-Place/Capping with Vertical Hydraulic Barrier

A summary of the corrective measure alternatives, including an assessment of each alternative against the evaluation criteria presented in §257.96(c) is provided in Table 4.

4.5 Remedy Selection

The corrective measure alternative proposed as the remedy for the A1 LF will be selected in accordance with §257.97 a minimum of 30 days after the public meeting required under §257.96(e) has been completed.

It should also be noted that, for purposes of this ACM, arsenic, barium, cobalt and lithium concentrations were conservatively assumed to be present at SSLs above their respective GWPSs based on the February 2019 SSL notification. However, as discussed in Sections 3.4-3.6, arsenic, barium and lithium concentrations are no longer considered to be present at SSLs above the GWPSs based on recent data and it is likely that the arsenic, barium and lithium concentrations observed in Site monitoring wells originate from a natural source other than the landfill. Arsenic, barium, cobalt and lithium concentrations in groundwater will continue to be monitored in accordance with the CCR Rule to confirm that the concentrations of these constituents remain below the GWPSs in the future. These monitoring results, along with updated statistical analysis and alternate source demonstrations (if applicable), will be considered as part of the remedy selection process.

LUMINANT

5.0 REFERENCES

Arnseth, Richard W., 2018. Remedial Technologies to Address CCR Constituents in Groundwater, Tennessee Department of Environmental Conservation - Environmental Show of the South, May

Barnes, Virgil E., 1970. Geologic Atlas of Texas, Waco Sheet. Texas Bureau of Economic Geology.

Bethke, C., 2015. Geochemist's Workbench: Release 12.0 - Aqueous Solutions, LLC.

Code of Federal Regulations, 2015 April. Chapter 40, Part 257, Subpart D.

Dzombak, D.A. and Morel, F., 1990. Surface complexation modeling: hydrous ferric oxide. John Wiley & Sons.

Goldemund, H and Robb, C, 2018. Current Overview of Groundwater Remediation Options for CCR Units, Proceedings of 2018 World of Coal Ash Conference.

Golder, 2019. Drinking Water Survey Report – Revision No. 1, Martin Lake Steam Electric Station – A1 Area Landfill, Panola County, Texas. July 25.

Hem, J.D., 1985. Study and interpretation of the chemical characteristics of natural water (Vol. 2254). US Geological Survey.

ITRC. 2010. A Decision Framework for Applying Monitored Natural Attenuation Processes to Metals and Radionuclides in Groundwater. Technical/Regulatory Guidance, December 2010.

ITRC. 2011. Permeable Reactive Barrier: Technology Update. PRB-5. June 2011.

Karamalidis, A. and Dzombak, D., 2011. Surface complexation modeling: gibbsite. John Wiley & Sons.

Ludwig, R, et. al., 2002. A Permeable Reactive Barrier for Treatment of Heavy Metals in Ground Water 40(1):59-66, January 2002

Parkhurst, D. and Appelo, C., 2013. Description of input and examples for PHREEQC version 3: a computer program for speciation, batch-reaction, one-dimensional transport, and inverse geochemical calculations (No. 6-A43). US Geological Survey.

Pastor, Behling & Wheeler, LLC (PBW), 2016. CCR Closure Plan – Martin Lake Steam Electric Station A-1 Area Landfill, Panola County, Texas, October.

PBW, 2017a. Coal Combustion Residual Rule Groundwater Monitoring System Certification, Martin Lake Steam Electric Station, A1 Area Landfill. October 16, 2017.

PBW, 2017b. Coal Combustion Residual Rule Statistical Analysis Plan, Martin Lake Steam Electric Station, A1 Area Landfill. October 11, 2017.

Smith, K., 1999. Metal sorption on mineral surfaces: an overview with examples relating to mineral deposits. The Environmental Geochemistry of Mineral Deposits. Part B: Case Studies and Research Topics, 6, pp.161-182.

Tessier, A., Campbell, P.G. and Bisson, M., 1979. Sequential extraction procedure for the speciation of particulate trace metals. Analytical chemistry, 51(7), pp.844-851.

LUMINANT

Uddin, M., 2017. A review on the adsorption of heavy metals by clay minerals, with special focus on the past decade. Chemical Engineering Journal, 308, pp.438-462.

US Army Corps of Engineers (USACE), 2010. Maywood Chemical Company Superfund Site, Groundwater Feasibility Study Report, September

USEPA, 1992. Barium - Fact Sheet on a Drinking Water Chemical Contaminant.

USEPA, 1996. Pump-and-Treat Ground-Water Remediation: A Guide for Decision Makers and Practitioners. EPA/625/R-95/005. July 1996.

USEPA. 1998. Evaluation of Subsurface Engineered Barriers at Waste Sites, EPA-542-R-98-005, July 1998.

USEPA. 2001. Phytoremediation of Contaminated Soil and Ground Water at Hazardous Waste Sites, EPA/540-S-01/500. February 2001.

USEPA, 2007a. Monitored Natural Attenuation of Inorganic Contaminants in Ground Water. Volume 1. Technical Basis for Assessment. EPA/600/R-07/139.

USEPA, 2007b. Monitored Natural Attenuation of Inorganic Contaminants in Ground Water. Volume 2. Assessment for Non-Radionuclides Including Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Nitrate, Perchlorate, and Selenium. EPA/600/R-07/140.

USEPA, 2009. Unified Guidance Document: Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, EPA 530-R-09-007, March 2009.

USEPA, 2014. Reference Guide to Treatment Technologies for Mining-Influenced Water. March 2014.

USEPA, 2015. 40 CFR Parts 257 and 261; Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. April 17, 2015.

USEPA, 2015. Use of Monitored Natural Attenuation for Inorganic Contaminants in Groundwater at Superfund Sites. U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response Directive 9283.1-36. August 2015.

USEPA, 2019a. Drinking Water Treatability Database – Arsenic and Cobalt . Retrieved from https://oaspub.epa.gov/tdb/pages/general/home.do

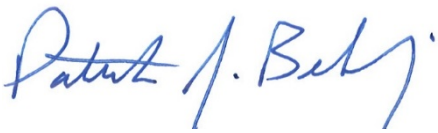
USEPA, 2019b. Permeable Reactive Barriers. CLU-IN. Retrieved from https://clu-in.org/techfocus/default.focus/sec/Permeable_Reactive_Barriers%2C_Permeable_Treatment_Zones%2C_and_Application_of_Zero-Valent_Iron/cat/Overview/

USEPA, 2019c. In Situ Chemical Reduction. CLU-IN. Retrieved from https://clu-in.org/techfocus/default.focus/sec/In_Situ_Chemical_Reduction/cat/Overview/

LUMINANT

Signature Page

Golder Associates Inc.



Patrick J. Behling, P.E.
Principal Engineer

William F. Vienne, P.G.
Senior Hydrogeologist

LUMINANT

Golder and the G logo are trademarks of Golder Associates Corporation.

https://golderassociates.sharepoint.com/sites/114142/project files/5 technical work/phase 2000 - ml a1 area lf/ccr acm report - a1 area lf_9-5-19.docx

TABLES

LUMINANT

TABLE 1
APPENDIX IV GROUNDWATER ANALYTICAL DATA SUMMARY
A1 AREA LANDFILL

Sample Location	Date Sampled	Sb (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Fl (mg/L)	Pb (mg/L)	Li (mg/L)	Hg (mg/L)	Mo (mg/L)	Se (mg/L)	Tl (mg/L)	Ra 226 (pCi/L)	Ra 228 (pCi/L)	Ra 226/228 Comb.^ (pCi/L)
	GWPS:	0.006	0.0164	2	0.004	0.005	0.1	0.0124	4	0.015	0.103	0.002	0.1	0.05	0.002	--	--	10.7
Upgradient Wells																		
BMW-11-AR	10/29/15	<0.0008	0.0116	0.0659	<0.0003	<0.0003	<0.002	0.0124	<0.1	0.000391 J	0.0594	<0.00008	0.00496 J	<0.002	<0.0005	1.60	4.75	6.35
	12/30/15	<0.0008	0.00362 J	0.0433	<0.0003	<0.0003	<0.002	<0.003	0.26 J	0.000362 J	0.0589	<0.00008	0.00384 J	<0.002	<0.0005	1.66	3.19	4.85
	02/25/16	<0.0008	0.00608	0.0724	<0.0003	<0.0003	<0.002	0.00486 J	0.123 J	<0.0003	0.0276	<0.00008	0.00597	<0.002	<0.0005	2.43	3.80	6.23
	04/07/16	<0.0008	0.00614	0.0929	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0195	<0.00008	0.00444 J	<0.002	<0.0005	0.885	1.48	2.37
	06/09/16	<0.0008	0.00532	0.0891	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0187	<0.00008	0.00355 J	<0.002	<0.0005	0.47	<0.674	1.14
	08/11/16	<0.0008	0.00271 J	0.0772	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0147	<0.00008	0.00346 J	<0.002	<0.0005	0.810	2.42	3.23
	10/26/16	<0.0008	<0.002	0.0429	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0508	<0.00008	0.00363 J	<0.002	<0.0005	0.631	0.922	1.55
	12/14/16	<0.0008	0.0061	0.074	<0.0003	<0.0003	<0.002	<0.003	<0.1	0.00347	0.0139	<0.00008	0.00303 J	<0.002	<0.0005	<0.821	<1.73	<2.551
	06/12/18	<0.0008	0.00444 J	0.0692	<0.0003	<0.0003	0.00295 J	<0.003	0.323 J	0.0017	0.0686	<0.00008	0.00340 J	<0.002	<0.0005	0.996	1.7	2.696
	09/14/18	NA	0.0056	0.0735	NA	NA	<0.002	<0.003	0.353 J	0.00147	0.0196	NA	0.00299 J	NA	NA	1.52	1.11	2.63
	05/15/19	<0.0008	0.00208 J	0.0399	<0.0003	<0.0003	<0.002	<0.003	0.198 J	<0.0003	0.0404	<0.00008	<0.002	<0.002	<0.0005	0.83	4.89	5.72
BMW-27	9/13/16	<0.0008	0.00536	0.0434	<0.0003	0.00062 J	<0.002	0.15	0.668	0.000432 J	0.0541	<0.00008	<0.002	<0.002	<0.0005	0.308	<1.14	1.45
	10/26/16	<0.0008	0.00625	0.0339	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0933	<0.00008	<0.002	<0.002	<0.0005	0.156	1.94	2.10
	12/14/16	<0.0008	0.0051	0.0342	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0932	<0.00008	<0.002	<0.002	<0.0005	<0.12	<1.05	<1.17
	01/23/17	<0.0008	0.00845	0.0333	<0.0003	0.00071 J	0.00278 J	0.195	0.573	0.000323 J	0.0484	<0.00008	<0.002	<0.002	<0.0005	0.369	0.934	1.30
	02/23/27	<0.0008	<0.002	0.0704	<0.0003	<0.0003	<0.002	<0.003	0.252 J	0.000736 J	<0.005	<0.00008	<0.002	<0.002	<0.0005	<0.209	0.660	0.87
	03/24/17	<0.0008	0.00319 J	0.0296	<0.0003	0.00078 J	<0.002	0.222	0.738	<0.0003	0.0474	<0.00008	<0.002	<0.002	<0.0005	0.414	<0.725	1.14
	04/24/17	<0.0008	<0.002	0.0269	<0.0003	0.00066 J	<0.002	0.21	0.663	<0.0003	0.0497	<0.00008	<0.002	<0.002	<0.0005	<0.452	1.53	1.98
	05/25/17	<0.0008	<0.002	0.0266	<0.0003	0.000521 J	<0.002	0.2	1.61	0.000439 J	0.0471	<0.00008	<0.002	<0.002	<0.0005	<0.443	1.38	1.82
	06/29/17	<0.0008	0.00593	0.0307	<0.0003	0.00851 J	0.00266 J	0.255	0.717	<0.0003	0.048	<0.0008	<0.002	<0.002	<0.0005	0.303	0.628	0.93
	06/12/18	<0.0008	0.00223 J	0.0182	<0.0003	<0.0003	<0.002	<0.003	<0.100	0.00097 J	0.0721	<0.00008	<0.002	<0.002	<0.0005	0.305	<0.5860	0.891
	09/13/18	NA	0.00467 J	0.0250	NA	NA	0.002 J	0.190	0.750	<0.0003	0.0531	NA	<0.002	NA	NA	0.691	1.04	1.731
	05/15/19	<0.0008	<0.002	0.0238	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0943	<0.00008	<0.002	<0.002	<0.0005	<0.195	0.962	1.157
BMW-33	08/01/19	NA	<0.00200	NA	NA	NA	NA	0.0176	0.342	NA	0.0206	NA	NA	NA	NA	NA	NA	NA
AI-17-SPOIL	08/14/19	NA	NA	NA	NA	NA	NA	<0.003	NA	NA	0.0394	NA	NA	NA	NA	NA	NA	NA
AIV-18-OB-95	07/08/19	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0454	NA	NA	NA	NA	NA	NA	NA
Downgradient Wells																		
BMW-18	10/30/15	<0.0008	<0.002	0.0401	<0.0003	<0.0003	0.00944	<0.003	0.148 J	<0.0003	0.14	<0.00008	<0.002	<0.002	<0.0005	0.526	<1.51	2.04
	12/30/15	<0.0008	<0.002	0.0168	<0.0003	<0.0003	<0.002	0.0129	0.101 J	<0.0003	0.0415	<0.00008	<0.002	<0.002	<0.0005	<0.405	<2.04	<2.445
	02/26/16	<0.0008	<0.002	0.0446	<0.0003	<0.0003	0.00214 J	<0.003	0.164 J	<0.0003	0.0156	<0.00008	<0.002	<0.002	<0.0005	<0.406	<1.9	<2.306
	04/07/16	<0.0008	<0.002	0.0306	<0.0003	<0.0003	<0.002	<0.003	0.117 J	<0.0003	0.0171	<0.00008	<0.002	<0.002	<0.0005	<0.109	<1.00	<1.109
	06/09/16	<0.0008	<0.002	0.0283	<0.0003	<0.0003	<0.002	<0.003	0.128 J	<0.0003	0.0152	<0.00008	<0.002	<0.002	<0.0005	<0.143	0.857	1.00
	08/11/16	<0.0008	<0.002	0.0291	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0147	<0.00008	<0.002	<0.002	<0.0005	<0.22	<1.07	<1.29
	10/26/16	<0.0008	<0.002	0.029	<0.0003	<0.0003	<0.002	<0.003	0.158 J	<0.0003	0.0156	<0.00008	<0.002	<0.002	<0.0005	<0.132	<0.534	<0.666
	12/14/16	<0.0008	<0.002	0.0384	<0.0003	<0.0003	<0.002	<0.003	0.134 J	<0.0003	0.0158	<0.00008	<0.002	<0.002	<0.0005	0.140	<1.99	2.13
	06/12/18	<0.0008	<0.002	0.0412	<0.0003	<0.0003	<0.002	<0.003	0.176 J	0.0013	0.0185	<0.00008	<0.002	<0.002	<0.0005	0.232	0.706	0.938
	09/14/18	NA	<0.002	0.0277	NA	NA	<0.002	<0.003	0.201 J	<0.0003	0.0165	NA	<0.002	NA	NA	<0.509	<0.589	<1.098
	05/15/19	<0.0008	<0.002	0.0362	<0.0003	<0.0003	<0.002	<0.003	0.229 J	<0.0003	0.016	<0.00008	<0.002	<0.002	<0.0005	<0.264	3.95	4.214
BMW-19	10/29/18	<0.0008	<0.002	0.0231	<0.0003	<0.0003	<0.002	0.0161	<0.1	<0.0003	0.0545	<0.00008	<0.002	<0.002	<0.0005	0.395	<1.56	1.96
	12/30/15	<0.0008	<0.002	0.0222	<0.0003	<0.0003	<0.002	0.0166	0.127 J	<0.0003	0.0506	<0.00008	<0.002	<0.002	<0.0005	0.598	<2.89	3.49
	02/25/16	<0.0008	0.00235 J	0.0169	<0.0003	<0.0003	<0.002	0.0149	<0.1	<0.0003	0.0711	<0.00008	<0.002	<0.002	<0.0005	0.571	1.94	2.51
	04/07/16	<0.0008	<0.002	0.0178	<0.0003	<0.0003	<0.002	0.0137	<0.1	<0.0003	0.0591	<0.00008	<0.002	<0.002	<0.0005	<0.185	<0.715	<0.9
	06/09/16	<0.0008	<0.002	0.0158	<0.0003	<0.0003	<0.002	0.0141	<0.1	<0.0003	0.0644	<0.00008	<0.002	<0.002	<0.0005	<0.142	1.98	2.12
	08/11/16	<0.0008	0.00711	0.0158	<0.0003	<0.0003	<0.002	0.0128	<0.1	<0.0003	0.0568	<0.00008	<0.002	<0.002	<0.0005	0.927	<0.812	1.74
	10/26/16	<0.0008	<0.002	0.0144	<0.0003	<0.0003	<0.002	0.0104	<0.1	<0.0003	0.0495	<0.00008	<0.002	<0.002	<0.0005	<0.152	<0.48	<0.632
	12/14/16	<0.0008	0.00369 J	0.0171	<0.0003	<0.0003	<0.002	0.0125	<0.1	<0.0003	0.0584	<0.00008	<0.002	<0.002	<0.0005	0.309	0.827	1.14
	06/12/18	<0.0008	0.0428	0.0243	<0.0003	<0.0003	0.00267	0.0115	<0.100	0.00183	0.0734	<0.00008	<0.002	<0.002	<0.0005	<0.395	1.17	1.565
	09/13/18	NA	0.00491 J	0.0132	NA	NA	<0.002	0.0125	0.404 J	<0.0003	0.0845	NA	<0.002	NA	NA	<0.376	1.46	1.836
	05/15/19	<0.0008	<0.002	0.0104	<0.0003	<0.0003	<0.002	<0.003	0.189 J	<0.0003	0.0647	<0.00008	<0.002	<0.002	<0.0005	0.487	4.66	5.147

DRAFT

TABLE 1
APPENDIX IV GROUNDWATER ANALYTICAL DATA SUMMARY
A1 AREA LANDFILL

Sample Location	Date Sampled	Sb (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Fl (mg/L)	Pb (mg/L)	Li (mg/L)	Hg (mg/L)	Mo (mg/L)	Se (mg/L)	Tl (mg/L)	Ra 226 (pCi/L)	Ra 228 (pCi/L)	Ra 226/228 Comb.^ (pCi/L)
	GWPS:	0.006	0.0164	2	0.004	0.005	0.1	0.0124	4	0.015	0.103	0.002	0.1	0.05	0.002	--	--	10.7
BMW-20	10/23/15	<0.0008	0.00236 J	0.0778	<0.0003	<0.0003	<0.002	0.0256	<0.1	0.000501 J	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.463	<1.89	2.35
	12/30/15	<0.0008	0.00344 J	0.0777	<0.0003	<0.0003	<0.002	0.051	0.12 J	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.816	<2.41	3.23
	02/25/16	<0.0008	0.00474 J	0.0989	<0.0003	<0.0003	<0.002	0.022	<0.1	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	<0.61	2.85	3.46
	04/07/16	<0.0008	0.00411 J	0.0912	<0.0003	<0.0003	<0.002	0.0276	<0.1	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.221	<1.08	1.30
	06/09/16	<0.0008	0.0103	0.0776	<0.0003	<0.0003	<0.002	0.054	<0.1	0.000696 J	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.51	<0.716	1.23
	08/11/16	<0.0008	<0.002	0.0637	<0.0003	<0.0003	<0.002	0.0513	<0.1	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.322	1.40	1.72
	10/26/16	<0.0008	0.00444 J	0.0421	<0.0003	<0.0003	<0.002	0.0786	<0.1	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.347	0.848	1.20
	12/13/16	<0.0008	0.00483 J	0.0377	<0.0003	<0.0003	<0.002	0.0451	<0.1	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.246	1.15	1.40
	06/11/18	<0.0008	0.00473 J	0.0515	<0.0003	<0.0003	<0.002	0.0681	0.144 J	0.000476	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.74	0.865	1.605
	09/13/18	NA	0.00473 J	0.0258	NA	NA	<0.002	0.0645	<0.100	0.000368 J	<0.005	NA	<0.002	NA	NA	0.519	0.711	1.23
	05/15/18	<0.0008	0.00541	0.0412	<0.0003	<0.0003	<0.002	0.003	0.418	<0.0003	0.0615	<0.00008	<0.002	<0.002	<0.0005	1.18	0.657	1.837
BMW-21	10/23/15	<0.0008	0.00324 J	0.0703	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0623	<0.00008	<0.002	<0.002	<0.0005	<0.436	<0.948	<1.384
	12/30/15	<0.0008	0.00247 J	0.0478	<0.0003	<0.0003	<0.002	<0.003	0.126 J	<0.0003	0.0602	<0.00008	<0.002	<0.002	<0.0005	0.584	<2.00	2.58
	02/25/16	<0.0008	0.00327 J	0.0471	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0602	<0.00008	<0.002	<0.002	<0.0005	0.735	2.13	2.87
	04/07/16	<0.0008	0.00337 J	0.0472	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0653	<0.00008	<0.002	<0.002	<0.0005	0.470	<2.78	3.25
	06/09/16	<0.0008	0.0034 J	0.0457	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0675	<0.00008	<0.002	<0.002	<0.0005	0.32	<0.917	1.24
	08/11/16	<0.0008	0.00373 J	0.0445	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0527	<0.00008	<0.002	<0.002	<0.0005	0.655	<0.728	1.38
	10/26/16	<0.0008	0.0037 J	0.0443	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0611	<0.00008	<0.002	<0.002	<0.0005	0.383	1.61	1.99
	12/13/16	<0.0008	0.00217 J	0.0438	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0631	<0.00008	<0.002	<0.002	<0.0005	0.213	1.00	1.21
	06/11/18	<0.0008	0.00373 J	0.0438	<0.0003	<0.0003	<0.002	<0.003	0.233 J	<0.0003	0.07	<0.00008	<0.002	<0.002	<0.0005	<0.239	<0.939	<1.178
	09/13/18	NA	0.00353 J	0.0412	NA	NA	<0.002	<0.003	0.136 J	<0.0003	0.0646	NA	<0.002	NA	NA	0.562	1.49	2.052
	05/15/19	<0.0008	0.00399 J	0.0412	<0.0003	<0.0003	<0.002	<0.003	0.366 J	<0.0003	0.0613	<0.00008	<0.002	<0.002	<0.0005	<0.322	1.07	1.392
BMW-22	10/23/15	<0.0008	<0.002	0.106	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0675	<0.00008	<0.002	<0.002	<0.0005	1.59	2.11	3.70
	12/30/15	<0.0008	<0.002	0.084	<0.0003	<0.0003	<0.002	<0.003	0.186 J	<0.0003	0.0594	<0.00008	<0.002	<0.002	<0.0005	0.973	<1.55	2.52
	02/25/16	<0.0008	<0.002	0.0761	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0801	<0.00008	<0.002	<0.002	<0.0005	0.594	<1.93	2.52
	04/07/16	<0.0008	<0.002	0.072	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0773	<0.00008	<0.002	<0.002	<0.0005	0.480	1.46	1.94
	06/08/16	<0.0008	0.00206 J	0.0667	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0847	<0.00008	<0.002	<0.002	<0.0005	0.888	1.88	2.77
	08/11/16	<0.0008	<0.002	0.0679	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0675	<0.00008	<0.002	<0.002	<0.0005	0.607	1.93	2.54
	10/26/16	<0.0008	0.00216 J	0.0645	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0753	<0.00008	<0.002	<0.002	<0.0005	0.633	1.02	1.65
	12/13/16	<0.0008	0.00232 J	0.0655	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0689	<0.00008	<0.002	<0.002	<0.0005	<0.209	1.05	1.26
	06/11/18	<0.0008	<0.002	0.0638	<0.0003	<0.0003	<0.002	<0.003	0.312 J	<0.0003	0.089	<0.00008	<0.002	<0.002	<0.0005	0.522	<1.020	1.54
	09/13/18	NA	<0.002	0.063	NA	NA	<0.002	<0.003	0.205 J	<0.0003	0.0882	NA	<0.002	NA	NA	1.29	2.89	4.18
	05/15/19	<0.0008	<0.002	0.0618	<0.0003	<0.0003	<0.002	<0.003	0.351 J	<0.0003	0.0779	<0.00008	<0.002	<0.002	<0.0005	3.36	1.64	5.00
BMW-23	10/23/15	<0.0008	<0.002	0.0519	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0802	<0.00008	<0.002	<0.002	<0.0005	1.19	<1.91	3.10
	12/30/15	<0.0008	<0.002	0.0462	<0.0003	<0.0003	<0.002	<0.003	0.122 J	<0.0003	0.0897	<0.00008	<0.002	<0.002	<0.0005	0.711	<2.62	3.33
	02/25/16	<0.0008	<0.002	0.0488	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0959	<0.00008	<0.002	<0.002	<0.0005	0.604	<1.78	2.38
	04/07/16	<0.0008	<0.002	0.0472	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.095	<0.00008	<0.002	<0.002	<0.0005	0.723	1.98	2.70
	06/08/16	<0.0008	<0.002	0.0497	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.103	<0.00008	<0.002	<0.002	<0.0005	0.654	1.29	1.94
	08/11/16	<0.0008	<0.002	0.0458	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.077	<0.00008	<0.002	<0.002	<0.0005	0.936	1.94	2.88
	10/26/16	<0.0008	<0.002	0.0437	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0856	<0.00008	<0.002	<0.002	<0.0005	0.472	1.76	2.23
	12/13/16	<0.0008	<0.002	0.0407	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0817	<0.00008	<0.002	<0.002	<0.0005	<0.225	0.704	0.93
	06/11/18	<0.0008	<0.002	0.0381	<0.0003	<0.0003	<0.002	<0.003	0.204 J	<0.0003	0.106	<0.00008	<0.002	<0.002	<0.0005	0.442	1.79	2.23
	09/13/18	NA	<0.002	0.0414	NA	NA	<0.002	<0.003	0.190 J	<0.0003	0.0915	NA	<0.002	NA	NA	0.774	1.23	2.00
	05/15/19	<0.0008	0.0024	0.0381	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0951	<0.00008	<0.002	<0.002	<0.0005	2.54	1	3.54

DRAFT

TABLE 1
APPENDIX IV GROUNDWATER ANALYTICAL DATA SUMMARY
A1 AREA LANDFILL

Sample Location	Date Sampled	Sb (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Fl (mg/L)	Pb (mg/L)	Li (mg/L)	Hg (mg/L)	Mo (mg/L)	Se (mg/L)	Tl (mg/L)	Ra 226 (pCi/L)	Ra 228 (pCi/L)	Ra 226/228 Comb.^ (pCi/L)
	GWPS:	0.006	0.0164	2	0.004	0.005	0.1	0.0124	4	0.015	0.103	0.002	0.1	0.05	0.002	--	--	10.7
BMW-24	10/23/15	<0.0008	0.00494 J	1.87	<0.0003	<0.0003	<0.002	0.00802	0.247 J	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	1.83	3.32	5.15
	12/30/15	<0.0008	0.00579	0.801	<0.0003	<0.0003	<0.002	0.0146	0.391 J	<0.0003	0.0161	<0.00008	<0.002	<0.002	<0.0005	0.485	<1.66	2.15
	02/25/16	<0.0008	0.00442 J	0.645	<0.0003	<0.0003	<0.002	0.0137	0.236 J	<0.0003	0.0267	<0.00008	<0.002	<0.002	<0.0005	1.20	<1.93	3.13
	04/07/16	<0.0008	0.00376 J	0.202	<0.0003	<0.0003	<0.002	0.0238	0.109 J	<0.0003	0.0415	<0.00008	<0.002	<0.002	<0.0005	<0.349	<1.58	<1.929
	06/08/16	<0.0008	0.00481 J	0.181	<0.0003	<0.0003	<0.002	0.0227	0.147 J	<0.0003	0.0475	<0.00008	<0.002	<0.002	<0.0005	0.360	1.26	1.62
	08/11/16	<0.0008	0.00414 J	1.26	<0.0003	<0.0003	<0.002	0.00707	0.225 J	<0.0003	0.00938 J	<0.00008	<0.002	<0.002	<0.0005	0.564	<0.942	1.51
	10/26/16	<0.0008	0.00364 J	1.88	<0.0003	<0.0003	<0.002	<0.003	0.305 J	<0.0003	0.00767 J	<0.00008	<0.002	<0.002	<0.0005	1.37	1.31	2.68
	12/13/16	<0.0008	0.00498 J	1.96	<0.0003	<0.0003	<0.002	0.00326 J	0.3 J	<0.0003	0.00914 J	<0.00008	<0.002	<0.002	<0.0005	0.270	1.16	1.43
	06/11/18	<0.0008	0.00266 J	0.487	<0.0003	<0.0003	<0.002	0.00633	0.466	<0.0003	0.0198	<0.00008	<0.002	<0.002	<0.0005	0.668	0.975	1.643
	09/13/18	NA	<0.002	2.19	NA	NA	<0.002	0.00304 J	0.769	<0.0003	0.00764 J	NA	<0.002	NA	NA	1.82	1.45	3.27
	05/15/19	<0.0008	0.00272 J	0.221	<0.0003	<0.0003	<0.002	0.000643	0.219 J	<0.0003	0.0512	<0.00008	<0.002	<0.002	<0.0005	1.45	<1.21	2.66
BMW-25	06/13/19	NA	NA	NA	NA	NA	NA	0.013	0.142	NA	0.0501	NA	NA	NA	NA	NA	NA	NA
	07/08/19	NA	NA	NA	NA	NA	NA	0.00514	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BMW-26	9/13/16	<0.0008	0.017	0.0425	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0944	<0.00008	0.00215 J	<0.002	<0.0005	0.154	<1.02	1.17
	10/26/16	<0.0008	0.00318 J	0.0731	<0.0003	<0.0003	<0.002	0.00402 J	<0.1	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.175	<0.695	0.87
	12/14/16	<0.0008	<0.002	0.0424	<0.0003	0.00082 J	<0.002	0.236	0.344 J	<0.0003	0.0527	<0.00008	<0.002	<0.002	<0.0005	0.177	<1.29	1.47
	01/23/17	<0.0008	0.0325	0.0446	<0.0003	<0.0003	<0.002	<0.003	<0.1	0.000594 J	0.0977	<0.00008	0.0035 J	<0.002	<0.0005	0.351	0.936	1.29
	02/23/27	<0.0008	<0.002	0.0705	<0.0003	<0.0003	<0.002	<0.003	0.106 J	0.000726 J	0.0052 J	<0.00008	<0.002	<0.002	<0.0005	0.306	0.951	1.26
	03/24/17	<0.0008	0.0107	0.0371	<0.0003	<0.0003	<0.002	<0.003	<0.1	0.000742 J	0.0964	<0.00008	0.00461 J	<0.002	<0.0005	0.335	<0.627	0.96
	04/24/17	<0.0008	0.00732	0.0322	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.099	<0.00008	0.00303 J	<0.002	<0.0005	<0.363	1.60	1.96
	05/25/17	<0.0008	0.00347 J	0.0243	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0951	<0.0008	0.00302 J	<0.002	<0.0005	<0.477	0.818	1.30
	06/29/17	<0.0008	0.0328	0.0352	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0985	<0.0008	0.00257 J	<0.002	<0.0005	0.198	0.677	0.88
	06/12/18	<0.0008	0.00316 J	0.0222	<0.0003	<0.0003	0.00231 J	<0.003	<0.100	0.00152	0.111	<0.00008	0.0029 J	<0.002	<0.0005	<0.251	<0.508	<0.759
	09/13/18	NA	0.0165	0.0360	NA	NA	<0.002	<0.003	<0.100	<0.0003	0.11	NA	<0.002	NA	NA	<0.426	0.826	1.252
	05/15/19	<0.0008	<0.002	0.0253	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.101	<0.00008	0.00218 J	<0.002	<0.0005	0.457	<1.13	1.587
BMW-27	9/13/16	<0.0008	0.00536	0.0434	<0.0003	0.00062 J	<0.002	0.15	0.668	0.000432 J	0.0541	<0.00008	<0.002	<0.002	<0.0005	0.308	<1.14	1.45
	10/26/16	<0.0008	0.00625	0.0339	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0933	<0.00008	<0.002	<0.002	<0.0005	0.156	1.94	2.10
	12/14/16	<0.0008	0.0051	0.0342	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0932	<0.00008	<0.002	<0.002	<0.0005	<0.12	<1.05	<1.17
	01/23/17	<0.0008	0.00845	0.0333	<0.0003	0.00071 J	0.00278 J	0.195	0.573	0.000323 J	0.0484	<0.00008	<0.002	<0.002	<0.0005	0.369	0.934	1.30
	02/23/27	<0.0008	<0.002	0.0704	<0.0003	<0.0003	<0.002	<0.003	0.252 J	0.000736 J	<0.005	<0.00008	<0.002	<0.002	<0.0005	<0.209	0.660	0.87
	03/24/17	<0.0008	0.00319 J	0.0296	<0.0003	0.00078 J	<0.002	0.222	0.738	<0.0003	0.0474	<0.00008	<0.002	<0.002	<0.0005	0.414	<0.725	1.14
	04/24/17	<0.0008	<0.002	0.0269	<0.0003	0.00066 J	<0.002	0.21	0.663	<0.0003	0.0497	<0.00008	<0.002	<0.002	<0.0005	<0.452	1.53	1.98
	05/25/17	<0.0008	<0.002	0.0266	<0.0003	0.000521 J	<0.002	0.2	1.61	0.000439 J	0.0471	<0.00008	<0.002	<0.002	<0.0005	<0.443	1.38	1.82
	06/29/17	<0.0008	0.00593	0.0307	<0.0003	0.00851 J	0.00266 J	0.255	0.717	<0.0003	0.048	<0.0008	<0.002	<0.002	<0.0005	0.303	0.628	0.93
	06/12/18	<0.0008	0.00223 J	0.0182	<0.0003	<0.0003	<0.002	<0.003	<0.100	0.00097 J	0.0721	<0.00008	<0.002	<0.002	<0.0005	0.305	<0.5860	0.891
	09/13/18	NA	0.00467 J	0.0250	NA	NA	0.002 J	0.190	0.750	<0.0003	0.0531	NA	<0.002	NA	NA	0.691	1.04	1.731
	05/15/19	<0.0008	<0.002	0.0238	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0943	<0.00008	<0.002	<0.002	<0.0005	<0.195	0.962	1.157
BMW-28	12/14/16	0.0012 J	<0.002	0.0509	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.11	<0.00008	0.0103	0.0045 J	<0.0005	<0.566	<2.22	2.79
	01/23/17	0.001 J	<0.002	0.0518	<0.0003	<0.0003	<0.002	<0.003	0.104 J	<0.0003	0.116	<0.00008	0.00881	<0.002	<0.0005	0.626	1.12	1.75
	02/23/27	<0.0008	<0.002	0.0734	<0.0003	<0.0003	<0.002	<0.003	0.11 J	0.000965 J	0.00514 J	<0.00008	<0.002	<0.002	<0.0005	0.168	0.835	1.00
	03/24/17	0.0012 J	<0.002	0.046	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.1	<0.00008	0.00773	0.0021 J	<0.0005	1.04	1.17	2.21
	04/24/17	0.0011 J	<0.002	0.047	<0.0003	<0.0003	<0.002	<0.003	0.19 J	<0.0003	0.109	<0.00008	0.00766	<0.002	<0.0005	0.356	1.880	2.24
	05/25/17	0.00119 J	<0.002	0.0468	<0.0003	<0.0003	<0.002	<0.003	<0.1	0.000427 J	0.102	<0.00008	0.00764	<0.002	<0.0005	<0.739	1.170	1.91
	06/29/17	<0.0008	0.00253 J	0.0549	<0.0003	<0.0003	<0.002	0.0084	0.137 J	<0.0003	0.104	<0.00008	0.00754	<0.002	<0.0005	0.489	2.310	2.80
	08/01/17	<0.0008	0.0057	0.0524	<0.0003	<0.0003	<0.002	0.0115	<0.1	<0.0003	0.114	<0.00008	0.00707	<0.002	<0.0005	0.536	2.43	2.97
	06/12/18	<0.0008	<0.002	0.0505	<0.0003	<0.0003	<0.002	<0.003	0.529	0.00122	0.116	<0.00008	0.00764	<0.002	<0.0005	0.197	1.12	1.32
	09/14/18	NA	<0.002	0.0419	NA	NA	<0.002	<0.003	0.445	<0.0003	0.114	NA	0.00782	NA	NA	0.35	1.15	1.50
	05/15/19	<0.0008	<0.002	0.0285	<0.0003	<0.0003	<0.002	<0.003	0.496	<0.0003	0.119	<0.00008	0.0124	<0.002	<0.0005	0.289	0.924	1.21

DRAFT

TABLE 1
APPENDIX IV GROUNDWATER ANALYTICAL DATA SUMMARY
A1 AREA LANDFILL

Sample Location	Date Sampled	Sb (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Fl (mg/L)	Pb (mg/L)	Li (mg/L)	Hg (mg/L)	Mo (mg/L)	Se (mg/L)	Tl (mg/L)	Ra 226 (pCi/L)	Ra 228 (pCi/L)	Ra 226/228 Comb.^ (pCi/L)
	GWPS:	0.006	0.0164	2	0.004	0.005	0.1	0.0124	4	0.015	0.103	0.002	0.1	0.05	0.002	--	--	10.7
BMW-29	06/13/19	NA	NA	NA	NA	NA	NA	NA	<0.100	NA	0.114	NA	NA	NA	NA	NA	NA	NA
	07/08/19	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.104	NA	NA	NA	NA	NA	NA	NA
BMW-30	06/13/19	NA	NA	0.0982	NA	NA	NA	NA	<0.100	NA	NA	NA	NA	NA	NA	NA	NA	NA
BMW-31	06/13/19	NA	NA	NA	NA	NA	NA	NA	0.255	NA	0.0203	NA	NA	NA	NA	NA	NA	NA
BMW-32	06/13/19	NA	NA	NA	NA	NA	NA	0.115	0.822	NA	0.115	NA	NA	NA	NA	NA	NA	NA
	07/08/19	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.116	NA	NA	NA	NA	NA	NA	NA
AI-2-OB	08/14/19	NA	NA	NA	NA	NA	NA	<0.003	NA	NA	<0.005	NA	NA	NA	NA	NA	NA	NA

Notes:
1. Abbreviations: GWPS - groundwater protection standard; mg/L - milligrams per liter; pCi/L - picocuries per liter.
2. ^ - Sum of Ra 226 and Ra 228 concentrations. Non-detect isotope results were assigned a value equal to the minimum detectable concentration.
3. J - concentration is below method quantitation limit; result is an estimate.
4. NA - Not analyzed.

LUMINANT

Table 2

Screening of Potential Source Control Response Technologies
Martin Lake Steam Electric Station
A1 Area Landfill

Source Control Response Technology	Description	Protective of Human Health and Environment	Attain Groundwater Protection Standard	Control Source of Release	Remove Contaminated Material From Environment	RCRA Compliance	Screening Comments	Retained for Further Evaluation
Closure In Place/Capping	Low-permeability cap constructed over landfill.	Isolates CCR material in landfill.	Mitigates on-going source of CCR constituents to groundwater, enhancing achievement of GWPS by Groundwater Response Technologies.	Minimizes potential for migration of CCR constituents to groundwater by controlling infiltration of precipitation through CCR material.	CCR material remains in landfill. Mitigates on-going source of CCR constituents to groundwater.	Complies with applicable RCRA requirements.	Capping is proven method of source control. Long-term cap maintenance and monitoring required.	Yes
Removal and Off-site Disposal	CCR material excavated from landfill, loaded onto trucks, transported to designated location, and placed in selected repository. Once placement complete, cap constructed over material.	CCR material removed from Site and no longer source of CCR constituents to groundwater. CCR material placed in new repository. Increased chance of exposure to workers and public during excavation, transportation, and placement at new repository.	Mitigates on-going source of CCR constituents to groundwater, enhancing achievement of GWPS by Groundwater Response Technologies.	Removes source of CCR constituents from Site.	Removes source of CCR constituents from Site. CCR material relocated to new repository.	Complies with applicable RCRA requirements.	Removal of material only implementable if suitable repository location is identified. Siting, regulatory approval, design, and construction of new repository likely required. Very large number of round-trip truck trips required to transport material to new location. New repository would require long term maintenance and monitoring. Difficult to implement due to logistics of excavation, transportation, and placement at new repository.	No

LUMINANT

Table 3

Screening of Potential Groundwater Response Technologies
Martin Lake Steam Electric Station
A1 Area Landfill

Groundwater Response Technology	Description	Protective of Human Health and Environment	Attain Groundwater Protection Standard	Control Source of Release	Remove Contaminated Material From Environment	RCRA Compliance	Screening Comments	Retained for Further Evaluation
Monitored Natural Attenuation	Natural processes (dispersion, dilution, sorption, coprecipitation, degradation/transformation, etc.) remove CCR constituents from groundwater in-situ. Groundwater monitoring to verify MNA effectiveness.	Migration of CCR constituents in groundwater controlled and CCR concentrations in groundwater reduced.	CCR constituents removed from groundwater through adsorption, precipitation, and/or coprecipitation. CCR constituents retained in aquifer soil matrix to achieve GWPS below and downgradient of CCR Unit.	CCR constituents removed from groundwater below and downgradient of CCR Unit.	CCR constituents removed from groundwater and retained in aquifer soil matrix.	Purge water from groundwater monitoring requires management in accordance with applicable RCRA requirements.	Site is good MNA candidate based on field MNA evaluation. Long-term groundwater monitoring required. Easy to implement. Groundwater modelling required to assess remediation timeframe.	Yes
Groundwater Extraction and Treatment	System of extraction wells along downgradient edge of landfill to provide hydraulic control of CR constituent groundwater plumes. Extracted groundwater treated in an on-site treatment system and discharged to Martin Lake or re-injected into aquifer. Groundwater monitoring to verify system effectiveness.	Migration of CCR constituents in groundwater controlled.	GWPS attained downgradient of CCR Unit, but limited effect on concentrations beneath unit.	CCR groundwater constituents contained at edge of landfill.	CCR constituents removed from extracted groundwater by treatment system. Treatment residuals (sludge, regenerate brine, etc.) require management.	Treatment residuals (sludge, regenerate brine, etc.) require management in accordance with applicable RCRA requirements.	Regulatory authorization for treated water discharge required. Bench/pilot testing of treatment system required. Groundwater modelling required to assess remediation timeframe.	Yes
Vertical Hydraulic Barrier	Vertical, low permeability hydraulic barrier along downgradient edge of landfill to provide hydraulic control of CCR constituent groundwater plumes. Groundwater extraction and treatment required upgradient of barrier to control groundwater elevations. Groundwater monitoring to verify system effectiveness.	Migration of CCR constituents in groundwater controlled.	GWPS attained downgradient of CCR Unit, but limited effect on concentrations beneath unit.	CCR groundwater constituents contained at edge of landfill.	CCR constituents removed from extracted groundwater by treatment system. Treatment residuals (sludge, regenerate brine, etc.) require management.	Excavated soil generated from barrier installation requires testing and management as necessary. Treatment residuals (sludge, regenerate brine, etc.) require management in accordance with applicable RCRA requirements.	Bench/pilot test of barrier materials likely required. Regulatory authorization for treated water discharge required. Bench/pilot testing of treatment system required. Groundwater modelling required to assess remediation timeframe.	Yes

PRELIMINARY

Groundwater Response Technology	Description	Protective of Human Health and Environment	Attain Groundwater Protection Standard	Control Source of Release	Remove Contaminated Material From Environment	RCRA Compliance	Screening Comments	Retained for Further Evaluation
Permeable Reactive Barrier	In-situ, passive, permeable treatment zone containing reactive media designed to intercept impacted groundwater and adjust geochemistry to immobilize CCR contaminants. CCR constituents removed through adsorption, precipitation and/or coprecipitation. PRB acts as a barrier to groundwater contamination but not groundwater flow. Groundwater monitoring to verify system effectiveness.	Migration of CCR constituents in groundwater controlled.	GWPS attained downgradient of CCR Unit, but limited effect on concentrations beneath unit.	CCR groundwater constituents removed from groundwater downgradient of CCR Unit.	CCR constituents removed from groundwater and retained on reactive media or aquifer soil matrix.	Excavated soil generated from PRB installation requires testing and management as necessary.	Potential removal of CCR constituents, but full-scale performance uncertain. Reactive media effectiveness reduced over time and media likely replaced periodically. Bench/pilot testing of PRB media/system required. Groundwater modelling required to assess remediation timeframe.	No
In-Situ Chemical Treatment	Injection of chemical/material into aquifer to adjust geochemistry and enhance precipitation, co-precipitation, or indirect adsorption of CCR constituents. Groundwater monitoring to verify system effectiveness.	Migration of CCR constituents in groundwater controlled.	GWPS attained downgradient of CCR Unit, but limited effect on concentrations beneath unit.	CCR groundwater constituents removed from groundwater downgradient of CCR Unit.	CCR constituents removed from groundwater and retained on aquifer soil matrix.	No significant RCRA compliance issues anticipated.	ICR considered emerging remediation technology for CCR constituents - not demonstrated under full-scale conditions. Bench/pilot-scale testing of ICR system required. Groundwater modelling required to assess remediation timeframe.	No
Phytoremediation	Use of plants to remove CCR constituents through uptake and accumulation within above ground portions of the plant. Primary plant process for removal is phytoextraction (uptake/accumulation of contaminants within aboveground portions of a plant). Groundwater monitoring to verify system effectiveness.	Migration of CCR constituents in groundwater controlled.	GWPS attained downgradient of CCR Unit, but limited effect on concentrations beneath unit.	CCR groundwater constituents removed from groundwater downgradient of CCR Unit.	CCR constituents removed from groundwater and accumulates in plants.	Management of harvested plants in accordance with RCRA may be required if accumulated CCR constituent concentrations are high.	Phytoextraction occurs in shallow root zone of plants, which limits the effectiveness for the groundwater depths at the Site. Phytoremediation for CCR constituent removal from groundwater has not been demonstrated under full-scale conditions Bench/pilot-scale testing of phytoremediation system required. Groundwater modelling required to assess remediation timeframe.	No

LUMINANT

Table 4

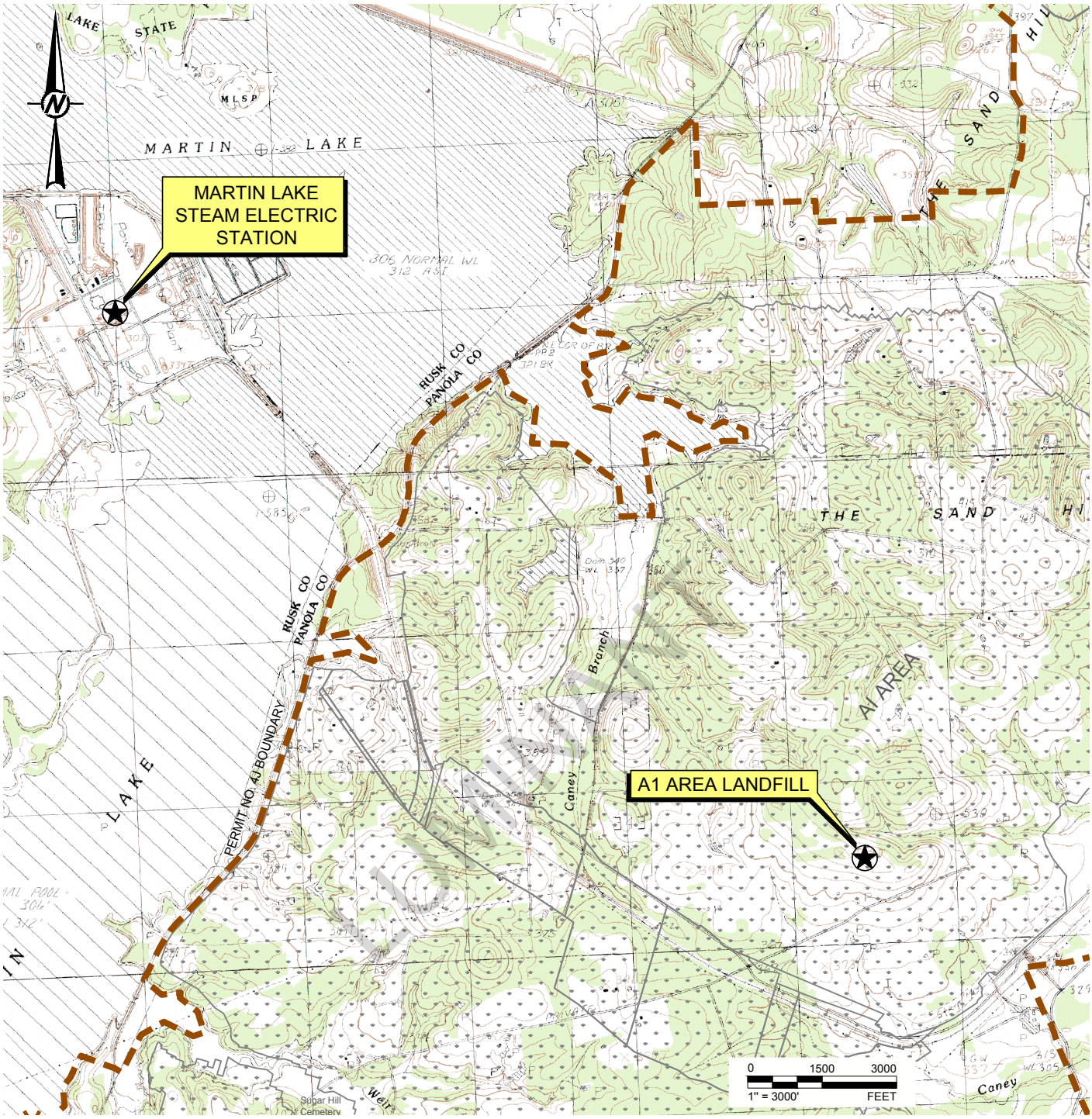
Evaluation of Corrective Measures Alternatives
Martin Lake Steam Electric Station
A1 Area Landfill

Corrective Measures Alternative	Description	Performance	Reliability	Ease of Implementation	Potential Impacts	Time Requirements	Institutional Requirements
Capping with Monitored Natural Attenuation	Low-permeability cap constructed over landfill. MNA to remove CCR constituents from groundwater and control migration. Groundwater monitoring to verify MNA effectiveness.	Cap isolates CCR material in landfill and mitigates on-going source of CCR constituents to groundwater. Site is good MNA candidate for CCR constituents based on MNA field evaluation.	Capping is a common and effective source control technology. On-going attenuation of CCR constituents in groundwater demonstrated during MNA field evaluation. Groundwater monitoring used to verify long-term MNA effectiveness.	Readily implementable with common construction techniques.	Source controlled through capping. CCR constituents removed from groundwater beneath and downgradient of landfill.	Cap Implementation: Up to 2.5 years after commencing closure activities per 257.102(f). MNA Implementation: 2-3 years Groundwater modelling required to assess remediation timeframe.	Minimal regulatory requirements. Deed restrictions required for downgradient plume areas that exceed GWPS.
Capping with Groundwater Extraction and Treatment	Low-permeability cap constructed over landfill. System of extraction wells along downgradient edge of landfill to provide hydraulic control of CCR constituent groundwater plumes. Extracted groundwater treated in an on-site treatment system and discharged to Martin Lake or re-injected into aquifer. Groundwater monitoring to verify system effectiveness.	Cap isolates CCR material in landfill and mitigates on-going source of CCR constituents to groundwater. Migration of CCR constituents in groundwater controlled at landfill boundary by extraction wells.	Capping is a common and effective source control technology. Groundwater extraction and treatment is a common and effective hydraulic control technology. Treatment system operational reliability is key component of overall reliability.	Readily implementable with common construction techniques. Bench/pilot testing of treatment system required. Regulatory authorization for treated water discharge could be difficult to obtain.	Source controlled through capping. Control of CCR constituent migration downgradient of landfill by extraction wells. Extraction system does not address groundwater beneath landfill.	Cap Implementation: Up to 2.5 years after commencing closure activities per 257.102(f). GW Ext/Treatment Implementation: 3-4 years Groundwater modelling required to assess remediation timeframe.	Regulatory authorization for treated water discharge required. Treatment system residuals (sludge, regenerate brine, etc.) require management.
Capping with Vertical Hydraulic Barrier and Groundwater Extraction and Treatment	Low-permeability cap constructed over landfill. Vertical, low permeability hydraulic barrier along downgradient edge of landfill to provide hydraulic control of CCR constituent groundwater plumes. Groundwater extraction and treatment required upgradient of barrier to control groundwater elevations. Groundwater monitoring to verify system effectiveness.	Cap isolates CCR material in landfill and mitigates on-going source of CCR constituents to groundwater. Migration of CCR constituents in groundwater controlled at landfill boundary by vertical barrier. Groundwater elevations upgradient of barrier controlled by groundwater extraction.	Capping is a common and effective source control technology. Vertical hydraulic barrier must be keyed into lower impermeable layer. Groundwater extraction and treatment is a common and effective hydraulic control technology. Treatment system operational reliability is key component of overall reliability.	Readily implementable with common construction techniques. Bench/pilot testing of treatment system required. Regulatory authorization for treated water discharge could be difficult to obtain.	Source controlled through capping. Control of CCR constituent migration downgradient of landfill by vertical barrier. Vertical barrier does not address groundwater beneath landfill.	Cap Implementation: Up to 2.5 years after commencing closure activities per 257.102(f). Barrier and GW Ext/Treat Implementation: 5-8 years Groundwater modelling required to assess remediation timeframe.	Regulatory authorization for treated water discharge required. Treatment system residuals (sludge, regenerate brine, etc.) require management.

DRAFT

FIGURES

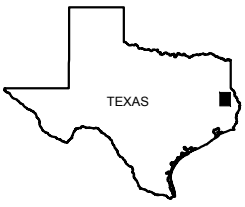
LUMINANT



LEGEND

MARTIN LAKE LIGNITE MINE PERMIT BOUNDARY

MINED OUT AREA



QUADRANGLE LOCATION

REFERENCE(S)

BASE MAP TAKEN FROM TNRIS.GOV, TATUM, TX 7.5 MIN. USGS QUADRANGLE DATED 1983.

CLIENT
LUMINANT

PROJECT
MARTIN LAKE STEAM ELECTRIC STATION
TATUM, TEXAS

TITLE
SITE LOCATION MAP

CONSULTANT
GOLDER

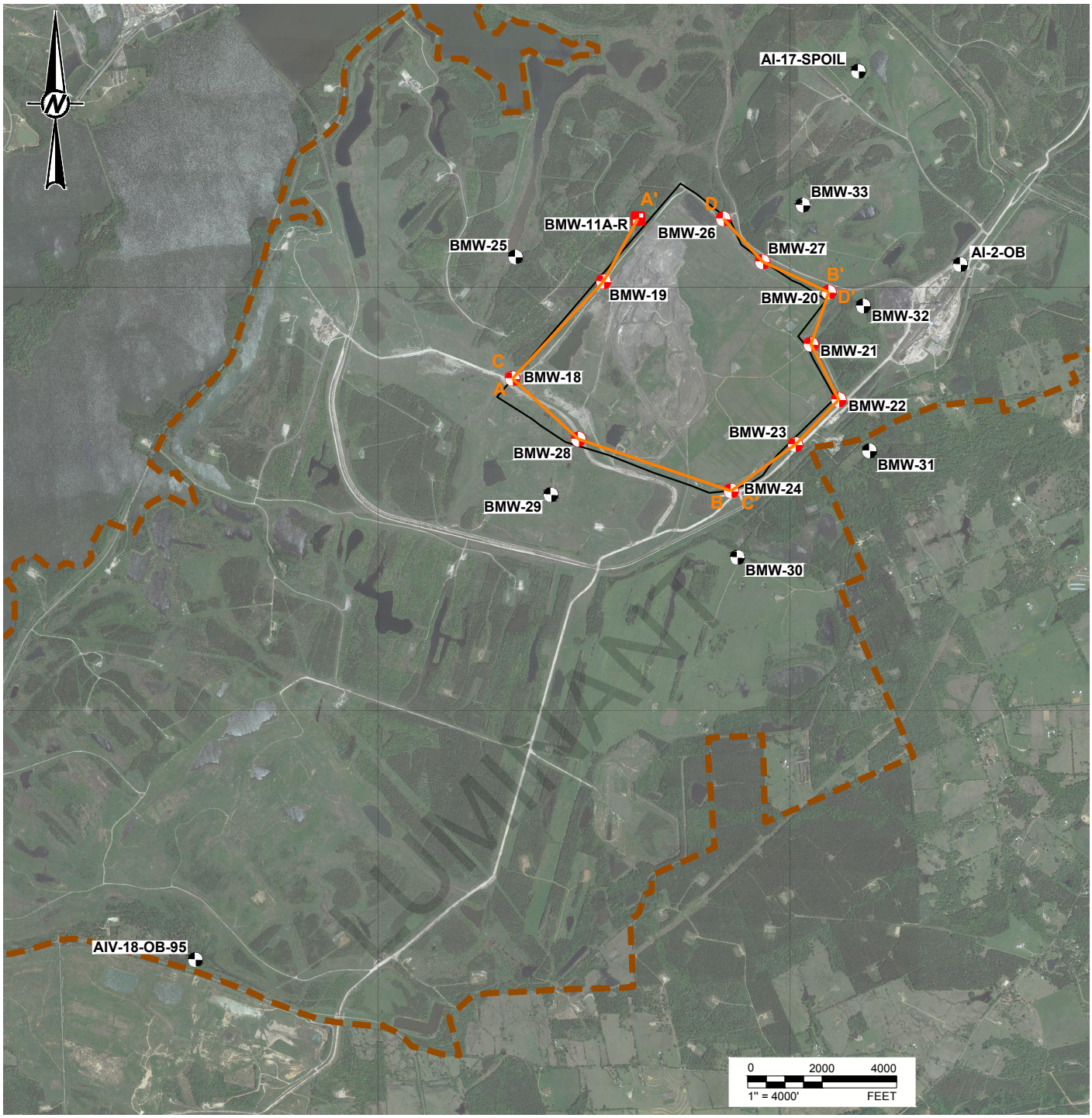
YYYY-MM-DD	2019-08-28
DESIGNED	AJD
PREPARED	AJD
REVIEWED	WFV
APPROVED	WFV

PROJECT NO. 19121403 | REV. 0 | FIGURE 1

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

0 1 in

Last Edited By: adiamond Date: 2019-08-27 Time:5:56:07 PM | Printed By: adiamond Date: 2019-08-28 Time:9:04:40 AM
Path: \\texarkanadata\Projects - Round Rock\19121403 - Luminant\Martin Lake A1 Area Landfill\ | File Name: FIG 1 - Site Location Map.dwg



LEGEND

- MARTIN LAKE LIGNITE MINE PERMIT BOUNDARY
- DOWNGRADIENT CCR MONITORING WELL
- UPGRADIENT CCR MONITORING WELL
- CCR DELINEATION WELL
- A — A' CROSS SECTION LOCATION

REFERENCE(S)

BASE MAP TAKEN FROM GOOGLE EARTH, IMAGERY DATED 4/6/17.

CLIENT
LUMINANT

PROJECT
MARTIN LAKE STEAM ELECTRIC STATION
TATUM, TEXAS

TITLE
DETAILED SITE PLAN - A1 AREA LANDFILL

CONSULTANT
GOLDER

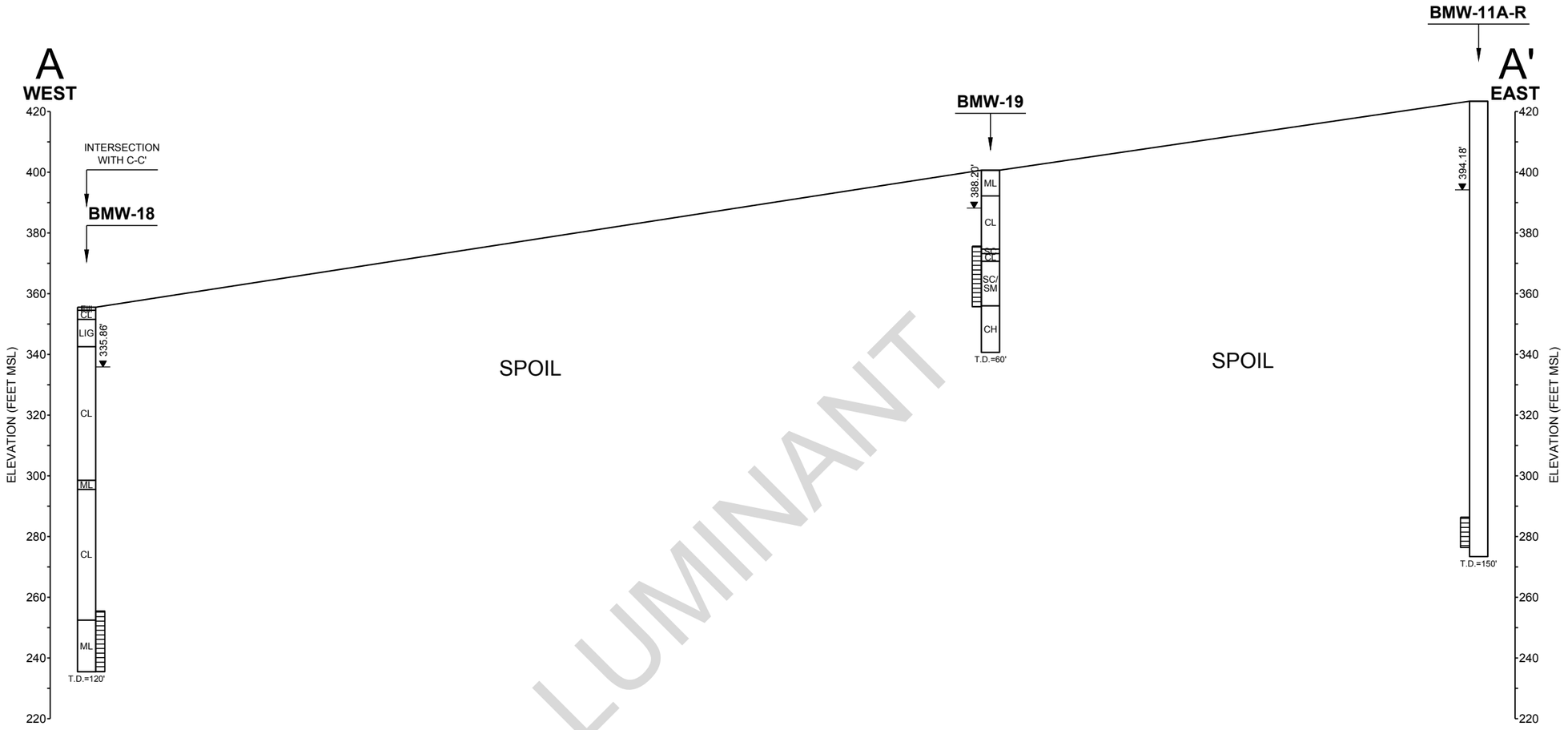
YYYY-MM-DD	2019-08-28
DESIGNED	AJD
PREPARED	AJD
REVIEWED	WFV
APPROVED	WFV

PROJECT NO. 19121403 | REV. 0 | FIGURE 2

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

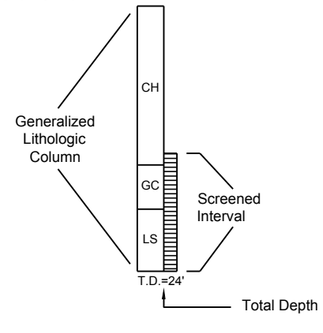
0 1 in

Last Edited By: adiamond Date: 2019-08-28 Time:9:14:57 AM | Printed By: adiamond Date: 2019-08-28 Time:10:18:24 AM
Path: \\texarkanadata\Projects - Round Rock\19121403 - Luminant\Martin Lake A1 Area Landfill\ | File Name: FIG 2 - Detailed Site Plan (A1 Area Landfill).dwg



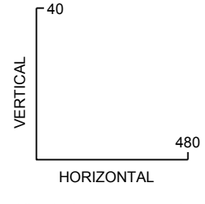
LUMINANT

MONITORING WELL CONSTRUCTION



Water Level (Ft MSL) Measured 5/15/19

SCALE IN FEET



12x Vertical Exaggeration

CLIENT
LUMINANT

PROJECT
MARTIN LAKE STEAM ELECTRIC STATION
TATUM, TEXAS

TITLE
A1 AREA LANDFILL
GEOLOGIC CROSS SECTION A-A'
NORTH SIDE OF A1 EXPANSION AREA

CONSULTANT
GOLDER

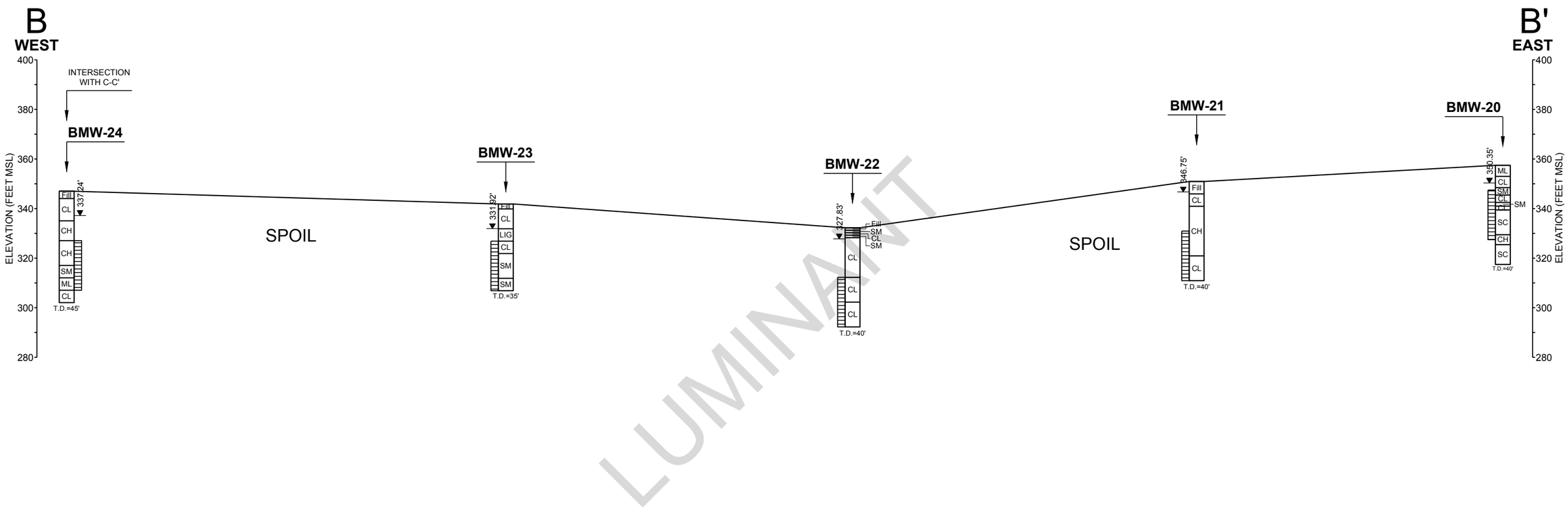
YYYY-MM-DD	2019-08-28
DESIGNED	AJD
PREPARED	AJD
REVIEWED	WFV
APPROVED	WFV

PROJECT NO. 19121403 | REV. 0 | FIGURE 3

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

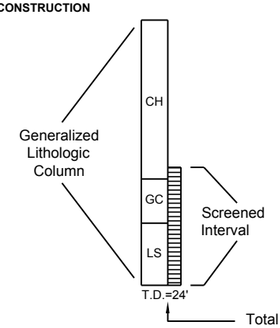
1 in
0

Path: \\texarkana\data\Projects - Round Rock\19121403 - Luminant\Martin Lake A1 Area Landfill\ | File Name: FIG 3-6 - Cross Sections.dwg | Last Edited By: adiamond Date: 2019-08-28 Time:9:57:54 AM | Printed By: adiamond Date: 2019-08-28 Time:9:58:34 AM



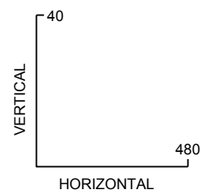
LUMINANT

MONITORING WELL CONSTRUCTION



▼ Water Level (Ft MSL) Measured 5/15/19

SCALE IN FEET



12x Vertical Exaggeration

CLIENT
LUMINANT

PROJECT
MARTIN LAKE STEAM ELECTRIC STATION
TATUM, TEXAS

TITLE
A1 AREA LANDFILL
GEOLOGIC CROSS SECTION B-B'
SOUTH SIDE OF A1 LANDFILL

CONSULTANT
GOLDER

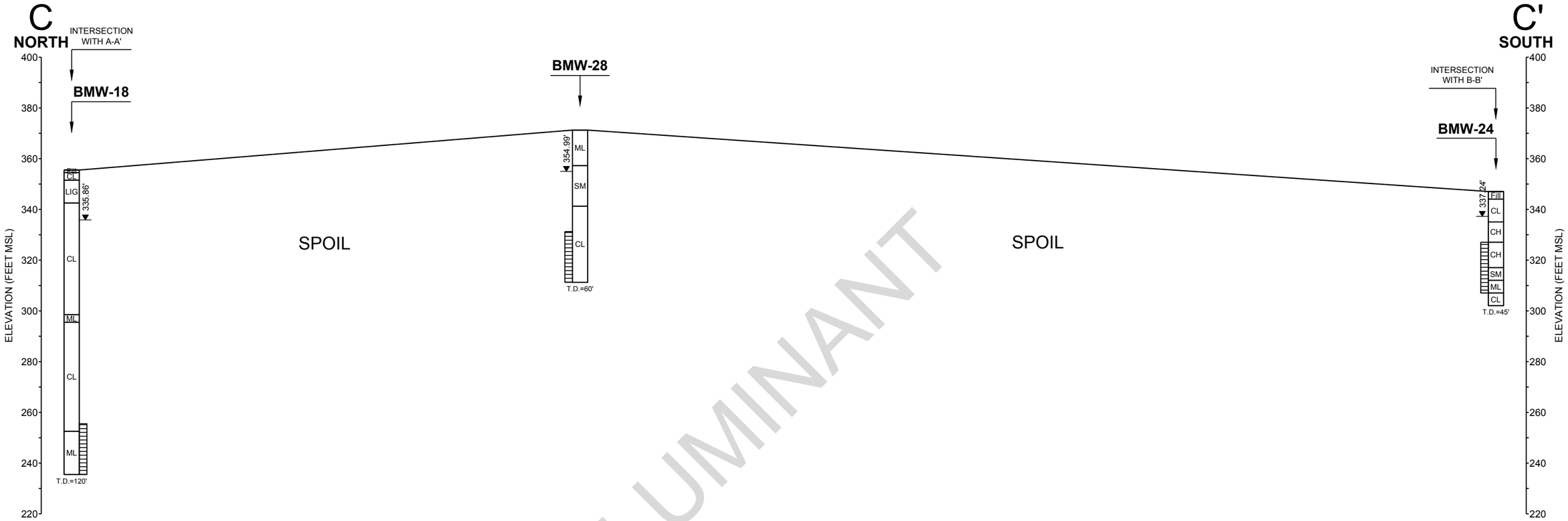
YYYY-MM-DD	2019-08-28
DESIGNED	AJD
PREPARED	AJD
REVIEWED	WFV
APPROVED	WFV

PROJECT NO. 19121403 | REV. 0 | FIGURE 4

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

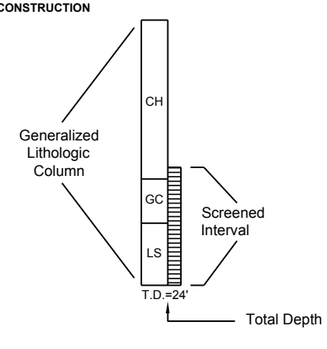
1 in
0

Path: \\texarkana\data\Projects - Round Rock\19121403 - Luminant\Martin Lake A1 Area Landfill\ | File Name: FIG 3-6 - Cross Sections.dwg | Last Edited By: adiamond Date: 2019-08-28 Time:9:57:54 AM | Printed By: adiamond Date: 2019-08-28 Time:9:59:05 AM



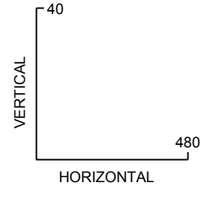
LUMINANT

MONITORING WELL CONSTRUCTION



▼ Water Level (Ft MSL) Measured 5/15/19

SCALE IN FEET



12x Vertical Exaggeration

CLIENT
LUMINANT

PROJECT
MARTIN LAKE STEAM ELECTRIC STATION
TATUM, TEXAS

TITLE
A1 AREA LANDFILL
GEOLOGIC CROSS SECTION C-C'
WEST SIDE OF A1 LANDFILL

CONSULTANT
GOLDER

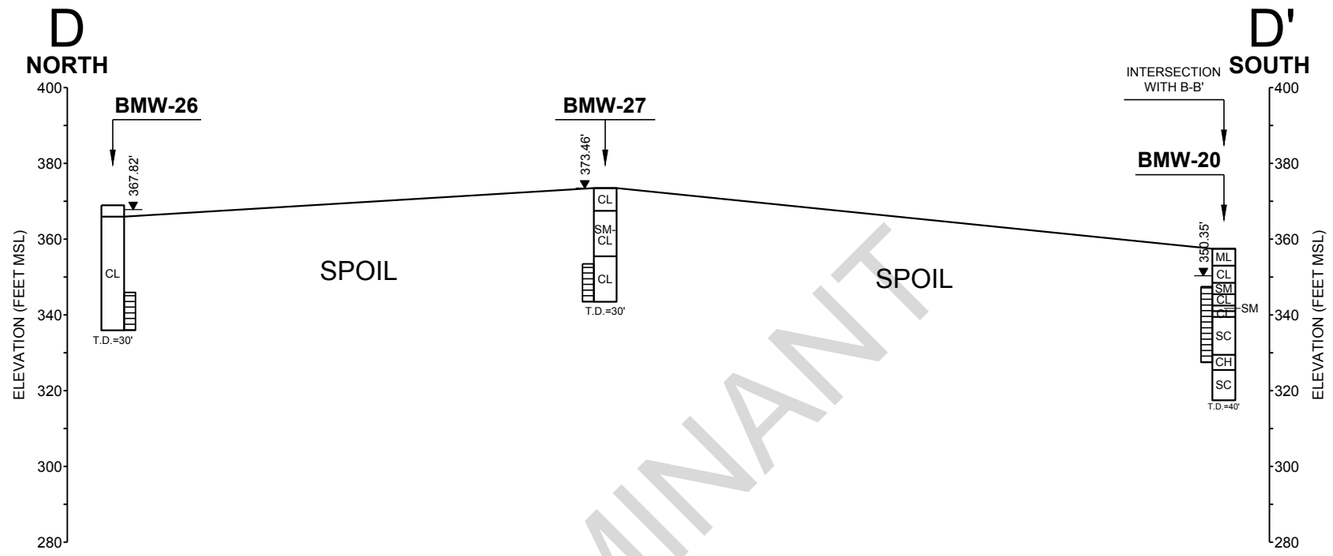
YYYY-MM-DD	2019-08-28
DESIGNED	AJD
PREPARED	AJD
REVIEWED	WFV
APPROVED	WFV

PROJECT NO. 19121403 | REV. 0 | FIGURE 5

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

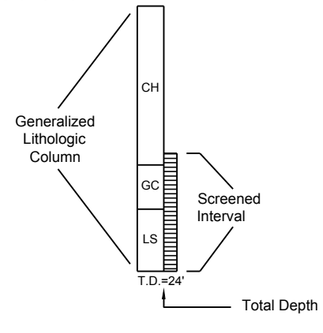
1 in
0

Path: \\texarkana\data\Projects - Round Rock\19121403 - Luminant\Martin Lake A1 Area Landfill\ | File Name: FIG 3-6 - Cross Sections.dwg | Last Edited By: adiamond Date: 2019-08-28 Time:9:57:54 AM | Printed By: adiamond Date: 2019-08-28 Time:9:59:30 AM



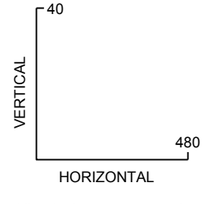
LUMINANT

MONITORING WELL CONSTRUCTION



Water Level (Ft MSL) Measured 5/15/19

SCALE IN FEET



12x Vertical Exaggeration

CLIENT
LUMINANT

PROJECT
MARTIN LAKE STEAM ELECTRIC STATION
TATUM, TEXAS

TITLE
A1 AREA LANDFILL
GEOLOGIC CROSS SECTION D-D'
EAST SIDE OF A1 LANDFILL

CONSULTANT
GOLDER

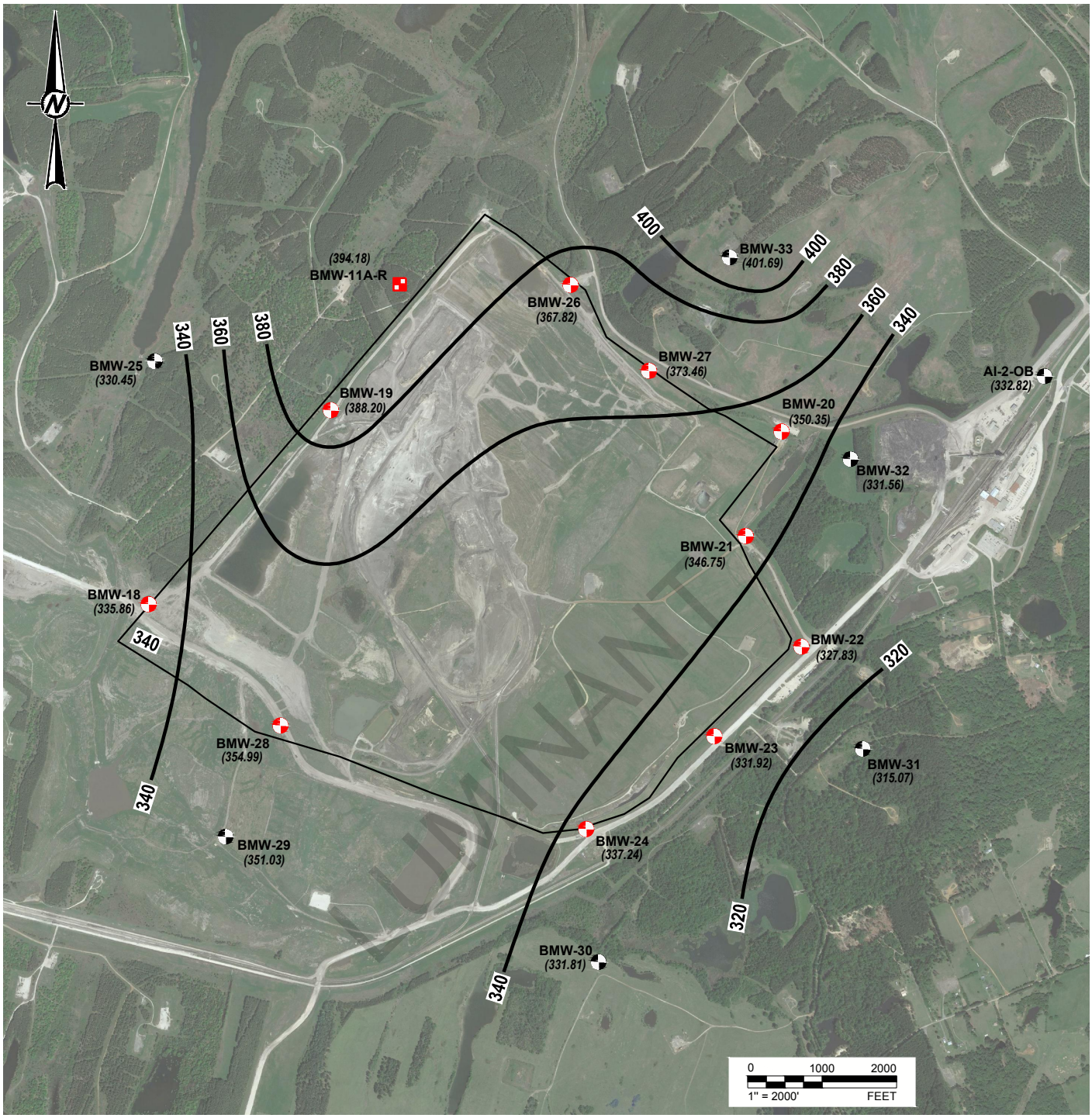
YYYY-MM-DD	2019-08-28
DESIGNED	AJD
PREPARED	AJD
REVIEWED	WFV
APPROVED	WFV

PROJECT NO. 19121403 | REV. 0 | FIGURE 6

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

0 1 in

Path: \\texarkana\data\Projects - Round Rock\19121403 - Luminant\Martin Lake A1 Area Landfill\ | File Name: FIG 3-6 - Cross Sections.dwg | Last Edited By: adiamond Date: 2019-08-28 Time:9:57:54 AM | Printed By: adiamond Date: 2019-08-28 Time:9:59:59 AM



LEGEND

- DOWNGRADIENT CCR MONITORING WELL
- UPGRADIENT CCR MONITORING WELL
- CCR DELINEATION WELL
- *(358.02)* GROUNDWATER POTENTIOMETRIC SURFACE (FT MSL)
- 360 GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR (C.I. = 20 FT)

NOTE(S)

1. CCR MONITORING WELL WATER LEVELS MEASURED 5/15/19. CCR DELINEATION WELL WATER LEVELS MEASURED 6/13/19. WELL AI-2-OB WATER LEVELS MEASURED 8/14/19.

REFERENCE(S)

BASE MAP TAKEN FROM GOOGLE EARTH, IMAGERY DATED 4/6/17.

CLIENT
LUMINANT

PROJECT
MARTIN LAKE STEAM ELECTRIC STATION
TATUM, TEXAS

TITLE
A1 AREA LANDFILL
POTENTIOMETRIC SURFACE MAP
MAY 15, 2019

CONSULTANT
GOLDER

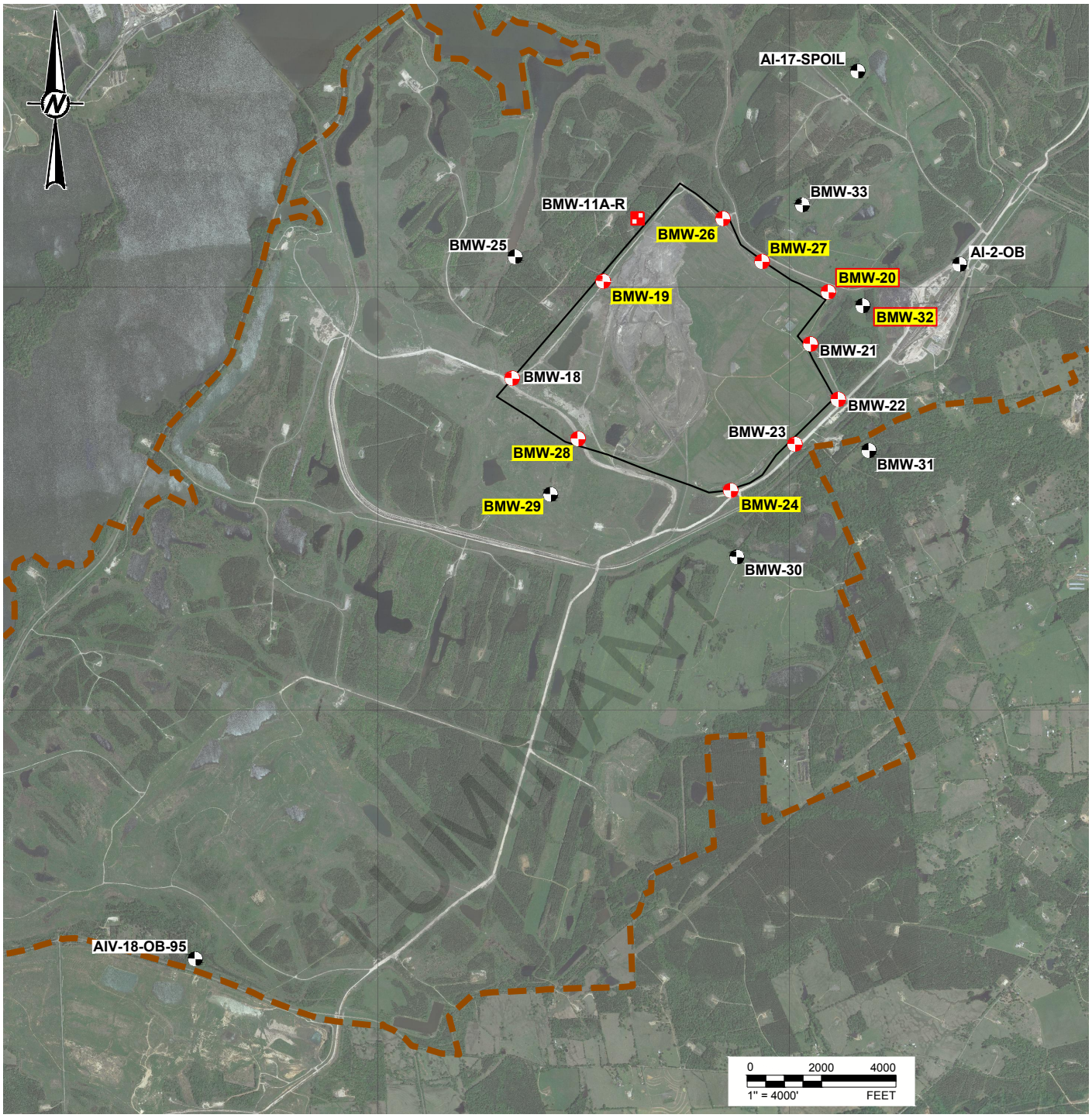
YYYY-MM-DD	2019-08-30
DESIGNED	AJD
PREPARED	AJD
REVIEWED	WFV
APPROVED	WFV

PROJECT NO. 19121403 | REV. 0 | FIGURE 7

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

0 1 in

Last Edited By: adiamond Date: 2019-08-30 Time:4:09:27 PM | Printed By: adiamond Date: 2019-08-30 Time:4:10:10 PM
Path: \\texarkanadata\Projects - Round Rock\19121403 - Luminant\Martin Lake A1 Area Landfill\ | File Name: FIG 7 - POT Surface Map-A1 Area Landfill (May 2019) with AI-2-OB.dwg



LEGEND

- MARTIN LAKE LIGNITE MINE PERMIT BOUNDARY
- DOWNGRADIENT CCR MONITORING WELL
- UPGRADIENT CCR MONITORING WELL
- CCR DELINEATION WELL
- SSLs FOR ONE OR MORE APPENDIX IV CONSTITUENTS IN DOWNGRADIENT WELLS BASED ON INITIAL STATISTICAL EVALUATION
- SSLs FOR ONE OR MORE APPENDIX IV CONSTITUENTS IN DOWNGRADIENT WELLS BASED ON UPDATED STATISTICAL EVALUATION

NOTE(S)

1. BMW-27 WAS PREVIOUSLY CONSIDERED TO BE A DOWNGRADINET WELL; HOWEVER, BASED ON ADDITIONAL GROUNDWATER ELEVATION DATA FROM THE NATURE AND EXTENT WELLS (SEE FIGURE 7), IT AND BMW-33 ARE CONSIDERED TO BE UPGRADIENT WELLS.

REFERENCE(S)

BASE MAP TAKEN FROM GOOGLE EARTH, IMAGERY DATED 4/6/17.

CLIENT
LUMINANT

PROJECT
MARTIN LAKE STEAM ELECTRIC STATION
TATUM, TEXAS

TITLE
A1 AREA LANDFILL
EXTENT OF APPENDIX IV CONSTITUENTS
DETECTED AT SSLs ABOVE GWPSs

CONSULTANT
GOLDER

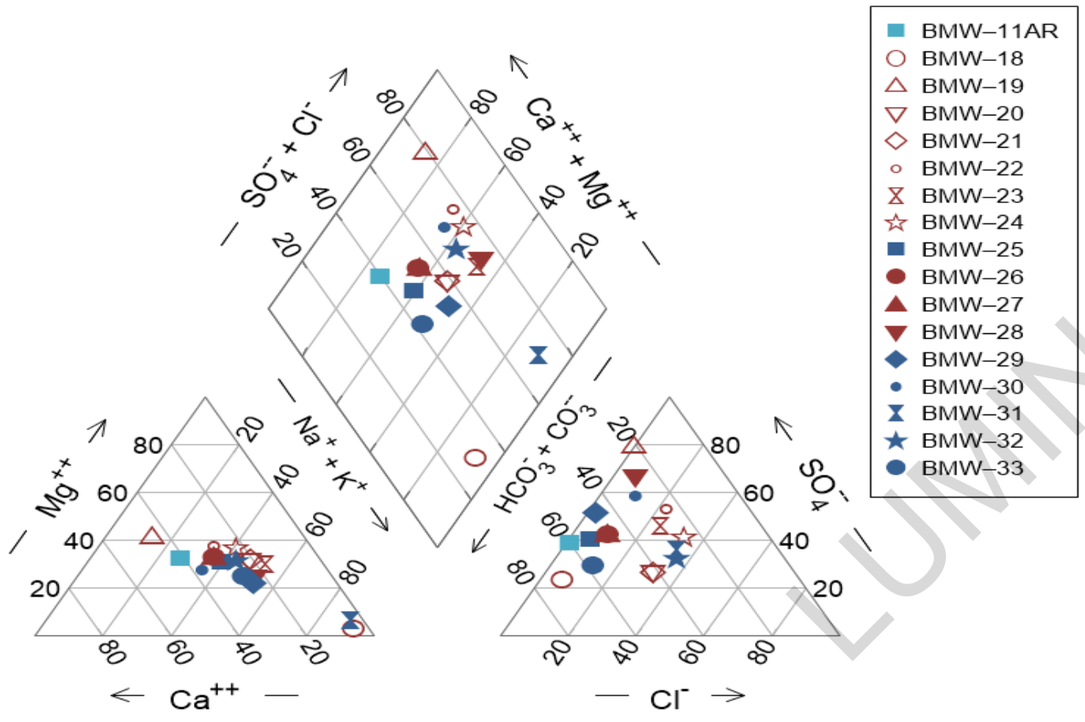
YYYY-MM-DD	2019-08-29
DESIGNED	AJD
PREPARED	AJD
REVIEWED	WFV
APPROVED	WFV

PROJECT NO.	REV.	FIGURE
19121403	0	8

Last Edited By: adiamond Date: 2019-08-29 Time:12:04:45 PM | Printed By: adiamond Date: 2019-08-29 Time:1:52:57 PM
Path: \\texarkanadata\Projects - Round Rock\19121403 - Luminant\Martin Lake A1 Area Landfill\ | File Name: FIG 8 - Extent of App IV Constituents (A1 Area Landfill).dwg

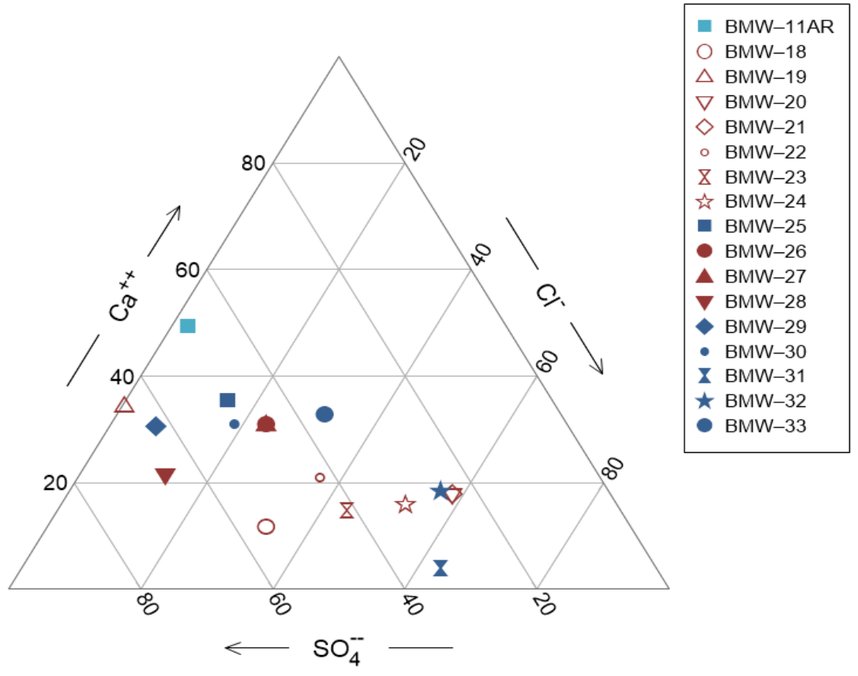
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
0 1 in

(a)



% meq/kg

(b)



% mol

LUMINANT

CLIENT
LUMINANT
MARTIN LAKE
A1 LANDFILL

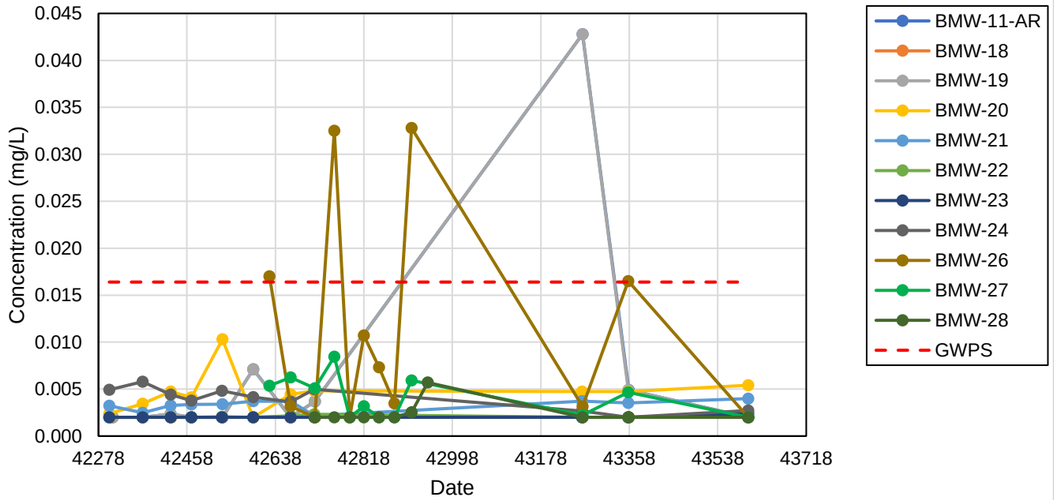
CONSULTANT
GOLDER

PROJECT
ASSESSMENT OF CORRECTIVE MEASURES
Monitored Natural Attenuation
GEOCHEMICAL ASSESSMENT

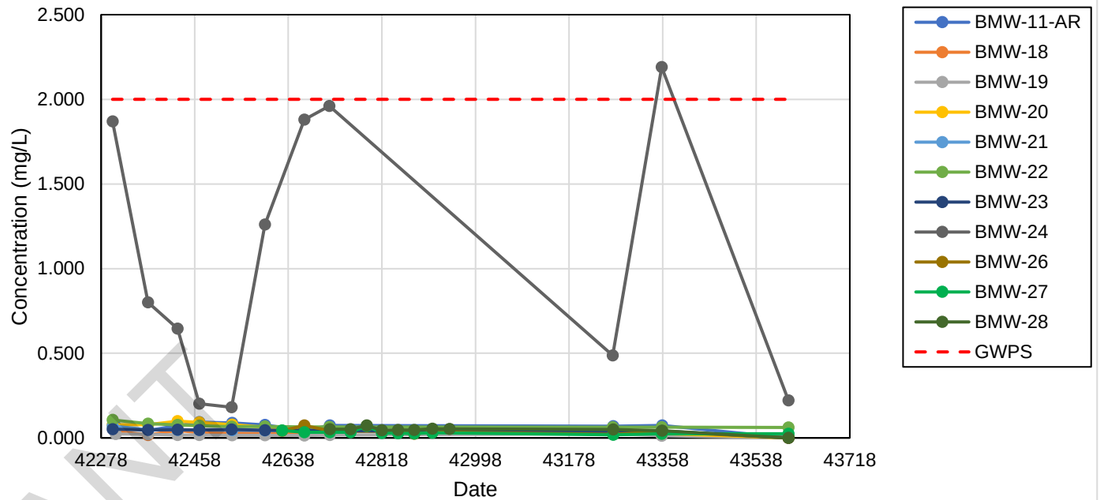
TITLE
MAJOR GROUNDWATER CEHMISTRY (A) AND SELECT RELATIVE ION ABUNDANCE (B)

PROJECT NO.	PHASE	REV.	FIGURE
19122434	01	A	9a-b

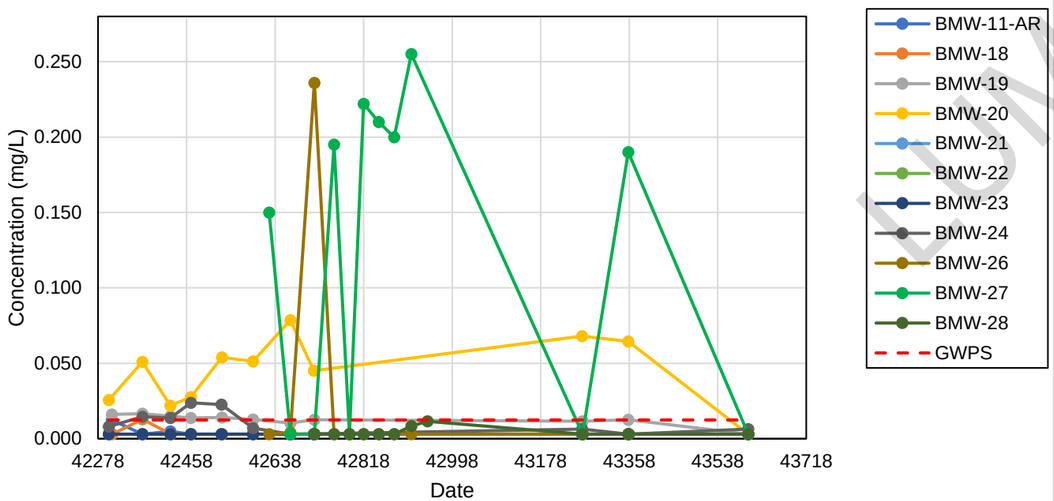
(a)



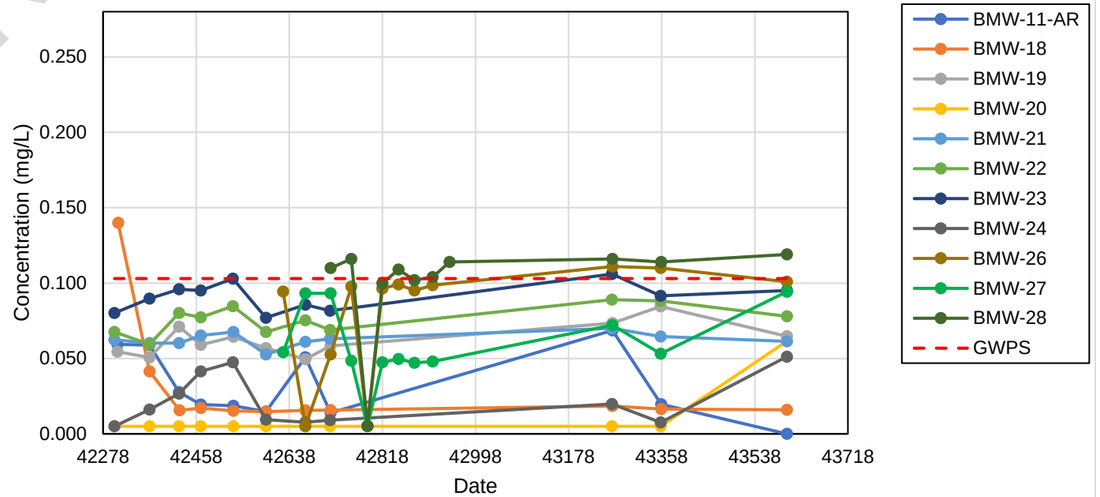
(b)



(c)



(d)



LUMINANT

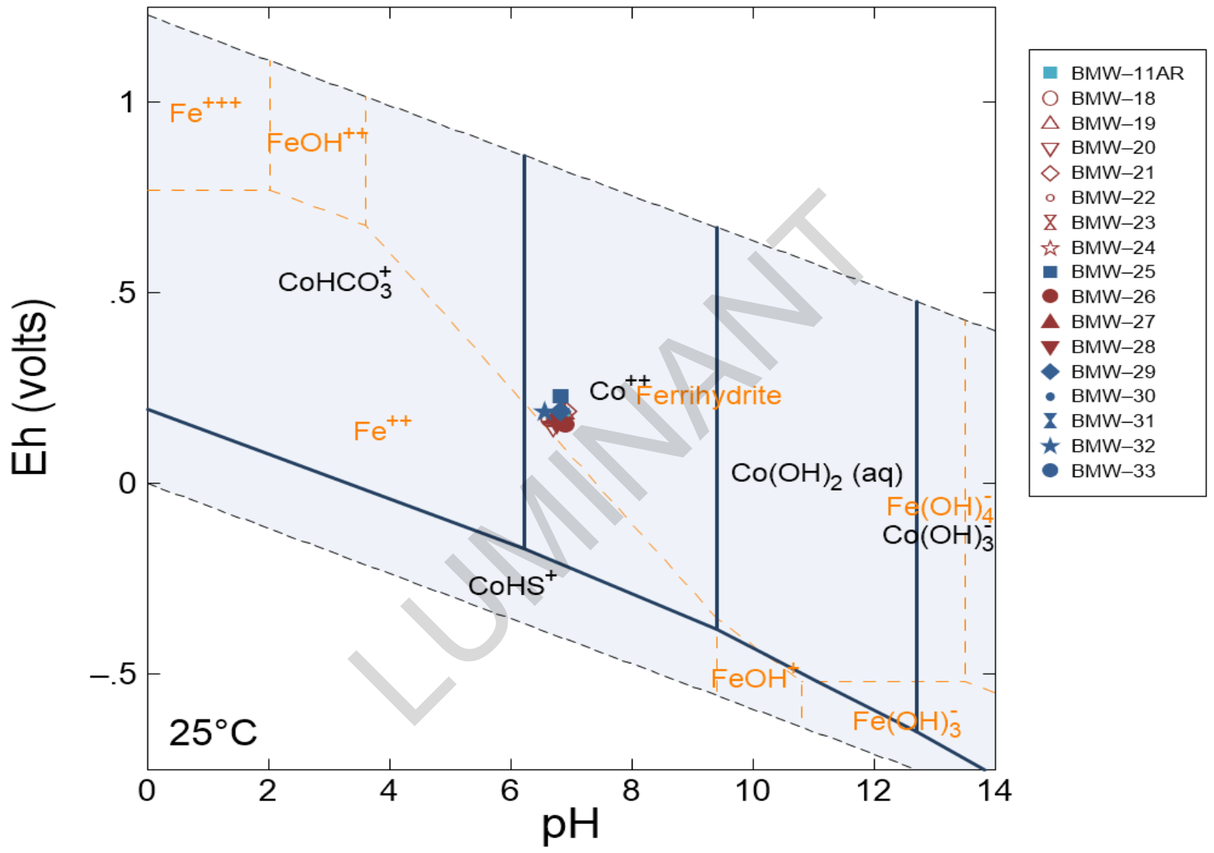
CLIENT
LUMINANT
MARTIN LAKE
A1 LANDFILL

CONSULTANT
GOLDER

PROJECT
ASSESSMENT OF CORRECTIVE MEASURES
GEOCHEMICAL ASSESSMENT

TITLE
HISTORICAL TRENDS OF ARSENIC (A), BARIUM (B), COBALT (C), AND LITHIUM (D) IN GROUNDWATER

PROJECT NO.	PHASE	REV.	FIGURE
19122434	01	A	10a-d



LUMINANT

CLIENT
LUMINANT
MARTIN LAKE
A1 LANDFILL

CONSULTANT
GOLDER

PROJECT
ASSESSMENT OF CORRECTIVE MEASURES
GEOCHEMICAL ASSESSMENT

TITLE
SPECIATION OF COBALT IN GROUNDWATER

PROJECT NO.	PHASE	REV.	FIGURE
19122434	01	A	11

APPENDIX A

BORING LOGS

LUMINANT

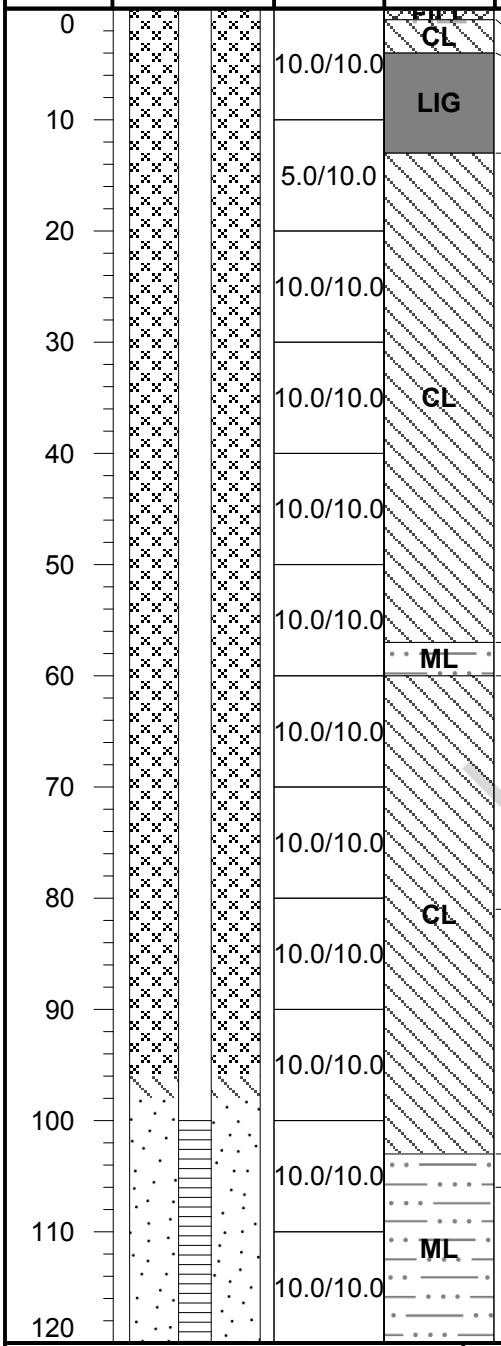
Luminant

Log of Boring: BMW-18

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	9/29/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	120
Driller's License:	5814M	TOC Elevation (ft. AMSL):	357.833
Logged By:	Jeremiah Bihl	Northing:	1051216950.561
Sampling Method:	4"x10' Core barrel	Easting:	2915599.992



Lithologic Description
(0 - 1) Top soil, light brown, rocks (1-3 cm) present
(1 - 4) CLAY spoil, dark gray to black with pale tan mottling, dry, firm, brittle
(4 - 13) LIGNITE with clay spoil, dark grey to black, dry to moist, soft, brittle, angular, low plasticity
(13 - 57) Silty CLAY spoil, dark gray to dark brown with red and yellow mottling, dry, soft to firm, crumbly, medium plasticity, color change to tan at 30', coal seam at 32' (black, dry to moist, soft), pieces of lignite present, color change to gray to dark gray at 35'
(57 - 60) Clayey SILT spoil, light brown to tan, moist, soft, low plasticity, lignite seam at 59'
(60 - 81) Silty CLAY spoil, black to gray, dry, soft to firm, low plasticity, crumbly, 6" dry white gravel layer at 69', 4" light brown silty sand layer at 81'
(81 - 103) Silty CLAY spoil, light gray, dry to moist, soft, low to medium plasticity, crumbly, rubber tire pieces at 89', hard lignite seam at 90' (hard, dry, black, firm), streaks of black (91'- 94'), becomes hard at 94', light to dark gray (94'-103')
(103 - 106) Clayey SILT spoil, gray, very moist, soft, medium plasticity
(106 - 120) Clayey SILT spoil, gray to dark gray, dry, firm, low plasticity

LUMINANT

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. This log should not be used separately from the report to which it is attached.

Well Materials
(0-100) Casing, 2" Sch 40 FJT PVC
(100-120) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-96') Grout
(96'-98') Bentonite pellets
(98'-110') 20/40 sand

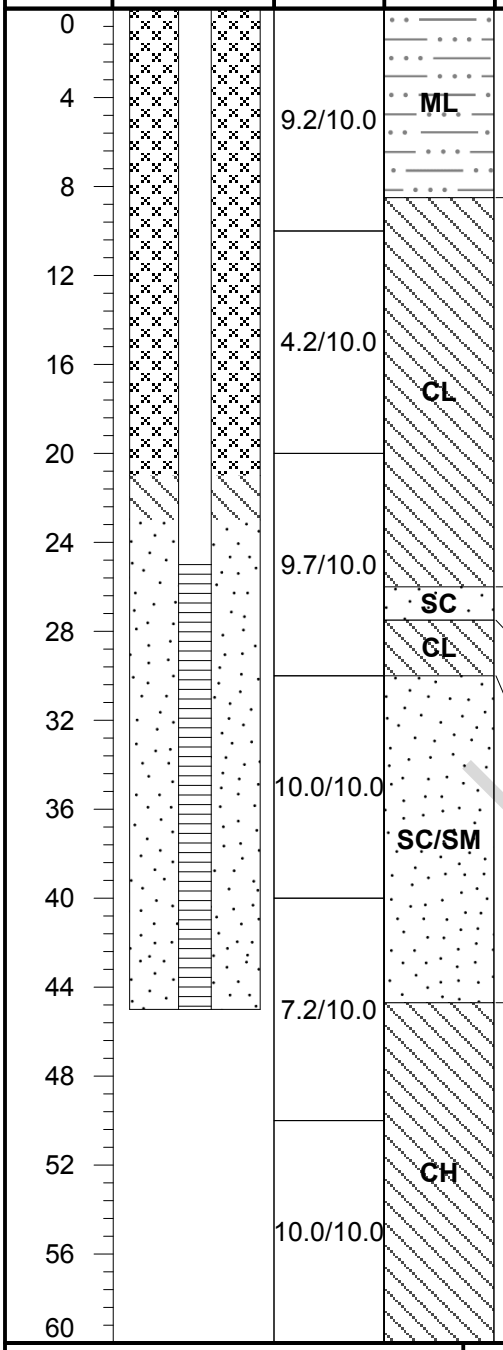
Luminant

Log of Boring: BMW-19

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	10/7/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	60
Driller's License:	5814M	TOC Elevation (ft. AMSL):	400.685
Logged By:	Nolan Townsend	Northing:	1048219535.121
Sampling Method:	4"x10' Core barrel	Easting:	2918071.024



Lithologic Description

(0 - 8.5) Sandy SILT with clay spoil, light brown to brownish yellow, dry to slightly mosit, soft, low plasticity, more clay content below ~1.0', trace black lignite fragments - dry, firm to hard, brittle, friable, sharp basal contact

(8.5 - 26) Sandy CLAY spoil, yellowish brown, gray after 9.5', trace to moderate orange-yellow mottling, dry to moist, firm, low plasticity, trace black lignite fragments, very fine sand, sharp basal contact

(26 - 27.5) Clayey SAND spoil, gray to yellowish brown, very moist to wet, soft, low plasticity, very fine sand, sharp basal conact

(27.5 - 30) Sandy CLAY spoil, gray to yellowish brown, trace to moderate orange mottling, moist to very moist, soft to firm, moderate plasticity, very fine sand, small lignite seam 29.7'-30.0', brittle and friable, dry, black, hard, sharp basal contact

(30 - 44.7) Clayey silty SAND spoil - sandy CLAY spoil, brownish yellow to gray to greenish gray, trace orange mottling, abundant orange mottling 37.5'-38.5' and 42'-44.7', very moist to wet, soft to firm, moderate to high plasicity, very fine sand

(44.7 - 60) Sandy CLAY spoil, greenish gray to gray, trace orange-red mottling, dry to moist, firm, moderate to high plasticity, trace black lignite fragments, abundant orange and red mottling 56.0'-59.5'

LUMINANT

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. This log should not be used separately from the report to which it is attached.
2. Hole collapsed - drilled back down to 45' with 6" casing to set well.

Well Materials
(0-25) Casing, 2" Sch 40 FJT PVC
(25-45) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-21') Grout
(21'-23') Bentonite pellets
(23'-45') 20/40 sand

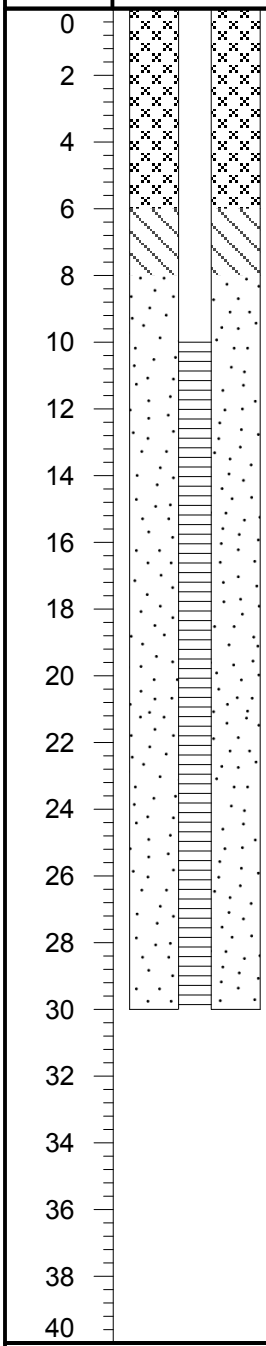
Luminant

Log of Boring: BMW-20

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	10/8/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	40
Driller's License:	5814M	TOC Elevation (ft. AMSL):	357.512
Logged By:	Nolan Townsend	Northing:	1057219166.631
Sampling Method:	4"x10' Core barrel	Easting:	2923995.525



Depth (ft)	Recovery (ft/ft)	USCS	Lithologic Description
0 – 4	9.5/10.0	ML	(0 - 4.5) Sandy SILT with clay spoil, brownish yellow to gray, trace to moderate orange mottling near 4.0', dry, soft, low plasticity, very fine sand
4 – 8		CL	(4.5 - 9) CLAY spoil with trace sand lenses, gray with trace to moderate orange/yellow mottling, dry to slightly moist, firm to hard, low to moderate plasticity, trace calcareous precipitates, sharp basal contact
8 – 12	9.8/10.0	SM	(9 - 12) Slightly silty SAND spoil, yellowish orange to tan, moist to very moist, slightly unconsolidated, moderate to high plasticity, very fine sand, moderately to well sorted, mostly quarts with ~5-10% lithic fragments, clay content present 10'-12', dark gray, sharp basal contact
12 – 14		CL	(12 - 15) CLAY spoil, slightly sandy, gray to dark gray, dry to slihgtly moist, firm to hard, low to moderate plasticity, trace black lignite fragments, sandy lenses, trace orange mottling
14 – 16		SM	(15 - 16.5) Silty SAND with clay spoil, tan to yellowish orange, moist to very moist, moderately consolidated, medium to high plasticity, very fine sand
16 – 18		CL	(16.5 - 18) CLAY spoil as above, dry to moist, firm to hard, moderate plasticity
18 – 28	10.0/10.0	SC	(18 - 28) Clayey SAND spoil, reddish orange and gray, very moist, wet at 20.0', moderately consolidated, moderate to high plasticity, clay composition increases and decreases throughout, very fine sand, becomes gray at 28.0' and more clay content
28 – 32		CH	(28 - 32) Sandy CLAY spoil, gray, trace orange mottling, moist to very moist, firm, moderate to high plasticity, locally sandy lenses/interbeds, trace lignitic fragments (black)
32 – 40	10.0/10.0	SC	(32 - 40) Clayey SAND spoil, reddish orange with gray clay, very moist to wet, moderately consolidated, moderate to high plasticity, very fine sand, localized small sandy clay seams, trace lignite fragments

LUMINANT

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. This log should not be used separately from the report to which it is attached.

Well Materials
(0-10) Casing, 2" Sch 40 FJT PVC
(10-30) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-6') Grout
(6'-8') Bentonite pellets
(8'-30') 20/40 sand

Luminant

Log of Boring: BMW-21

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	9/27/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	40
Driller's License:	5814M	TOC Elevation (ft. AMSL):	350.976
Logged By:	Jeremiah Bihl	Northing:	1054217792.58
Sampling Method:	4"x10' Core barrel	Easting:	2923478.615

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Lithologic Description
0 – 5		10.0/10.1	FILL	(0 - 5) Top soil, sandy with small amounts of clay, tan/brown, moist, soft, low plasticity
5 – 10			CL	(5 - 10) Sandy CLAY spoil, dark gray to black, moist, soft, low to medium plasticity, trace amounts of lignite, clay content increases with depth
10 – 20		10.0/10.0	CH	(10 - 30) CLAY spoil with angular lignite, light gray, moist, soft, high plasticity, 1'-thick lignite layer at 25', hardness increases from 26' to 30'
20 – 30		10.0/10.0	CH	
30 – 40		10.0/10.0	CL	(30 - 40) CLAY spoil with angular lignite pieces, wet, soft with increasing hardness with depth, medium plasticity, water present at 30', moisture decreases at 35'

LUMINANT

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. This log should not be used separately from the report to which it is attached.

Well Materials
(0-20) Casing, 2" Sch 40 FJT PVC
(20-40) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-37') Grout
(16'-18') Bentonite pellets
(18'-40') 20/40 sand

Luminant

Log of Boring: BMW-22

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	9/27/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	40
Driller's License:	5814M	TOC Elevation (ft. AMSL):	332.304
Logged By:	Jeremiah Bihl	Northing:	1060216298.457
Sampling Method:	4"x10' Core barrel	Easting:	2924359.671

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Lithologic Description
0			FILL	(0 - 1) Top soil, light brown
2			SM	(1 - 2) Sandy silty spoil with pieces of rock, light brown, abundant organics
			CL	(2 - 3) CLAY spoil, yellow-reddish
4			SM	(3 - 4) Sandy silty spoil with pieces of rock, light brown/tan, abundant organics
6		10.0/10.0		
8				
10				(4 - 20) CLAY spoil, dark gray, lignite present (angular), color change to light gray to yellow clay with some red mottling at 6', firm, moist, medium plasticity, color change to tan at 10', moist and soft lignite layer (12'-13'), hard and lignite layer (angular pieces) at 13'
12				
14		10.0/10.0		
16				
18				
20				
22			CL	
24				(20 - 30) Sandy CLAY spoil, light gray, moist, soft, medium plasticity, moisture content decreases with depth, hardness increases with depth, plasticity decreases with depth
26		10.0/10.0		
28				
30				
32				(30 - 40) Sandy CLAY spoil, light gray, wet, soft, hardness increases with depth
34				
36		10.0/10.0		
38				
40				

LUMINANT

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. This log should not be used separately from the report to which it is attached.

Well Materials
(0-20) Casing, 2" Sch 40 FJT PVC
(20-40) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-37') Grout
(16'-18') Bentonite pellets
(18'-40') 20/40 sand

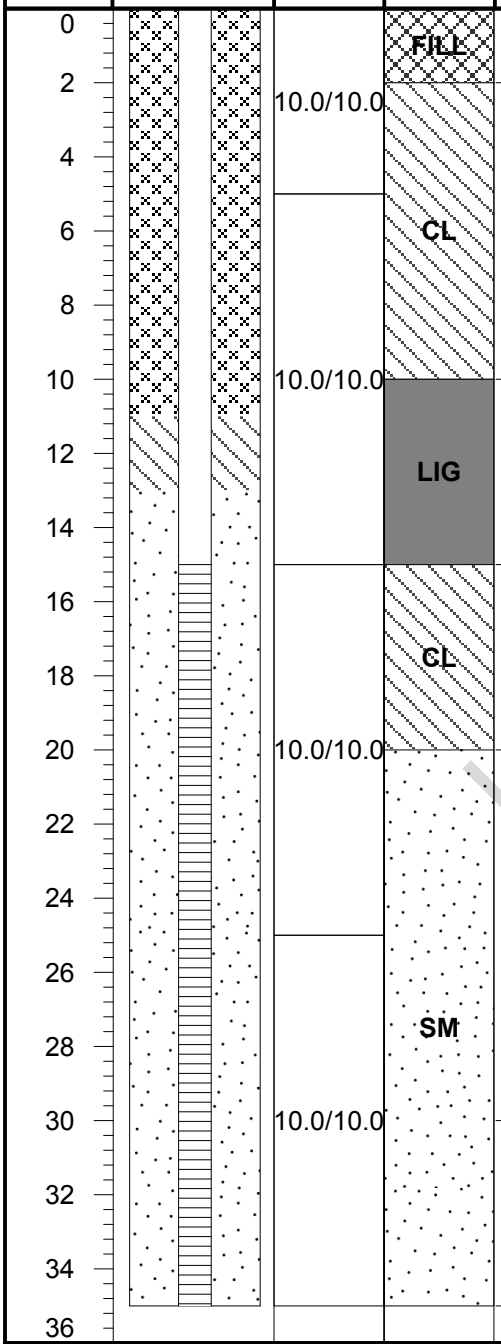
Luminant

Log of Boring: BMW-23

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	9/28/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	35
Driller's License:	5814M	TOC Elevation (ft. AMSL):	341.903
Logged By:	Jeremiah Bihl	Northing:	1061215105.129
Sampling Method:	4"x10' Core barrel	Easting:	2923179.729



Lithologic Description

(0 - 2) Top soil, sandy silty CLAY, moist, soft, light brown

(2 - 10) CLAY spoil, light gray to pale yellow, some sand present, soft, moist, low plasticity, color change to brown at 5'

(10 - 15) LIGNITE spoil, black, soft, moist, crumbly, sharp contact

(15 - 20) CLAY spoil, dark gray and light tan, dry, hard, medium plasticity

(20 - 30) Silty SAND spoil with small amounts of clay, moist, soft, low plasticity, small seams of lignite, clay content increases with depth (20'-30')

(30 - 35) Silty SAND spoil, light gray, wet, very soft, low plasticity, some clay content at 32', sand lenses present

LUMINANT

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. This log should not be used separately from the report to which it is attached.

Well Materials
(0-15) Casing, 2" Sch 40 FJT PVC
(15-35) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-11') Grout
(11'-13') Bentonite pellets
(13'-35') 20/40 sand

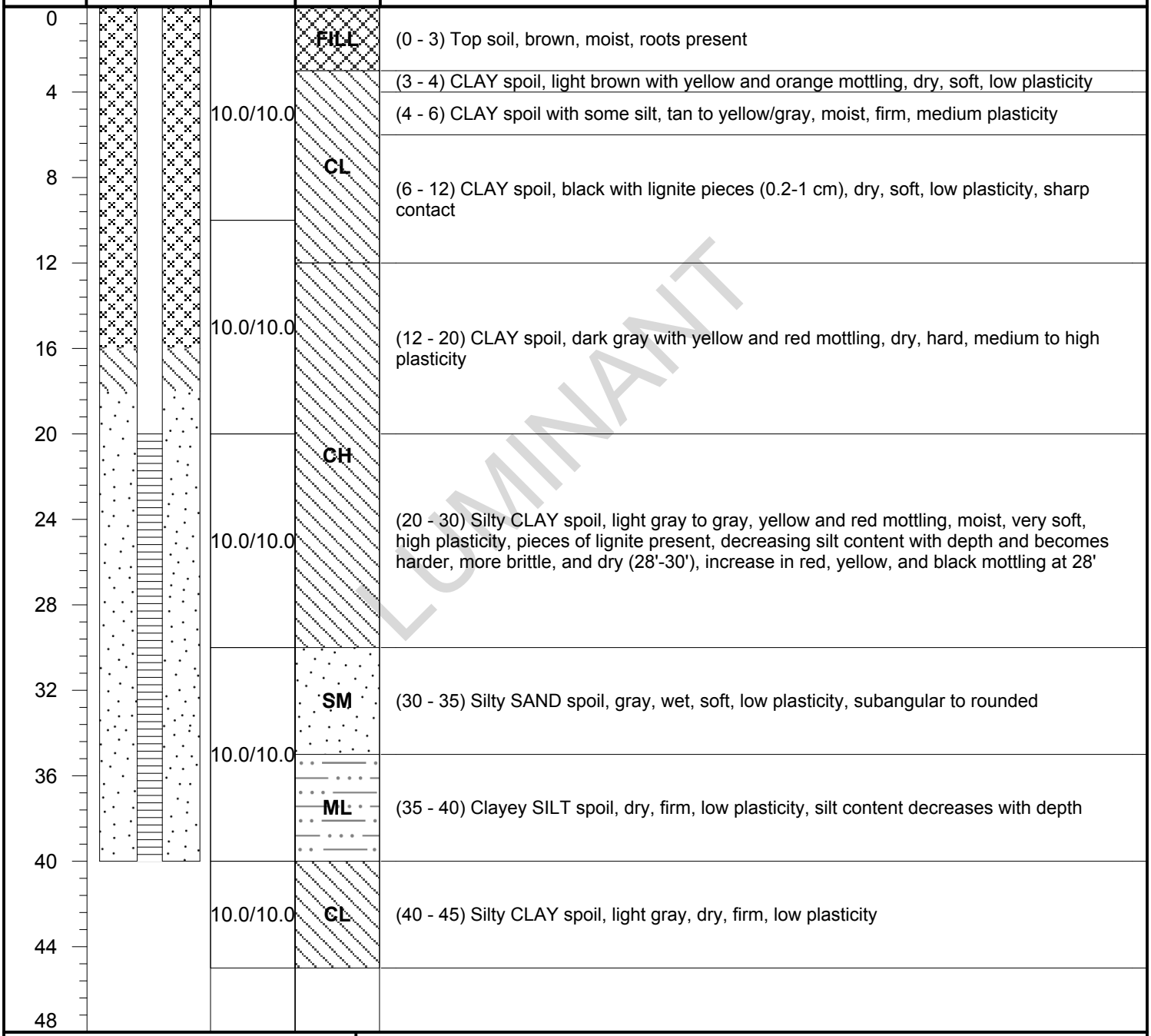
Luminant

Log of Boring: BMW-24

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	9/28/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	45
Driller's License:	5814M	TOC Elevation (ft. AMSL):	347.074
Logged By:	Jeremiah Bihl	Northing:	1066213874.314
Sampling Method:	4"x10' Core barrel	Easting:	2921447.467



LUMINANT

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. This log should not be used separately from the report to which it is attached.

Well Materials
(0-20) Casing, 2" Sch 40 FJT PVC
(20-40) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-16') Grout
(16'-18') Bentonite pellets
(18'-40') 20/40 sand

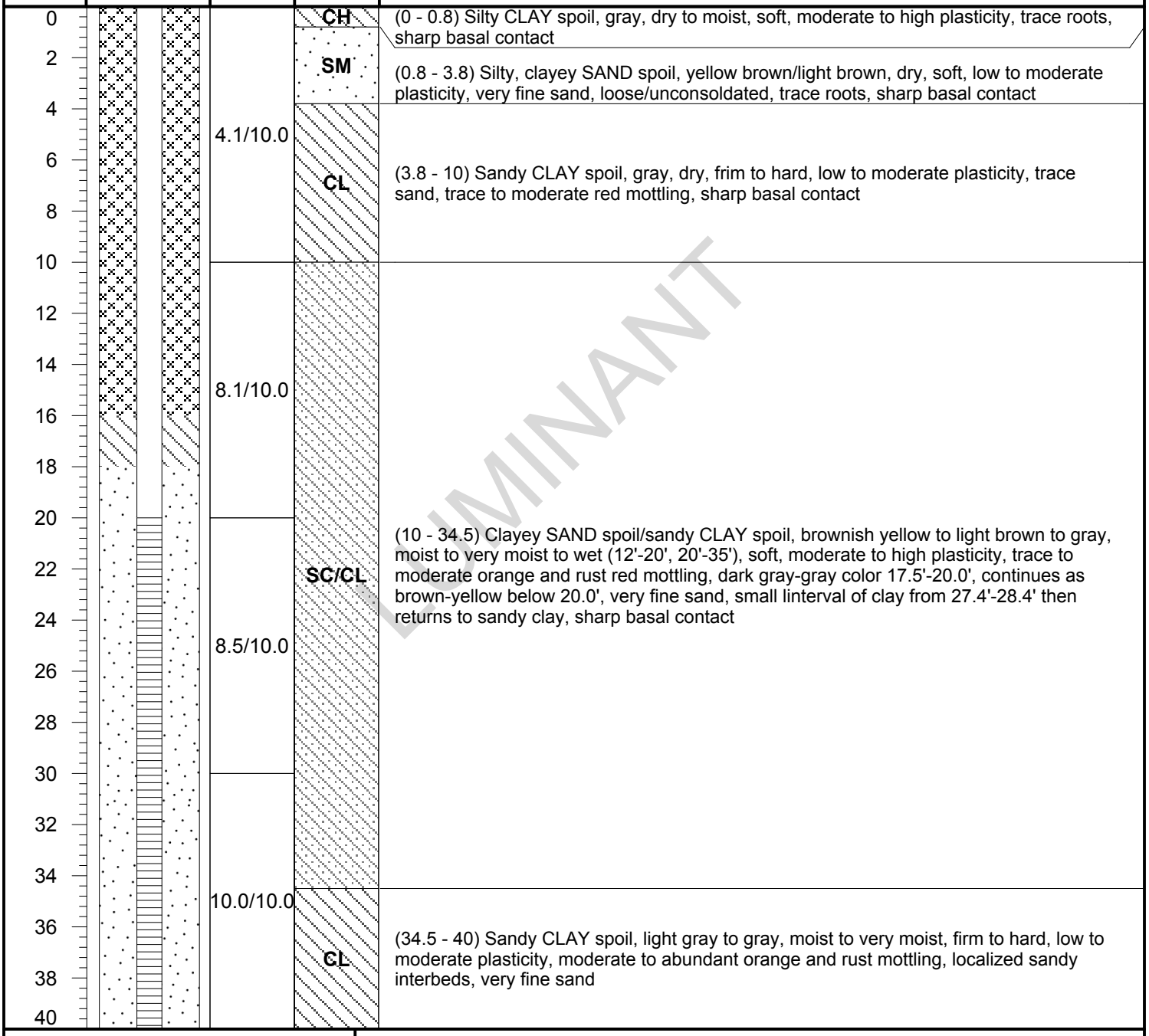
Luminant

Log of Boring: BMW-25

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	10/7/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	40
Driller's License:	5814M	TOC Elevation (ft. AMSL):	339.946
Logged By:	Nolan Townsend	Northing:	1070220215.073
Sampling Method:	4"x10' Core barrel	Easting:	2915715.233



LUMINANT

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. This log should not be used separately from the report to which it is attached.

Well Materials
(0-20) Casing, 2" Sch 40 FJT PVC
(20-40) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-16') Grout
(16'-18') Bentonite pellets
(18'-40') 20/40 sand

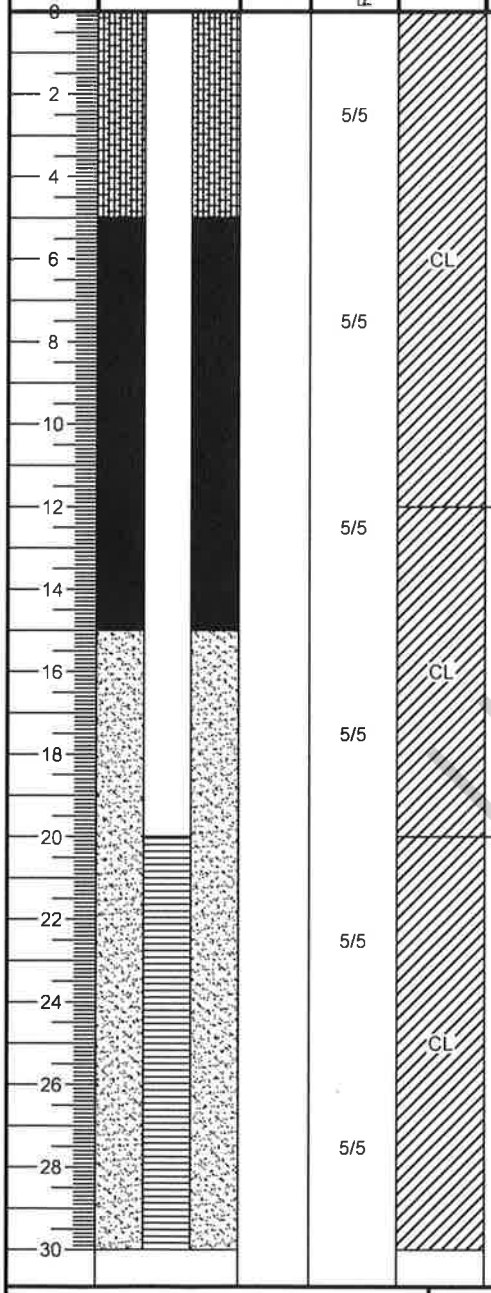
LUMINANT

Log of Boring: BMW-26

A-1 AREA LANDFILL
TATUM, TEXAS

PBW PROJECT No.: 5164-F

Completion Date:	8-31-16	Drilling Method:	HS Auger
Drilling Company:	Walker-Hill Env.	Borehole Diameter (in.):	10.25"
Driller:	Jeremy Thornhill	Total Depth (ft):	30.0'
Driller's License:	NA	Northing:	221187.022
Field Supervisor:	RKS	Easting:	2921306.755
Sampling Method:	5'Macrocore Sampler	Ground Elev. (ft AMSL):	365.958



Lithologic Description

0.0-12.0 - Clay with silt and lignite fragments, dark gray-black, soft, moist, low plasticity

Wet at 4.0'

12.0-20.0 - Silty clay, dark brown, saturated, low plasticity

20.0-30.0 - Silty clay, fine grained, dark brown, saturated, low plasticity

LUMINANT

PBW
Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:

1. All logged material is mine spoil.

Depth (bgs)	Well Materials
0' - 20'	Casing, 4" Sch 40 PVC, FJT
20' - 30'	Screen, 4" Sch 40 PVC, .010 Slot

Depth (bgs)	Annular Materials
0' - 5'	Grout
5' - 15'	Bentonite Pellet Seal
15' - 30'	20/40 Sand

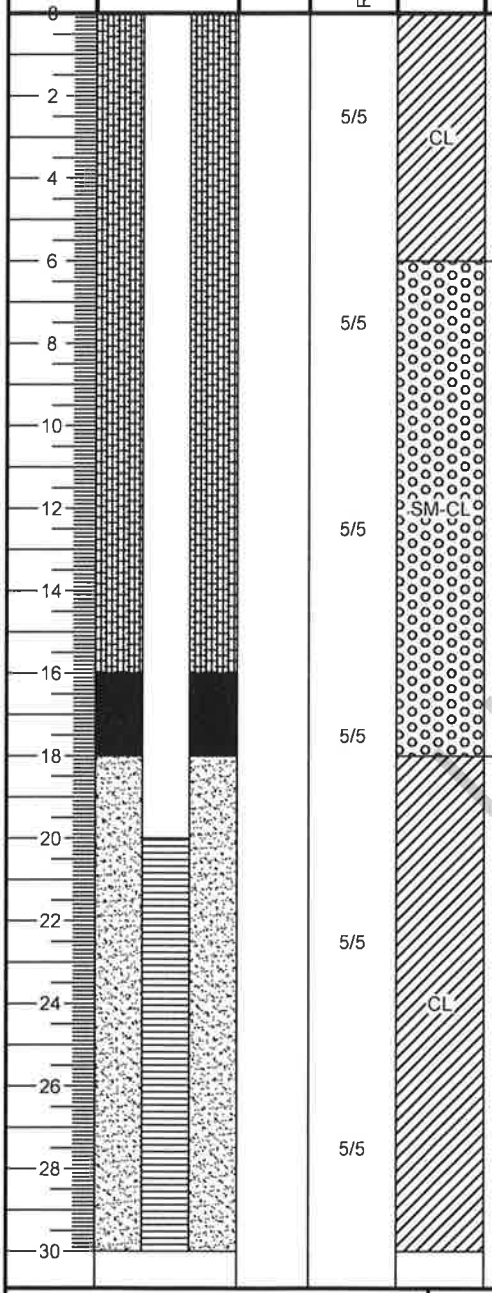
LUMINANT

Log of Boring: BMW-27

A-1 AREA LANDFILL
TATUM, TEXAS

PBW PROJECT No.: 5164-F

Completion Date:	9-1-16	Drilling Method:	HS Auger
Drilling Company:	Walker-Hill Env.	Borehole Diameter (in.):	10.25"
Driller:	Jeremy Thornhill	Total Depth (ft):	30.0'
Driller's License:	NA	Northing:	220024.389
Field Supervisor:	RKS	Easting:	2922347.297
Sampling Method:	5'Macrocore Sampler	Ground Elev. (ft AMSL):	373.463



Lithologic Description

0.0-6.0 - Clay with silt and fine sand, dark gray, soft, moist, low plasticity

Wet at 5.0'

6.0-18.0 - Silty sand with clay, brown, soft, moist

18.0-30.0 - Silty clay with lignite, dark brown-gray, wet, low plasticity

LUMINANT

PBW
Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. All logged material is mine spoil.

Depth (bgs)	Well Materials
0' - 20'	Casing, 4" Sch 40 PVC, FJT
20' - 30'	Screen, 4" Sch 40 PVC, .010 Slot

Depth (bgs)	Annular Materials
0' - 16'	Grout
16' - 18'	Bentonite Pellet Seal
18' - 30'	20/40 Sand

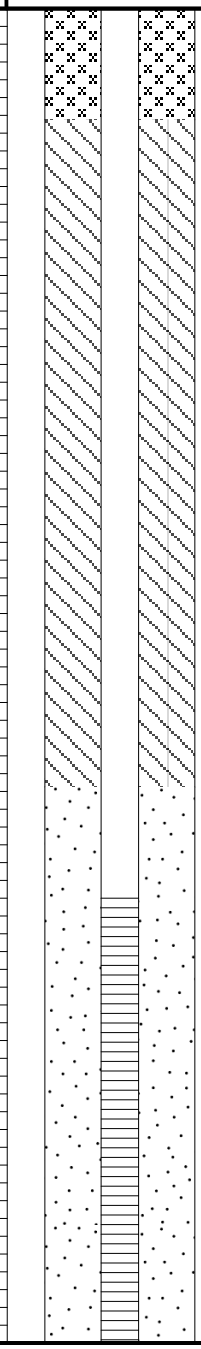
Luminant

Log of Boring: BMW-28

A-1 Area Landfill
Tatum, TX

PBW Project No. 5164F

Completion Date:	10/27/2016	Drilling Method:	HSA
Drilling Company:	ETTL	Borehole Diameter (in.):	10.25
Driller:	Tommy Cook	Total Depth (ft):	60
Driller's License:	2853	TOC Elevation (ft. AMSL):	373.208
Logged By:	Jeremiah Bihl	Northing:	
Sampling Method:	4"x10' Core barrel	Easting:	

Depth (ft)	Well Materials	USCS	Lithologic Description
0 – 14		ML	(0 - 14) Clayey SILT (spoil), black to brown, some pieces of coal, moist, low plasticity.
14 – 30		SM	(14 - 30) SAND with silt and small amounts of clay (spoil), some coal pieces, black, soft, dry, low plasticity.
30 – 60		CL	(30 - 60) CLAY with some silt (spoil), pieces of coal, soft, black to dark gray, dry, low plasticity, possible sandstone/siltstone boulder at 40'.

LUMINANT

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. This log should not be used separately from the report to which it is attached.
2. All logged material is mine spoil.

Well Materials
(0-40) Casing, 2" Sch 40 FJT PVC
(40-60) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-5') Grout
(5'-35') Bentonite pellets
(35'-60') 20/40 sand

Luminant

Log of Boring: BMW-29

Big Brown Steam Electric Station
Franklin, Texas

Golder Project No. 19122434E

Completion Date:	5/31/2019	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6
Driller:	Rodney Labrosse	Total Depth (ft):	40
Driller's License:	60059	TOC Elevation (ft. AMSL):	380.83
Logged By:	Kelsey Worley	Northing:	3565716
Sampling Method:	4"x10' Core barrel	Easting:	355228.3

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Lithologic Description
0				
5		1.8/10.0	NR	(0 - 8.2) No return
10			CH	(8.2 - 10) CLAY, some fine sand present, brown to gray, dry, firm, no plasticity
			NR	(10 - 12.7) No terturn
15		7.3/10.0	CH	(12.7 - 24) CLAY, dark gray, some organic staining, pieces of lignite present, slighlty moist, firm, moderate plasticity, fine to large lignite 21'-23.6'
20				
25		9.6/10.0	CL	(24 - 29.8) Silty CLAY, gray, moist, soft, moderate plasticity, minor sand conent at 28.2', Saturated at 29.8'
30				
35		9.4/10.0	SC	(29.8 - 40) Clayey SAND, fine to very fine sand, gray to brown, sand content decreases with depth, saturated, moist at 34.7, dry at 38.1
40				

LUMINANT

GOLDER
2201 Double Creek Dr., Suite 4004
Round Rock, Texas 78664
O·512.671.3434 F·512.671.3446

Notes:
1. This log should not be used separately from the report to which it is attached.
2. Entire core is composed of mine spoil.

Well Materials
(+3.77 - 30) Casing, 2" Sch 40 FJT PVC
(30 - 40) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-25') Grout
(25'-28') Bentonite pellets
(28'-40') 20/40 sand

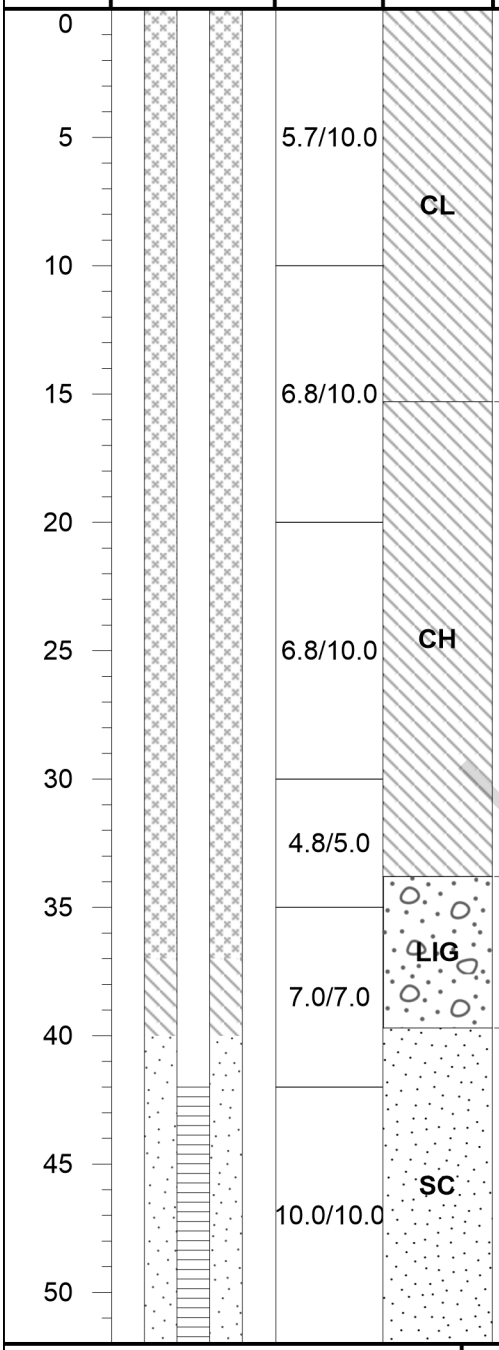
Luminant

Log of Boring: BMW-30

Big Brown Steam Electric Station
Franklin, Texas

Golder Project No. 19122434E

Completion Date:	5/30/2019	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6
Driller:	Rodney Labrosse	Total Depth (ft):	52
Driller's License:	60059	TOC Elevation (ft. AMSL):	363.35
Logged By:	Kelsey Worley	Northing:	3568008
Sampling Method:	4"x10' Core barrel	Easting:	357427.5



Lithologic Description
(0 - 15.3) Sandy CLAY, dark gray, fine sand throughout, pebble to cobble size lignite throughout, trace Fe staining, roots in top 2', 9'-15.3' dark gray with light gray and some trace mottling
(15.3 - 33.8) CLAY, dark gray transition to mix of tan, orange, gray, mottle hard to very hard, moderate to high plastitcity, transition to greenish/ gray at 20', rooting at 25.2'
(33.8 - 39.7) LIGNITE, fine to large cobble size pieces
(39.7 - 52) Clayey SAND, wet at 40' very fine sand in clay, light gray to gray with some black, very tight 42 to 46, wet again below 46'

LUMINANT

GOLDER
2201 Double Creek Dr., Suite 4004
Round Rock, Texas 78664
O·512.671.3434 F·512.671.3446

Notes:
1. This log should not be used separately from the report to which it is attached.
2. Entire core is composed of mine spoil.

Well Materials
(+3 - 42) Casing, 2" Sch 40 FJT PVC
(42 - 52) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-37') Grout
(37'-40') Bentonite pellets
(40'-52') 20/40 sand

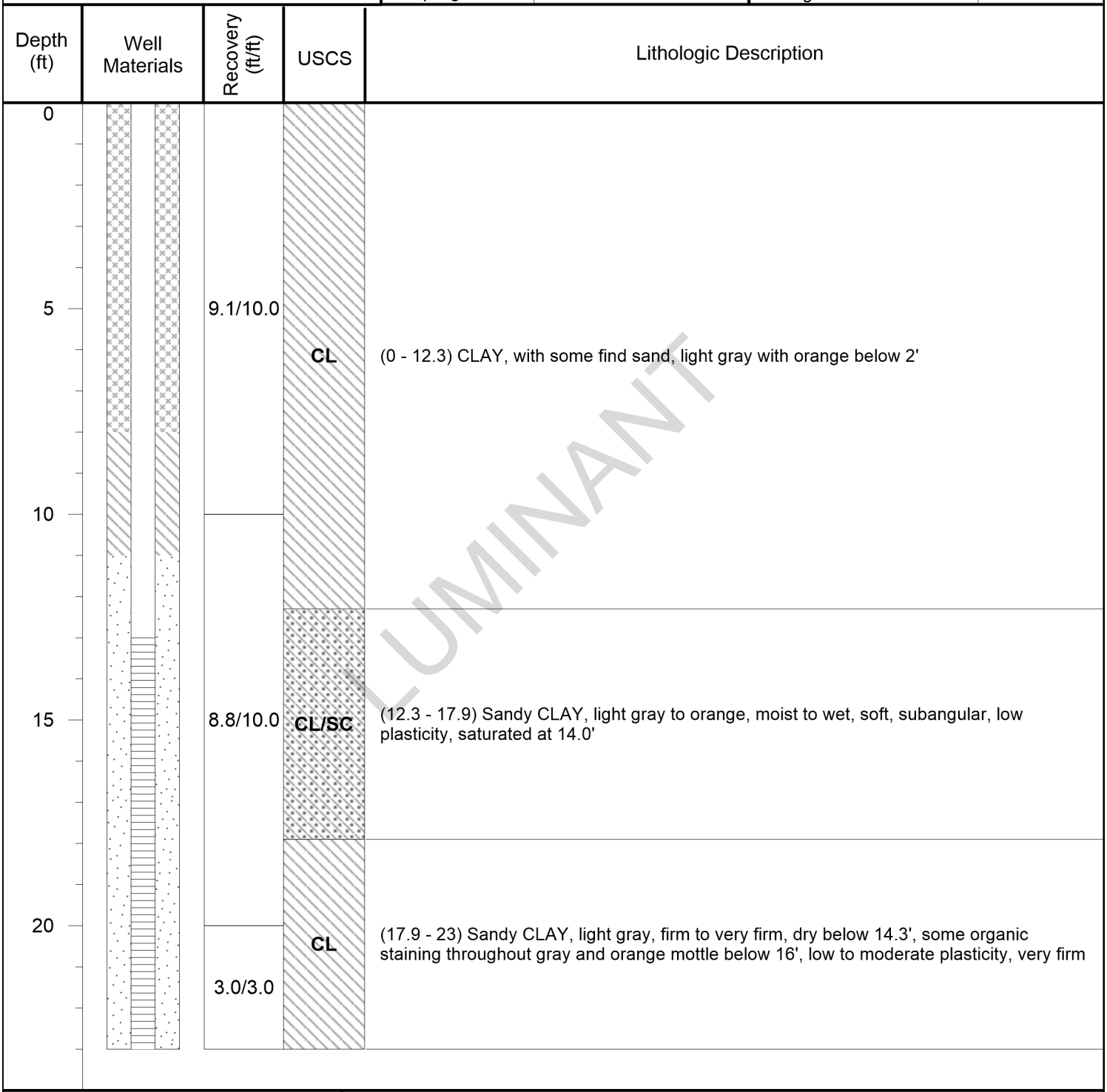
Luminant

Log of Boring: BMW-31

Big Brown Steam Electric Station
Franklin, Texas

Golder Project No. 19122434E

Completion Date:	5/31/2019	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6
Driller:	Rodney Labrosse	Total Depth (ft):	23
Driller's License:	60059	TOC Elevation (ft. AMSL):	324.33
Logged By:	Kelsey Worley	Northing:	3565972
Sampling Method:	4"x10' Core barrel	Easting:	357863.1



LUMINANT

GOLDER
2201 Double Creek Dr., Suite 4004
Round Rock, Texas 78664
O·512.671.3434 F·512.671.3446

Notes:
1. This log should not be used separately from the report to which it is attached.
2. Entire core is composed of mine spoil.

Well Materials
(+3.60 - 13) Casing, 2" Sch 40 FJT PVC
(13'- 23') Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-8') Grout
(8'-11') Bentonite pellets
(11'-23') 20/40 sand

Luminant

Log of Boring: BMW-32

Big Brown Steam Electric Station
Franklin, Texas

Golder Project No. 19122434E

Completion Date:	5/29/2019	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6
Driller:	Rodney Labrosse	Total Depth (ft):	37
Driller's License:	60059	TOC Elevation (ft. AMSL):	344.09
Logged By:	Kelsey Worley	Northing:	3567175
Sampling Method:	4"x10' Core barrel	Easting:	357875

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Lithologic Description
0				
5		6.9/10.0	CL	(0 - 8.9) CLAY fill material, organics and roots on the top foot, mix of tan gray and orange, some iron content, firm, trace sand, black coal pieces mixed in clay below 8.0'
10			CH	(8.9 - 14.7) CLAY, mixture of clay with black staining, and lignite pieces, soft to firm, moist to wet, subangular, moderate to high plasticity
15		6.5/10.0	LIG	(14.7 - 24.5) LIGNITE, fine to large lignite pieces, subangular, wet at 22.5'-23.5' small to fine lignite, hard, black to brown, soft to hard
20				
25		4.4/5.0	CL/CH	(24.5 - 25) CLAY, dark brown, black, dry, very hard, some orange streaks throughout with black staining
30			SC	(25 - 37) Clayey SAND, gray with some oxidation, soft, round, low plasticity, sand is fine to very fine, increasing clay content with depth
35		7.0/7.0		

LUMINANT

GOLDER
2201 Double Creek Dr., Suite 4004
Round Rock, Texas 78664
O·512.671.3434 F·512.671.3446

Notes:
1. This log should not be used separately from the report to which it is attached.
2. Entire core is composed of mine spoil.

Well Materials
(+3 - 27) Casing, 2" Sch 40 FJT PVC
(27 - 37) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-21') Grout
(21'-25') Bentonite pellets
(25'-37') 20/40 sand

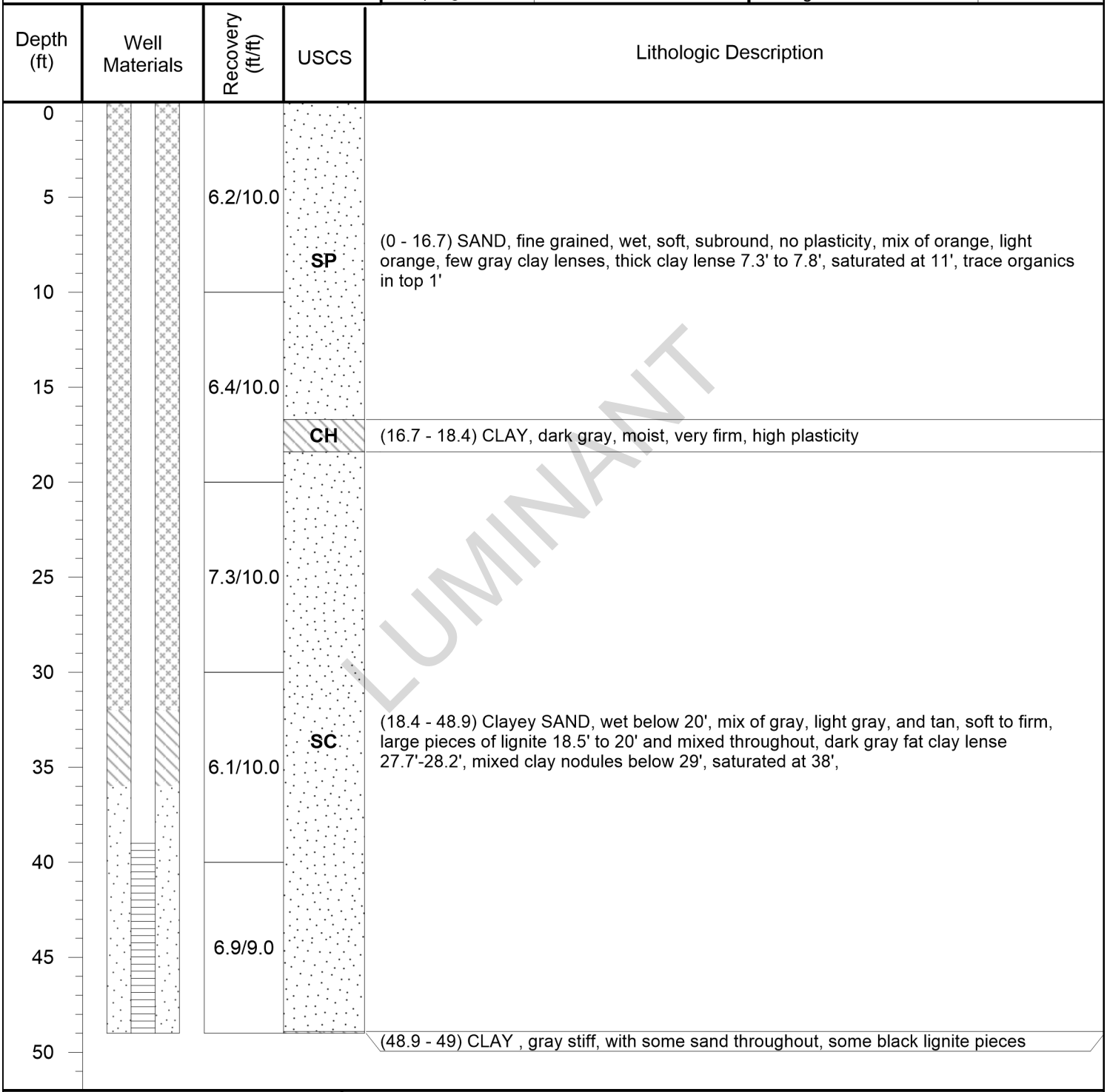
Luminant

Log of Boring: BMW-33

Big Brown Steam Electric Station
Franklin, Texas

Golder Project No. 19122434E

Completion Date:	5/30/2019	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6
Driller:	Rodney Labrosse	Total Depth (ft):	48
Driller's License:	60059	TOC Elevation (ft. AMSL):	427.7
Logged By:	Sergio Ruiz	Northing:	3568008
Sampling Method:	4"x10' Core barrel	Easting:	357427.5



LUMINANT

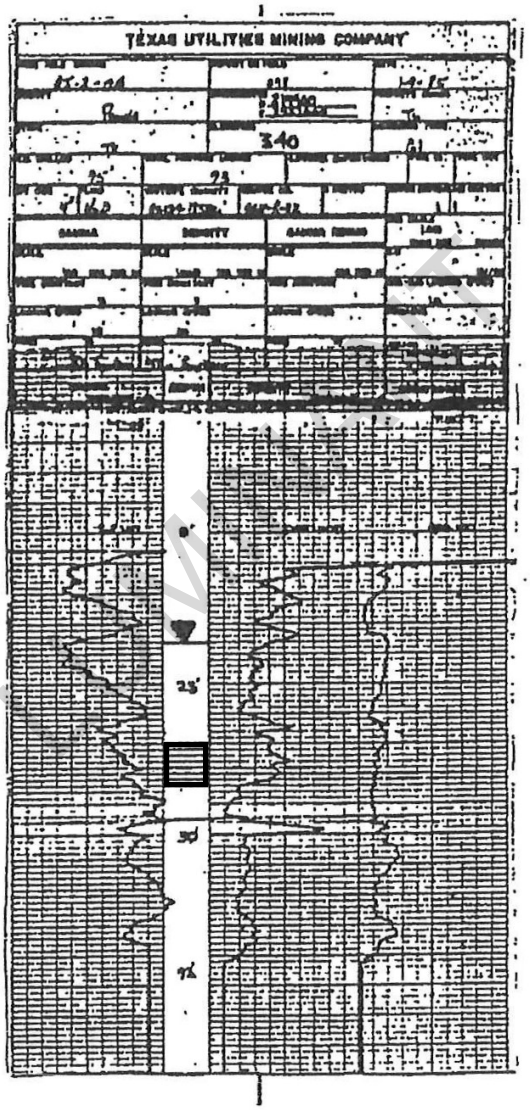
GOLDER
2201 Double Creek Dr., Suite 4004
Round Rock, Texas 78664
O·512.671.3434 F·512.671.3446

Notes:
1. This log should not be used separately from the report to which it is attached.
2. Entire core is composed of mine spoil.

Well Materials
(+3 - 38) Casing, 2" Sch 40 FJT PVC
(38 - 48) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-32') Grout
(32'-36') Bentonite pellets
(36'-48') 20/40 sand

AI-2-OB



APPENDIX B

LABORATORY ANALYTICAL REPORTS

LUMINANT

June 18, 2019

Will Vienne
Golder
2201 Double Creek Dr #4004
Round Rock, Texas 78664
TEL: (512) 671-3434
FAX (512) 671-3446

Order No.: 1905185

RE: Luminant-A1 Landfill

Dear Will Vienne:

DHL Analytical, Inc. received 11 sample(s) on 5/16/2019 for the analyses presented in the following report.

There were no problems with the analyses and all data met requirements of NELAP except where noted in the Case Narrative. All non-NELAP methods will be identified accordingly in the case narrative and all estimated uncertainties of test results are within method or EPA specifications.

If you have any questions regarding these tests results, please feel free to call. Thank you for using DHL Analytical.

Sincerely,

John DuPont
General Manager

LUMINANT

This report was performed under the accreditation of the State of Texas Laboratory Certification Number: T104704211-19-24

Table of Contents

Miscellaneous Documents **3**

CaseNarrative 1905185 ..... **6**

WorkOrderSampleSummary 1905185 ..... **7**

PrepDatesReport 1905185 ..... **8**

AnalyticalDatesReport 1905185 ..... **12**

Analytical Report 1905185 ..... **17**

AnalyticalQCSummaryReport 1905185 ..... **39**

Subcontract Report 1905185 ..... **65**

LUMINANT

DHL ANALYTICAL
2300 Double Creek Dr. ■ Round Rock, TX 78664
Phone (512) 388-8222 ■ FAX (512) 388-8229
Web: www.dhlanalytical.com
E-Mail: login@dhlanalytical.com

№ 82167

CHAIN-OF-CUSTODY

CLIENT: GOLDER
ADDRESS: 2201 DOUBLE CREEK DR, ROUND ROCK, TX 78664
PHONE: 512-671-3434 FAX/E-MAIL: 512-671-3446
DATA REPORTED TO: WILL VIENNE
ADDITIONAL REPORT COPIES TO:

DATE: 5-15-19 PAGE 1 OF 1
PO #: DHL WORK ORDER #: 1905185
PROJECT LOCATION OR NAME: LUMINANT - A1 LANDFILL
CLENT PROJECT #: 19122262-D COLLECTOR: J. BRAYDON

Authorize 5% surcharge for TRRP Report? ☐ Yes ☐ No

S=SOIL P=PAINT
W=WATER SL=SLUDGE
A=AIR O=OTHER
L=LIQUID SO=SOLID
SE=SEDIMENT

Field Sample I.D.	DHL Lab #	Date	Time	Matrix	Container Type	# of Containers	PRESERVATION: HCl	HNO_3	H_2SO_4 ☐ NaOH ☐	ICE	UNPRESERVED	ANALYSES: BTEX ☐ MTBE ☐ [METHOD 8021]	TPH 1005 ☐ TPH 1006 ☐ HOLD 1006 ☐	GRO [METHOD 8015] ☐ DRO [METHOD 8105] ☐	VOC 8260 ☐ VOC 624 ☐ VOC 8260/5035 ☐	SVOC 8270 ☐ PAH 8270 ☐ HOLD PAH ☐ SVOC 625 ☐	8270 PEST ☐ 625 PEST/PCB ☐ 608 PCB ☐	8270 O-P PEST ☐ 8082 PCB ☐ 8270 PCB ☐	8321 HERB ☐ T PHOS, AMMONIA ☐	METALS 6020 ☐ METALS 200.8 ☐ DISS. METALS ☐	RCRA ☐ TX11 ☐ _____ ☐	PH ☐ HEX CHROM ☐ ALKALINITY ☐ COD ☐	CHLORIDE ☐ ANIONS _____ ☐	TCLP-SVOC ☐ VOC ☐ PEST ☐ HERB ☐	TCLP-METALS ☐ RCRA 8 ☐ TX-11 ☐ Pb ☐	RCI ☐ FLASHPOINT ☐ DGAS ☐	TDS ☐ TSS ☐ % MOISTURE ☐ CYANIDE ☐	APPENDIX III & IV NO_3, PO_4, Na, Ms + K	FERROUS AND FERRIC IRON	FIELD NOTES
BMW-24	01	5-15-19	0735	W		7																						X	X	X	
BMW-23	02		0825	W		7																						X	X	X	
BMW-22	03		0915	W		7																						X	X	X	
BMW-21	04		0955	W		7																						X	X	X	
BMW-27	05		1055	W		7																						X	X	X	
BMW-26	06		1140	W		7																						X	X	X	
BMW-11AR	07		1235	W		7																						X	X	X	
BMW-19	08		1325	W		7																						X	X	X	
BMW-18	09		1410	W		7																						X	X	X	
BMW-28	10		1500	W		7																						X	X	X	
BMW-20	11		1600	W		7																						X	X	X	

LUMINANT

RELINQUISHED BY: (Signature) DATE/TIME 5-16-19 9:15 RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature) DATE/TIME 5-16-19 11:21 RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature) DATE/TIME RECEIVED BY: (Signature)

☐ DHL DISPOSAL @ $5.00 each ☐ Return

TURN AROUND TIME
RUSH ☐ CALL FIRST
1 DAY ☐ CALL FIRST
2 DAY ☐
NORMAL ☒
OTHER ☐ _____

LABORATORY USE ONLY:
RECEIVING TEMP: 1.3/0.7/1.0/2.3 THERM #: 73
CUSTODY SEALS: ☐ BROKEN ☐ INTACT ☒ NOT USED
CARRIER: ☐ LONE STAR ☐ FEDEX ☐ UPS ☐ OTHER
☐ COURIER DELIVERY
☐ HAND DELIVERED

DHL COC Rev 1 | FEB 2010

Eric Lau

From: John DuPont
Sent: Tuesday, May 28, 2019 11:35 AM
To: Eric Lau
Subject: FW: CCR Analysis

Appendix III Parameters:
Metals (Ca and B)
Anions (Cl, F, and SO4)
TDS

Appendix IV Parameters:

Metals (As, Ba, Be, Cd, Co, Cr, Hg, Li, Mo, Pb, Sb, Se, and Tl)
Ra-226
Ra-228

From: Vienne, Will [mailto:William_Vienne@golder.com]
Sent: Tuesday, April 09, 2019 12:48 PM
To: John DuPont <dupont@dhlanalytical.com>
Subject: CCR Analysis

LUMINANT

DHL Analytical, Inc.

Sample Receipt Checklist

Client Name Golder | Date Received: 5/16/2019

Work Order Number 1905185 | Received by EL

Checklist completed by: [signature] Signature | 5/16/2019 Date | Reviewed by DS Initials | 5/16/2019 Date

Carrier name Hand Delivered

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shippping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑ EL 5/16/19	No ☑	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	1.3 °C
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH<2 acceptable upon receipt?	Yes ☑	No ☐	NA ☐ LOT # 11837
	Adjusted? No		Checked by EL
Water - ph>9 (S) or ph>10 (CN) acceptable upon receipt?	Yes ☐	No ☐	NA ☑ LOT #
	Adjusted?		Checked by

LUMINANT

Any No response must be detailed in the comments section below.

Client contacted _____ Date contacted: _____ Person contacted _____

Contacted by: _____ Regarding: _____

Comments: One VOA for sample "B/MW-23" broken in Login.

Corrective Action Proceed w/ 2 remaining unbroken VOAs

DHL Analytical, Inc. **Date:** *18-Jun-19*

CLIENT: Golder
Project: Luminant-A1 Landfill
Lab Order: 1905185

CASE NARRATIVE

Samples were analyzed using the methods outlined in the following references:

Method SW6020A - Metals Analysis
Method SW7470A - Mercury Analysis
Method E300 - Anions Analysis
Method M2320 B - Alkalinity Analysis
Method M3500-Fe D - Ferrous Iron Analysis (this parameter is not NELAP certified)
Method M3500-Fe D - Ferric Iron (calculation) (this calculation is not NELAP certified).
Method M4500-P E - Orthophosphate Analysis
Method M2540C - TDS Analysis
Sub-contract - Radium-228 and Radium-226 analyses by methods E904 and SM 7500 Ra B M. Analyzed at Pace Analytical.

LUMINANT

LOG IN

The samples were received and log-in performed on 5/16/19. A total of 11 samples were received. For sample BMW-23 one VOA vial was broken in login. Proceeded with analysis of Ferrous Iron with the remaining two VOA vials. The samples arrived in good condition and were properly packaged.

METALS ANALYSIS

For Metals analysis performed on 5/22/19 the matrix spike and matrix spike duplicate recoveries were out of control limits for three analytes. These are flagged accordingly in the QC summary report. The sample selected for the matrix spike and matrix spike duplicate was from this work order. The LCS was within control limits for these analytes. No further corrective actions were taken.

For Metals analysis performed on 5/22/19 the RPD for the serial dilution was slightly above control limits for Boron. This is flagged accordingly. The PDS was within control limits for this analyte. No further corrective actions were taken.

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT: Golder
Project: Luminant-A1 Landfill
Lab Order: 1905185

Work Order Sample Summary

Lab Smp ID	Client Sample ID	Tag Number	Date Collected	Date Recved
1905185-01	BMW-24		05/15/19 07:35 AM	5/16/2019
1905185-02	BMW-23		05/15/19 08:25 AM	5/16/2019
1905185-03	BMW-22		05/15/19 09:15 AM	5/16/2019
1905185-04	BMW-21		05/15/19 09:55 AM	5/16/2019
1905185-05	BMW-27		05/15/19 10:55 AM	5/16/2019
1905185-06	BMW-26		05/15/19 11:40 AM	5/16/2019
1905185-07	BMW-11AR		05/15/19 12:35 PM	5/16/2019
1905185-08	BMW-19		05/15/19 01:25 PM	5/16/2019
1905185-09	BMW-18		05/15/19 02:10 PM	5/16/2019
1905185-10	BMW-28		05/15/19 03:00 PM	5/16/2019
1905185-11	BMW-20		05/15/19 04:00 PM	5/16/2019

LUMINANT

Lab Order: 1905185
Client: Golder
Project: Luminant-A1 Landfill

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1905185-01A	BMW-24	05/15/19 07:35 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/20/19 02:56 PM	91002
1905185-01B	BMW-24	05/15/19 07:35 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-24	05/15/19 07:35 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-24	05/15/19 07:35 AM	Aqueous	SW7470A	Mercury Aq Prep	05/23/19 09:25 AM	91059
1905185-01C	BMW-24	05/15/19 07:35 AM	Aqueous	M2320 B	Alkalinity Preparation	05/17/19 09:00 AM	90967
	BMW-24	05/15/19 07:35 AM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-24	05/15/19 07:35 AM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-24	05/15/19 07:35 AM	Aqueous	M4500-P E	Orthophosphate Prep	05/16/19 02:09 PM	90950
	BMW-24	05/15/19 07:35 AM	Aqueous	M2540C	TDS Preparation	05/20/19 12:59 PM	91001
1905185-02A	BMW-23	05/15/19 08:25 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/20/19 02:56 PM	91002
1905185-02B	BMW-23	05/15/19 08:25 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-23	05/15/19 08:25 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-23	05/15/19 08:25 AM	Aqueous	SW7470A	Mercury Aq Prep	05/23/19 09:25 AM	91059
1905185-02C	BMW-23	05/15/19 08:25 AM	Aqueous	M2320 B	Alkalinity Preparation	05/17/19 09:00 AM	90967
	BMW-23	05/15/19 08:25 AM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-23	05/15/19 08:25 AM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-23	05/15/19 08:25 AM	Aqueous	M4500-P E	Orthophosphate Prep	05/16/19 02:09 PM	90950
	BMW-23	05/15/19 08:25 AM	Aqueous	M2540C	TDS Preparation	05/20/19 12:59 PM	91001
1905185-03A	BMW-22	05/15/19 09:15 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/20/19 02:56 PM	91002
1905185-03B	BMW-22	05/15/19 09:15 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-22	05/15/19 09:15 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-22	05/15/19 09:15 AM	Aqueous	SW7470A	Mercury Aq Prep	05/23/19 09:25 AM	91059
1905185-03C	BMW-22	05/15/19 09:15 AM	Aqueous	M2320 B	Alkalinity Preparation	05/17/19 09:00 AM	90967
	BMW-22	05/15/19 09:15 AM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-22	05/15/19 09:15 AM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-22	05/15/19 09:15 AM	Aqueous	M4500-P E	Orthophosphate Prep	05/16/19 02:09 PM	90950
	BMW-22	05/15/19 09:15 AM	Aqueous	M2540C	TDS Preparation	05/20/19 12:59 PM	91001
1905185-04A	BMW-21	05/15/19 09:55 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/20/19 02:56 PM	91002

LUMINANT

Lab Order: 1905185
Client: Golder
Project: Luminant-A1 Landfill

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1905185-04B	BMW-21	05/15/19 09:55 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-21	05/15/19 09:55 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-21	05/15/19 09:55 AM	Aqueous	SW7470A	Mercury Aq Prep	05/23/19 09:25 AM	91059
1905185-04C	BMW-21	05/15/19 09:55 AM	Aqueous	M2320 B	Alkalinity Preparation	05/17/19 09:00 AM	90967
	BMW-21	05/15/19 09:55 AM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-21	05/15/19 09:55 AM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-21	05/15/19 09:55 AM	Aqueous	M4500-P E	Orthophosphate Prep	05/16/19 02:09 PM	90950
	BMW-21	05/15/19 09:55 AM	Aqueous	M2540C	TDS Preparation	05/20/19 12:59 PM	91001
1905185-05A	BMW-27	05/15/19 10:55 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/20/19 02:56 PM	91002
1905185-05B	BMW-27	05/15/19 10:55 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-27	05/15/19 10:55 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-27	05/15/19 10:55 AM	Aqueous	SW7470A	Mercury Aq Prep	05/23/19 09:25 AM	91059
1905185-05C	BMW-27	05/15/19 10:55 AM	Aqueous	M2320 B	Alkalinity Preparation	05/17/19 09:00 AM	90967
	BMW-27	05/15/19 10:55 AM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-27	05/15/19 10:55 AM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-27	05/15/19 10:55 AM	Aqueous	M4500-P E	Orthophosphate Prep	05/16/19 02:09 PM	90950
	BMW-27	05/15/19 10:55 AM	Aqueous	M2540C	TDS Preparation	05/20/19 12:59 PM	91001
1905185-06A	BMW-26	05/15/19 11:40 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/20/19 02:56 PM	91002
1905185-06B	BMW-26	05/15/19 11:40 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-26	05/15/19 11:40 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-26	05/15/19 11:40 AM	Aqueous	SW7470A	Mercury Aq Prep	05/23/19 09:25 AM	91059
1905185-06C	BMW-26	05/15/19 11:40 AM	Aqueous	M2320 B	Alkalinity Preparation	05/17/19 09:00 AM	90967
	BMW-26	05/15/19 11:40 AM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-26	05/15/19 11:40 AM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-26	05/15/19 11:40 AM	Aqueous	M4500-P E	Orthophosphate Prep	05/16/19 02:09 PM	90950
	BMW-26	05/15/19 11:40 AM	Aqueous	M2540C	TDS Preparation	05/20/19 12:59 PM	91001
1905185-07A	BMW-11AR	05/15/19 12:35 PM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/20/19 02:56 PM	91002
1905185-07B	BMW-11AR	05/15/19 12:35 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989

LUMINANT

Lab Order: 1905185
Client: Golder
Project: Luminant-A1 Landfill

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1905185-07B	BMW-11AR	05/15/19 12:35 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-11AR	05/15/19 12:35 PM	Aqueous	SW7470A	Mercury Aq Prep	05/23/19 09:25 AM	91059
1905185-07C	BMW-11AR	05/15/19 12:35 PM	Aqueous	M2320 B	Alkalinity Preparation	05/17/19 09:00 AM	90967
	BMW-11AR	05/15/19 12:35 PM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-11AR	05/15/19 12:35 PM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-11AR	05/15/19 12:35 PM	Aqueous	M4500-P E	Orthophosphate Prep	05/16/19 02:09 PM	90950
	BMW-11AR	05/15/19 12:35 PM	Aqueous	M2540C	TDS Preparation	05/20/19 12:59 PM	91001
1905185-08A	BMW-19	05/15/19 01:25 PM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/20/19 02:56 PM	91002
1905185-08B	BMW-19	05/15/19 01:25 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-19	05/15/19 01:25 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-19	05/15/19 01:25 PM	Aqueous	SW7470A	Mercury Aq Prep	05/23/19 09:25 AM	91059
1905185-08C	BMW-19	05/15/19 01:25 PM	Aqueous	M2320 B	Alkalinity Preparation	05/17/19 09:00 AM	90967
	BMW-19	05/15/19 01:25 PM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-19	05/15/19 01:25 PM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-19	05/15/19 01:25 PM	Aqueous	E300	Anion Preparation	05/17/19 09:26 AM	90964
	BMW-19	05/15/19 01:25 PM	Aqueous	M4500-P E	Orthophosphate Prep	05/16/19 02:09 PM	90950
	BMW-19	05/15/19 01:25 PM	Aqueous	M2540C	TDS Preparation	05/20/19 12:59 PM	91001
1905185-09A	BMW-18	05/15/19 02:10 PM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/20/19 02:56 PM	91002
1905185-09B	BMW-18	05/15/19 02:10 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-18	05/15/19 02:10 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-18	05/15/19 02:10 PM	Aqueous	SW7470A	Mercury Aq Prep	05/23/19 09:25 AM	91059
1905185-09C	BMW-18	05/15/19 02:10 PM	Aqueous	M2320 B	Alkalinity Preparation	05/17/19 09:00 AM	90967
	BMW-18	05/15/19 02:10 PM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-18	05/15/19 02:10 PM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-18	05/15/19 02:10 PM	Aqueous	M4500-P E	Orthophosphate Prep	05/16/19 02:09 PM	90950
	BMW-18	05/15/19 02:10 PM	Aqueous	M2540C	TDS Preparation	05/20/19 12:59 PM	91001
1905185-10A	BMW-28	05/15/19 03:00 PM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/20/19 02:56 PM	91002
1905185-10B	BMW-28	05/15/19 03:00 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989

LUMINANT

Lab Order: 1905185
Client: Golder
Project: Luminant-A1 Landfill

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1905185-10B	BMW-28	05/15/19 03:00 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-28	05/15/19 03:00 PM	Aqueous	SW7470A	Mercury Aq Prep	05/23/19 09:25 AM	91059
1905185-10C	BMW-28	05/15/19 03:00 PM	Aqueous	M2320 B	Alkalinity Preparation	05/17/19 09:00 AM	90967
	BMW-28	05/15/19 03:00 PM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-28	05/15/19 03:00 PM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-28	05/15/19 03:00 PM	Aqueous	E300	Anion Preparation	05/17/19 09:26 AM	90964
	BMW-28	05/15/19 03:00 PM	Aqueous	M4500-P E	Orthophosphate Prep	05/16/19 02:09 PM	90950
	BMW-28	05/15/19 03:00 PM	Aqueous	M2540C	TDS Preparation	05/20/19 12:59 PM	91001
1905185-11A	BMW-20	05/15/19 04:00 PM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/20/19 02:56 PM	91002
1905185-11B	BMW-20	05/15/19 04:00 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-20	05/15/19 04:00 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/20/19 09:30 AM	90989
	BMW-20	05/15/19 04:00 PM	Aqueous	SW7470A	Mercury Aq Prep	05/23/19 09:25 AM	91059
1905185-11C	BMW-20	05/15/19 04:00 PM	Aqueous	M2320 B	Alkalinity Preparation	05/17/19 09:00 AM	90967
	BMW-20	05/15/19 04:00 PM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-20	05/15/19 04:00 PM	Aqueous	E300	Anion Preparation	05/16/19 01:49 PM	90934
	BMW-20	05/15/19 04:00 PM	Aqueous	M4500-P E	Orthophosphate Prep	05/16/19 02:09 PM	90950
	BMW-20	05/15/19 04:00 PM	Aqueous	M2540C	TDS Preparation	05/20/19 12:59 PM	91001

LUMINANT

Lab Order: 1905185
Client: Golder
Project: Luminant-A1 Landfill

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1905185-01A	BMW-24	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91002	1	05/24/19	UV/VIS_2_190524A
	BMW-24	Aqueous	M3500-Fe D	Ferrous Iron	91002	1	05/20/19 03:58 PM	UV/VIS_2_190520A
1905185-01B	BMW-24	Aqueous	SW7470A	Mercury Total: Aqueous	91059	1	05/24/19 09:39 AM	CETAC2_HG_190524A
	BMW-24	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	1	05/22/19 02:56 PM	ICP-MS4_190522D
	BMW-24	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	10	05/23/19 11:22 AM	ICP-MS4_190523A
1905185-01C	BMW-24	Aqueous	M2320 B	Alkalinity	90967	1	05/17/19 01:18 PM	TITRATOR_190517A
	BMW-24	Aqueous	E300	Anions by IC method - Water	90934	1	05/16/19 06:01 PM	IC2_190516B
	BMW-24	Aqueous	E300	Anions by IC method - Water	90934	10	05/17/19 01:13 AM	IC2_190516B
	BMW-24	Aqueous	M4500-P E	Orthophosphate	90950	1	05/16/19 02:47 PM	UV/VIS_2_190516B
	BMW-24	Aqueous	M2540C	Total Dissolved Solids	91001	1	05/20/19 04:45 PM	WC_190520A
1905185-02A	BMW-23	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91002	1	05/24/19	UV/VIS_2_190524A
	BMW-23	Aqueous	M3500-Fe D	Ferrous Iron	91002	1	05/20/19 04:00 PM	UV/VIS_2_190520A
1905185-02B	BMW-23	Aqueous	SW7470A	Mercury Total: Aqueous	91059	1	05/24/19 09:42 AM	CETAC2_HG_190524A
	BMW-23	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	1	05/22/19 02:58 PM	ICP-MS4_190522D
	BMW-23	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	20	05/23/19 11:24 AM	ICP-MS4_190523A
1905185-02C	BMW-23	Aqueous	M2320 B	Alkalinity	90967	1	05/17/19 01:36 PM	TITRATOR_190517A
	BMW-23	Aqueous	E300	Anions by IC method - Water	90934	1	05/16/19 06:17 PM	IC2_190516B
	BMW-23	Aqueous	E300	Anions by IC method - Water	90934	10	05/17/19 01:29 AM	IC2_190516B
	BMW-23	Aqueous	M4500-P E	Orthophosphate	90950	1	05/16/19 02:47 PM	UV/VIS_2_190516B
	BMW-23	Aqueous	M2540C	Total Dissolved Solids	91001	1	05/20/19 04:45 PM	WC_190520A
1905185-03A	BMW-22	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91002	1	05/24/19	UV/VIS_2_190524A
	BMW-22	Aqueous	M3500-Fe D	Ferrous Iron	91002	1	05/20/19 04:00 PM	UV/VIS_2_190520A
1905185-03B	BMW-22	Aqueous	SW7470A	Mercury Total: Aqueous	91059	1	05/24/19 09:44 AM	CETAC2_HG_190524A
	BMW-22	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	1	05/22/19 03:00 PM	ICP-MS4_190522D
	BMW-22	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	20	05/23/19 11:26 AM	ICP-MS4_190523A
1905185-03C	BMW-22	Aqueous	M2320 B	Alkalinity	90967	1	05/17/19 02:01 PM	TITRATOR_190517A

LUMINANT

Lab Order: 1905185
Client: Golder
Project: Luminant-A1 Landfill

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1905185-03C	BMW-22	Aqueous	E300	Anions by IC method - Water	90934	10	05/17/19 01:45 AM	IC2_190516B
	BMW-22	Aqueous	E300	Anions by IC method - Water	90934	1	05/16/19 06:33 PM	IC2_190516B
	BMW-22	Aqueous	M4500-P E	Orthophosphate	90950	1	05/16/19 02:48 PM	UV/VIS_2_190516B
	BMW-22	Aqueous	M2540C	Total Dissolved Solids	91001	1	05/20/19 04:45 PM	WC_190520A
1905185-04A	BMW-21	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91002	1	05/24/19	UV/VIS_2_190524A
	BMW-21	Aqueous	M3500-Fe D	Ferrous Iron	91002	1	05/20/19 04:00 PM	UV/VIS_2_190520A
1905185-04B	BMW-21	Aqueous	SW7470A	Mercury Total: Aqueous	91059	1	05/24/19 09:46 AM	CETAC2_HG_190524A
	BMW-21	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	1	05/22/19 03:02 PM	ICP-MS4_190522D
	BMW-21	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	20	05/23/19 11:28 AM	ICP-MS4_190523A
1905185-04C	BMW-21	Aqueous	M2320 B	Alkalinity	90967	1	05/17/19 02:47 PM	TITRATOR_190517A
	BMW-21	Aqueous	E300	Anions by IC method - Water	90934	1	05/16/19 06:49 PM	IC2_190516B
	BMW-21	Aqueous	E300	Anions by IC method - Water	90934	10	05/17/19 02:01 AM	IC2_190516B
	BMW-21	Aqueous	M4500-P E	Orthophosphate	90950	1	05/16/19 02:48 PM	UV/VIS_2_190516B
	BMW-21	Aqueous	M2540C	Total Dissolved Solids	91001	1	05/20/19 04:45 PM	WC_190520A
1905185-05A	BMW-27	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91002	1	05/24/19	UV/VIS_2_190524A
	BMW-27	Aqueous	M3500-Fe D	Ferrous Iron	91002	1	05/20/19 04:01 PM	UV/VIS_2_190520A
1905185-05B	BMW-27	Aqueous	SW7470A	Mercury Total: Aqueous	91059	1	05/24/19 09:48 AM	CETAC2_HG_190524A
	BMW-27	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	20	05/23/19 11:30 AM	ICP-MS4_190523A
	BMW-27	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	1	05/22/19 03:04 PM	ICP-MS4_190522D
1905185-05C	BMW-27	Aqueous	M2320 B	Alkalinity	90967	1	05/17/19 03:13 PM	TITRATOR_190517A
	BMW-27	Aqueous	E300	Anions by IC method - Water	90934	1	05/16/19 07:05 PM	IC2_190516B
	BMW-27	Aqueous	E300	Anions by IC method - Water	90934	10	05/17/19 02:17 AM	IC2_190516B
	BMW-27	Aqueous	M4500-P E	Orthophosphate	90950	1	05/16/19 02:48 PM	UV/VIS_2_190516B
	BMW-27	Aqueous	M2540C	Total Dissolved Solids	91001	1	05/20/19 04:45 PM	WC_190520A
1905185-06A	BMW-26	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91002	1	05/24/19	UV/VIS_2_190524A
	BMW-26	Aqueous	M3500-Fe D	Ferrous Iron	91002	1	05/20/19 04:01 PM	UV/VIS_2_190520A

LUMINANT

Lab Order: 1905185
Client: Golder
Project: Luminant-A1 Landfill

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1905185-06B	BMW-26	Aqueous	SW7470A	Mercury Total: Aqueous	91059	1	05/24/19 09:51 AM	CETAC2_HG_190524A
	BMW-26	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	1	05/22/19 02:52 PM	ICP-MS4_190522D
	BMW-26	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	20	05/23/19 11:18 AM	ICP-MS4_190523A
1905185-06C	BMW-26	Aqueous	M2320 B	Alkalinity	90967	1	05/17/19 03:40 PM	TITRATOR_190517A
	BMW-26	Aqueous	E300	Anions by IC method - Water	90934	10	05/17/19 02:33 AM	IC2_190516B
	BMW-26	Aqueous	E300	Anions by IC method - Water	90934	1	05/16/19 07:21 PM	IC2_190516B
	BMW-26	Aqueous	M4500-P E	Orthophosphate	90950	1	05/16/19 02:49 PM	UV/VIS_2_190516B
	BMW-26	Aqueous	M2540C	Total Dissolved Solids	91001	1	05/20/19 04:45 PM	WC_190520A
1905185-07A	BMW-11AR	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91002	1	05/24/19	UV/VIS_2_190524A
	BMW-11AR	Aqueous	M3500-Fe D	Ferrous Iron	91002	1	05/20/19 04:01 PM	UV/VIS_2_190520A
1905185-07B	BMW-11AR	Aqueous	SW7470A	Mercury Total: Aqueous	91059	1	05/24/19 09:53 AM	CETAC2_HG_190524A
	BMW-11AR	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	1	05/22/19 03:06 PM	ICP-MS4_190522D
	BMW-11AR	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	10	05/23/19 11:32 AM	ICP-MS4_190523A
1905185-07C	BMW-11AR	Aqueous	M2320 B	Alkalinity	90967	1	05/17/19 03:59 PM	TITRATOR_190517A
	BMW-11AR	Aqueous	E300	Anions by IC method - Water	90934	1	05/16/19 07:37 PM	IC2_190516B
	BMW-11AR	Aqueous	E300	Anions by IC method - Water	90934	10	05/17/19 02:49 AM	IC2_190516B
	BMW-11AR	Aqueous	M4500-P E	Orthophosphate	90950	1	05/16/19 02:49 PM	UV/VIS_2_190516B
	BMW-11AR	Aqueous	M2540C	Total Dissolved Solids	91001	1	05/20/19 04:45 PM	WC_190520A
1905185-08A	BMW-19	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91002	1	05/24/19	UV/VIS_2_190524A
	BMW-19	Aqueous	M3500-Fe D	Ferrous Iron	91002	1	05/20/19 04:02 PM	UV/VIS_2_190520A
1905185-08B	BMW-19	Aqueous	SW7470A	Mercury Total: Aqueous	91059	1	05/24/19 09:55 AM	CETAC2_HG_190524A
	BMW-19	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	1	05/22/19 03:07 PM	ICP-MS4_190522D
	BMW-19	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	20	05/23/19 11:34 AM	ICP-MS4_190523A
1905185-08C	BMW-19	Aqueous	M2320 B	Alkalinity	90967	1	05/17/19 04:15 PM	TITRATOR_190517A
	BMW-19	Aqueous	E300	Anions by IC method - Water	90934	1	05/16/19 07:53 PM	IC2_190516B
	BMW-19	Aqueous	E300	Anions by IC method - Water	90934	10	05/17/19 03:05 AM	IC2_190516B

LUMINANT

Lab Order: 1905185
Client: Golder
Project: Luminant-A1 Landfill

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1905185-08C	BMW-19	Aqueous	E300	Anions by IC method - Water	90964	100	05/17/19 04:09 PM	IC2_190517B
	BMW-19	Aqueous	M4500-P E	Orthophosphate	90950	1	05/16/19 02:49 PM	UV/VIS_2_190516B
	BMW-19	Aqueous	M2540C	Total Dissolved Solids	91001	1	05/20/19 04:45 PM	WC_190520A
1905185-09A	BMW-18	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91002	1	05/24/19	UV/VIS_2_190524A
	BMW-18	Aqueous	M3500-Fe D	Ferrous Iron	91002	1	05/20/19 04:02 PM	UV/VIS_2_190520A
1905185-09B	BMW-18	Aqueous	SW7470A	Mercury Total: Aqueous	91059	1	05/24/19 09:58 AM	CETAC2_HG_190524A
	BMW-18	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	20	05/23/19 11:36 AM	ICP-MS4_190523A
	BMW-18	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	1	05/22/19 03:09 PM	ICP-MS4_190522D
1905185-09C	BMW-18	Aqueous	M2320 B	Alkalinity	90967	1	05/17/19 04:24 PM	TITRATOR_190517A
	BMW-18	Aqueous	E300	Anions by IC method - Water	90934	1	05/16/19 08:09 PM	IC2_190516B
	BMW-18	Aqueous	E300	Anions by IC method - Water	90934	10	05/17/19 03:21 AM	IC2_190516B
	BMW-18	Aqueous	M4500-P E	Orthophosphate	90950	1	05/16/19 02:50 PM	UV/VIS_2_190516B
	BMW-18	Aqueous	M2540C	Total Dissolved Solids	91001	1	05/20/19 04:45 PM	WC_190520A
1905185-10A	BMW-28	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91002	1	05/24/19	UV/VIS_2_190524A
	BMW-28	Aqueous	M3500-Fe D	Ferrous Iron	91002	1	05/20/19 04:02 PM	UV/VIS_2_190520A
1905185-10B	BMW-28	Aqueous	SW7470A	Mercury Total: Aqueous	91059	1	05/24/19 10:04 AM	CETAC2_HG_190524A
	BMW-28	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	1	05/22/19 03:11 PM	ICP-MS4_190522D
	BMW-28	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	50	05/23/19 11:38 AM	ICP-MS4_190523A
1905185-10C	BMW-28	Aqueous	M2320 B	Alkalinity	90967	1	05/17/19 04:49 PM	TITRATOR_190517A
	BMW-28	Aqueous	E300	Anions by IC method - Water	90934	1	05/16/19 08:25 PM	IC2_190516B
	BMW-28	Aqueous	E300	Anions by IC method - Water	90934	10	05/17/19 03:37 AM	IC2_190516B
	BMW-28	Aqueous	E300	Anions by IC method - Water	90964	100	05/17/19 04:25 PM	IC2_190517B
	BMW-28	Aqueous	M4500-P E	Orthophosphate	90950	1	05/16/19 02:50 PM	UV/VIS_2_190516B
	BMW-28	Aqueous	M2540C	Total Dissolved Solids	91001	1	05/20/19 04:45 PM	WC_190520A
1905185-11A	BMW-20	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91002	1	05/24/19	UV/VIS_2_190524A
	BMW-20	Aqueous	M3500-Fe D	Ferrous Iron	91002	1	05/20/19 04:02 PM	UV/VIS_2_190520A

LUMINANT

Lab Order: 1905185
Client: Golder
Project: Luminant-A1 Landfill

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1905185-11B	BMW-20	Aqueous	SW7470A	Mercury Total: Aqueous	91059	1	05/24/19 10:07 AM	CETAC2_HG_190524A
	BMW-20	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	1	05/22/19 03:50 PM	ICP-MS4_190522D
	BMW-20	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90989	20	05/23/19 11:53 AM	ICP-MS4_190523A
1905185-11C	BMW-20	Aqueous	M2320 B	Alkalinity	90967	1	05/17/19 05:15 PM	TITRATOR_190517A
	BMW-20	Aqueous	E300	Anions by IC method - Water	90934	1	05/16/19 10:01 PM	IC2_190516B
	BMW-20	Aqueous	E300	Anions by IC method - Water	90934	10	05/17/19 04:57 AM	IC2_190516B
	BMW-20	Aqueous	M4500-P E	Orthophosphate	90950	1	05/16/19 02:52 PM	UV/VIS_2_190516B
	BMW-20	Aqueous	M2540C	Total Dissolved Solids	91001	1	05/20/19 04:45 PM	WC_190520A

LUMINANT

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-24
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-01
Project No:	19122262-D	**Collection Date:**	05/15/19 07:35 AM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **RO**
Antimony	<0.000800	0.000800	0.00250		mg/L	1	05/22/19 02:56 PM
Arsenic	0.00272	0.00200	0.00500	J	mg/L	1	05/22/19 02:56 PM
Barium	0.221	0.00300	0.0100		mg/L	1	05/22/19 02:56 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 02:56 PM
Boron	0.601	0.0100	0.0300		mg/L	1	05/22/19 02:56 PM
Cadmium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 02:56 PM
Calcium	57.9	1.00	3.00		mg/L	10	05/23/19 11:22 AM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 02:56 PM
Cobalt	0.00643	0.00300	0.00500		mg/L	1	05/22/19 02:56 PM
Iron	35.1	0.300	1.00		mg/L	10	05/23/19 11:22 AM
Lead	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 02:56 PM
Lithium	0.0512	0.00500	0.0100		mg/L	1	05/22/19 02:56 PM
Magnesium	57.5	1.00	3.00		mg/L	10	05/23/19 11:22 AM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 02:56 PM
Potassium	3.22	0.100	0.300		mg/L	1	05/22/19 02:56 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 02:56 PM
Sodium	119	1.00	3.00		mg/L	10	05/23/19 11:22 AM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/22/19 02:56 PM
MERCURY TOTAL: AQUEOUS		**SW7470A**					Analyst: **BM**
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/24/19 09:39 AM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	169	3.00	10.0		mg/L	10	05/17/19 01:13 AM
Fluoride	0.219	0.100	0.400	J	mg/L	1	05/16/19 06:01 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	05/16/19 06:01 PM
Sulfate	280	10.0	30.0		mg/L	10	05/17/19 01:13 AM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	176	10.0	20.0		mg/L @ pH 4.53	1	05/17/19 01:18 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.53	1	05/17/19 01:18 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.53	1	05/17/19 01:18 PM
Alkalinity, Total (As CaCO3)	176	20.0	20.0		mg/L @ pH 4.53	1	05/17/19 01:18 PM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	35.1	0.0500	0.100	N	mg/L	1	05/24/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/20/19 03:58 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-24
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-01
Project No:	19122262-D	**Collection Date:**	05/15/19 07:35 AM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **CC**
Phosphorus, Total Orthophosphate (As P)	0.0510	0.0300	0.100	J	mg/L	1	05/16/19 02:47 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	881	10.0	10.0		mg/L	1	05/20/19 04:45 PM

LUMINANT

Qualifiers:	*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
	DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit
	ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
	S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-23
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-02
Project No:	19122262-D	**Collection Date:**	05/15/19 08:25 AM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **RO**
Antimony	<0.000800	0.000800	0.00250		mg/L	1	05/22/19 02:58 PM
Arsenic	0.00240	0.00200	0.00500	J	mg/L	1	05/22/19 02:58 PM
Barium	0.0381	0.00300	0.0100		mg/L	1	05/22/19 02:58 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 02:58 PM
Boron	1.31	0.0100	0.0300		mg/L	1	05/22/19 02:58 PM
Cadmium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 02:58 PM
Calcium	89.9	2.00	6.00		mg/L	20	05/23/19 11:24 AM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 02:58 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	05/22/19 02:58 PM
Iron	9.64	0.0300	0.100		mg/L	1	05/22/19 02:58 PM
Lead	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 02:58 PM
Lithium	0.0951	0.00500	0.0100		mg/L	1	05/22/19 02:58 PM
Magnesium	92.2	2.00	6.00		mg/L	20	05/23/19 11:24 AM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 02:58 PM
Potassium	4.28	0.100	0.300		mg/L	1	05/22/19 02:58 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 02:58 PM
Sodium	311	2.00	6.00		mg/L	20	05/23/19 11:24 AM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/22/19 02:58 PM
MERCURY TOTAL: AQUEOUS		**SW7470A**					Analyst: **BM**
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/24/19 09:42 AM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	240	3.00	10.0		mg/L	10	05/17/19 01:29 AM
Fluoride	<0.100	0.100	0.400		mg/L	1	05/16/19 06:17 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	05/16/19 06:17 PM
Sulfate	613	10.0	30.0		mg/L	10	05/17/19 01:29 AM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	414	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 01:36 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 01:36 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 01:36 PM
Alkalinity, Total (As CaCO3)	414	20.0	20.0		mg/L @ pH 4.54	1	05/17/19 01:36 PM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	9.55	0.0500	0.100	N	mg/L	1	05/24/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	0.0937	0.0500	0.100	JN	mg/L	1	05/20/19 04:00 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-23
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-02
Project No:	19122262-D	**Collection Date:**	05/15/19 08:25 AM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **CC**
Phosphorus, Total Orthophosphate (As P)	0.202	0.0300	0.100		mg/L	1	05/16/19 02:47 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	1640	50.0	50.0		mg/L	1	05/20/19 04:45 PM

LUMINANT

Qualifiers:	*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
	DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit
	ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
	S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-22
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-03
Project No:	19122262-D	**Collection Date:**	05/15/19 09:15 AM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **RO**
Antimony	<0.000800	0.000800	0.00250		mg/L	1	05/22/19 03:00 PM
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:00 PM
Barium	0.0618	0.00300	0.0100		mg/L	1	05/22/19 03:00 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:00 PM
Boron	3.39	0.200	0.600		mg/L	20	05/23/19 11:26 AM
Cadmium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:00 PM
Calcium	198	2.00	6.00		mg/L	20	05/23/19 11:26 AM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:00 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	05/22/19 03:00 PM
Iron	9.99	0.0300	0.100		mg/L	1	05/22/19 03:00 PM
Lead	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:00 PM
Lithium	0.0779	0.00500	0.0100		mg/L	1	05/22/19 03:00 PM
Magnesium	155	2.00	6.00		mg/L	20	05/23/19 11:26 AM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:00 PM
Potassium	6.15	0.100	0.300		mg/L	1	05/22/19 03:00 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:00 PM
Sodium	265	2.00	6.00		mg/L	20	05/23/19 11:26 AM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/22/19 03:00 PM
MERCURY TOTAL: AQUEOUS		**SW7470A**					Analyst: **BM**
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/24/19 09:44 AM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	311	3.00	10.0		mg/L	10	05/17/19 01:45 AM
Fluoride	0.351	0.100	0.400	J	mg/L	1	05/16/19 06:33 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	05/16/19 06:33 PM
Sulfate	967	10.0	30.0		mg/L	10	05/17/19 01:45 AM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	474	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 02:01 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 02:01 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 02:01 PM
Alkalinity, Total (As CaCO3)	474	20.0	20.0		mg/L @ pH 4.54	1	05/17/19 02:01 PM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	9.99	0.0500	0.100	N	mg/L	1	05/24/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/20/19 04:00 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-22
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-03
Project No:	19122262-D	**Collection Date:**	05/15/19 09:15 AM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **CC**
Phosphorus, Total Orthophosphate (As P)	0.0540	0.0300	0.100	J	mg/L	1	05/16/19 02:48 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	2260	50.0	50.0		mg/L	1	05/20/19 04:45 PM

LUMINANT

Qualifiers:	*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
	DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit
	ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
	S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-21
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-04
Project No:	19122262-D	**Collection Date:**	05/15/19 09:55 AM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **RO**
Antimony	<0.000800	0.000800	0.00250		mg/L	1	05/22/19 03:02 PM
Arsenic	0.00399	0.00200	0.00500	J	mg/L	1	05/22/19 03:02 PM
Barium	0.0412	0.00300	0.0100		mg/L	1	05/22/19 03:02 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:02 PM
Boron	0.994	0.0100	0.0300		mg/L	1	05/22/19 03:02 PM
Cadmium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:02 PM
Calcium	147	2.00	6.00		mg/L	20	05/23/19 11:28 AM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:02 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	05/22/19 03:02 PM
Iron	1.02	0.0300	0.100		mg/L	1	05/22/19 03:02 PM
Lead	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:02 PM
Lithium	0.0613	0.00500	0.0100		mg/L	1	05/22/19 03:02 PM
Magnesium	138	2.00	6.00		mg/L	20	05/23/19 11:28 AM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:02 PM
Potassium	5.21	0.100	0.300		mg/L	1	05/22/19 03:02 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:02 PM
Sodium	386	2.00	6.00		mg/L	20	05/23/19 11:28 AM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/22/19 03:02 PM
MERCURY TOTAL: AQUEOUS		**SW7470A**					Analyst: **BM**
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/24/19 09:46 AM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	428	3.00	10.0		mg/L	10	05/17/19 02:01 AM
Fluoride	0.366	0.100	0.400	J	mg/L	1	05/16/19 06:49 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	05/16/19 06:49 PM
Sulfate	474	10.0	30.0		mg/L	10	05/17/19 02:01 AM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	780	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 02:47 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 02:47 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 02:47 PM
Alkalinity, Total (As CaCO3)	780	20.0	20.0		mg/L @ pH 4.54	1	05/17/19 02:47 PM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	1.02	0.0500	0.100	N	mg/L	1	05/24/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/20/19 04:00 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-21
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-04
Project No:	19122262-D	**Collection Date:**	05/15/19 09:55 AM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **CC**
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	05/16/19 02:48 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	1980	50.0	50.0		mg/L	1	05/20/19 04:45 PM

LUMINANT

Qualifiers:	*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
	DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit
	ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
	S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-27
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-05
Project No:	19122262-D	**Collection Date:**	05/15/19 10:55 AM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **RO**
Antimony	<0.000800	0.000800	0.00250		mg/L	1	05/22/19 03:04 PM
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:04 PM
Barium	0.0238	0.00300	0.0100		mg/L	1	05/22/19 03:04 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:04 PM
Boron	0.460	0.0100	0.0300		mg/L	1	05/22/19 03:04 PM
Cadmium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:04 PM
Calcium	190	2.00	6.00		mg/L	20	05/23/19 11:30 AM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:04 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	05/22/19 03:04 PM
Iron	0.0447	0.0300	0.100	J	mg/L	1	05/22/19 03:04 PM
Lead	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:04 PM
Lithium	0.0943	0.00500	0.0100		mg/L	1	05/22/19 03:04 PM
Magnesium	122	2.00	6.00		mg/L	20	05/23/19 11:30 AM
Molybdenum	0.00204	0.00200	0.00500	J	mg/L	1	05/22/19 03:04 PM
Potassium	12.5	0.100	0.300		mg/L	1	05/22/19 03:04 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:04 PM
Sodium	251	2.00	6.00		mg/L	20	05/23/19 11:30 AM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/22/19 03:04 PM
MERCURY TOTAL: AQUEOUS		**SW7470A**					Analyst: **BM**
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/24/19 09:48 AM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	129	3.00	10.0		mg/L	10	05/17/19 02:17 AM
Fluoride	<0.100	0.100	0.400		mg/L	1	05/16/19 07:05 PM
Nitrate-N	0.798	0.100	0.500		mg/L	1	05/16/19 07:05 PM
Sulfate	674	10.0	30.0		mg/L	10	05/17/19 02:17 AM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	783	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 03:13 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 03:13 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 03:13 PM
Alkalinity, Total (As CaCO3)	783	20.0	20.0		mg/L @ pH 4.54	1	05/17/19 03:13 PM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	<0.0500	0.0500	0.100	N	mg/L	1	05/24/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/20/19 04:01 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-27
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-05
Project No:	19122262-D	**Collection Date:**	05/15/19 10:55 AM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **CC**
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	05/16/19 02:48 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	1840	50.0	50.0		mg/L	1	05/20/19 04:45 PM

LUMINANT

Qualifiers:	*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
	DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit
	ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
	S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-26
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-06
Project No:	19122262-D	**Collection Date:**	05/15/19 11:40 AM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **RO**
Antimony	<0.000800	0.000800	0.00250		mg/L	1	05/22/19 02:52 PM
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 02:52 PM
Barium	0.0253	0.00300	0.0100		mg/L	1	05/22/19 02:52 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 02:52 PM
Boron	0.449	0.0100	0.0300		mg/L	1	05/22/19 02:52 PM
Cadmium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 02:52 PM
Calcium	200	2.00	6.00		mg/L	20	05/23/19 11:18 AM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 02:52 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	05/22/19 02:52 PM
Iron	<0.0300	0.0300	0.100		mg/L	1	05/22/19 02:52 PM
Lead	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 02:52 PM
Lithium	0.101	0.00500	0.0100		mg/L	1	05/22/19 02:52 PM
Magnesium	130	2.00	6.00		mg/L	20	05/23/19 11:18 AM
Molybdenum	0.00218	0.00200	0.00500	J	mg/L	1	05/22/19 02:52 PM
Potassium	13.3	0.100	0.300		mg/L	1	05/22/19 02:52 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 02:52 PM
Sodium	265	2.00	6.00		mg/L	20	05/23/19 11:18 AM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/22/19 02:52 PM
MERCURY TOTAL: AQUEOUS		**SW7470A**					Analyst: **BM**
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/24/19 09:51 AM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	135	3.00	10.0		mg/L	10	05/17/19 02:33 AM
Fluoride	<0.100	0.100	0.400		mg/L	1	05/16/19 07:21 PM
Nitrate-N	0.851	0.100	0.500		mg/L	1	05/16/19 07:21 PM
Sulfate	706	10.0	30.0		mg/L	10	05/17/19 02:33 AM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	828	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 03:40 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 03:40 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 03:40 PM
Alkalinity, Total (As CaCO3)	828	20.0	20.0		mg/L @ pH 4.54	1	05/17/19 03:40 PM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	<0.0500	0.0500	0.100	N	mg/L	1	05/24/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/20/19 04:01 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-26
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-06
Project No:	19122262-D	**Collection Date:**	05/15/19 11:40 AM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **CC**
Phosphorus, Total Orthophosphate (As P)	0.0340	0.0300	0.100	J	mg/L	1	05/16/19 02:49 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	1930	50.0	50.0		mg/L	1	05/20/19 04:45 PM

LUMINANT

Qualifiers:	*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
	DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit
	ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
	S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-11AR
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-07
Project No:	19122262-D	**Collection Date:**	05/15/19 12:35 PM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **RO**
Antimony	<0.000800	0.000800	0.00250		mg/L	1	05/22/19 03:06 PM
Arsenic	0.00208	0.00200	0.00500	J	mg/L	1	05/22/19 03:06 PM
Barium	0.0399	0.00300	0.0100		mg/L	1	05/22/19 03:06 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:06 PM
Boron	0.374	0.0100	0.0300		mg/L	1	05/22/19 03:06 PM
Cadmium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:06 PM
Calcium	138	1.00	3.00		mg/L	10	05/23/19 11:32 AM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:06 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	05/22/19 03:06 PM
Iron	1.35	0.0300	0.100		mg/L	1	05/22/19 03:06 PM
Lead	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:06 PM
Lithium	0.0404	0.00500	0.0100		mg/L	1	05/22/19 03:06 PM
Magnesium	64.6	1.00	3.00		mg/L	10	05/23/19 11:32 AM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:06 PM
Potassium	20.3	0.100	0.300		mg/L	1	05/22/19 03:06 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:06 PM
Sodium	90.4	1.00	3.00		mg/L	10	05/23/19 11:32 AM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/22/19 03:06 PM
MERCURY TOTAL: AQUEOUS		**SW7470A**					Analyst: **BM**
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/24/19 09:53 AM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	6.11	0.300	1.00		mg/L	1	05/16/19 07:37 PM
Fluoride	0.198	0.100	0.400	J	mg/L	1	05/16/19 07:37 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	05/16/19 07:37 PM
Sulfate	324	10.0	30.0		mg/L	10	05/17/19 02:49 AM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	527	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 03:59 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 03:59 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 03:59 PM
Alkalinity, Total (As CaCO3)	527	20.0	20.0		mg/L @ pH 4.54	1	05/17/19 03:59 PM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	1.35	0.0500	0.100	N	mg/L	1	05/24/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/20/19 04:01 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-11AR
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-07
Project No:	19122262-D	**Collection Date:**	05/15/19 12:35 PM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **CC**
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	05/16/19 02:49 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	970	10.0	10.0		mg/L	1	05/20/19 04:45 PM

LUMINANT

Qualifiers:	*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
	DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit
	ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
	S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-19
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-08
Project No:	19122262-D	**Collection Date:**	05/15/19 01:25 PM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **RO**
Antimony	<0.000800	0.000800	0.00250		mg/L	1	05/22/19 03:07 PM
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:07 PM
Barium	0.0104	0.00300	0.0100		mg/L	1	05/22/19 03:07 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:07 PM
Boron	0.474	0.0100	0.0300		mg/L	1	05/22/19 03:07 PM
Cadmium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:07 PM
Calcium	388	2.00	6.00		mg/L	20	05/23/19 11:34 AM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:07 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	05/22/19 03:07 PM
Iron	0.750	0.0300	0.100		mg/L	1	05/22/19 03:07 PM
Lead	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:07 PM
Lithium	0.0647	0.00500	0.0100		mg/L	1	05/22/19 03:07 PM
Magnesium	216	2.00	6.00		mg/L	20	05/23/19 11:34 AM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:07 PM
Potassium	11.7	0.100	0.300		mg/L	1	05/22/19 03:07 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:07 PM
Sodium	135	2.00	6.00		mg/L	20	05/23/19 11:34 AM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/22/19 03:07 PM
MERCURY TOTAL: AQUEOUS		**SW7470A**					Analyst: **BM**
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/24/19 09:55 AM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	4.66	0.300	1.00		mg/L	1	05/16/19 07:53 PM
Fluoride	0.189	0.100	0.400	J	mg/L	1	05/16/19 07:53 PM
Nitrate-N	1.35	0.100	0.500		mg/L	1	05/16/19 07:53 PM
Sulfate	1760	100	300		mg/L	100	05/17/19 04:09 PM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	482	10.0	20.0		mg/L @ pH 4.53	1	05/17/19 04:15 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.53	1	05/17/19 04:15 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.53	1	05/17/19 04:15 PM
Alkalinity, Total (As CaCO3)	482	20.0	20.0		mg/L @ pH 4.53	1	05/17/19 04:15 PM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	0.750	0.0500	0.100	N	mg/L	1	05/24/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/20/19 04:02 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-19
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-08
Project No:	19122262-D	**Collection Date:**	05/15/19 01:25 PM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **CC**
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	05/16/19 02:49 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	3090	50.0	50.0		mg/L	1	05/20/19 04:45 PM

LUMINANT

Qualifiers:	*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
	DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit
	ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
	S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-18
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-09
Project No:	19122262-D	**Collection Date:**	05/15/19 02:10 PM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **RO**
Antimony	<0.000800	0.000800	0.00250		mg/L	1	05/22/19 03:09 PM
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:09 PM
Barium	0.0362	0.00300	0.0100		mg/L	1	05/22/19 03:09 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:09 PM
Boron	0.443	0.0100	0.0300		mg/L	1	05/22/19 03:09 PM
Cadmium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:09 PM
Calcium	7.91	0.100	0.300		mg/L	1	05/22/19 03:09 PM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:09 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	05/22/19 03:09 PM
Iron	0.0676	0.0300	0.100	J	mg/L	1	05/22/19 03:09 PM
Lead	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:09 PM
Lithium	0.0160	0.00500	0.0100		mg/L	1	05/22/19 03:09 PM
Magnesium	2.47	0.100	0.300		mg/L	1	05/22/19 03:09 PM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:09 PM
Potassium	2.91	0.100	0.300		mg/L	1	05/22/19 03:09 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:09 PM
Sodium	173	2.00	6.00		mg/L	20	05/23/19 11:36 AM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/22/19 03:09 PM
MERCURY TOTAL: AQUEOUS		**SW7470A**					Analyst: **BM**
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/24/19 09:58 AM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	20.0	0.300	1.00		mg/L	1	05/16/19 08:09 PM
Fluoride	0.229	0.100	0.400	J	mg/L	1	05/16/19 08:09 PM
Nitrate-N	0.324	0.100	0.500	J	mg/L	1	05/16/19 08:09 PM
Sulfate	89.9	1.00	3.00		mg/L	1	05/16/19 08:09 PM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	285	10.0	20.0		mg/L @ pH 4.52	1	05/17/19 04:24 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.52	1	05/17/19 04:24 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.52	1	05/17/19 04:24 PM
Alkalinity, Total (As CaCO3)	285	20.0	20.0		mg/L @ pH 4.52	1	05/17/19 04:24 PM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	0.0676	0.0500	0.100	JN	mg/L	1	05/24/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/20/19 04:02 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-18
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-09
Project No:	19122262-D	**Collection Date:**	05/15/19 02:10 PM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **CC**
Phosphorus, Total Orthophosphate (As P)	0.140	0.0300	0.100		mg/L	1	05/16/19 02:50 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	473	10.0	10.0		mg/L	1	05/20/19 04:45 PM

LUMINANT

Qualifiers:	*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
	DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit
	ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
	S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-28
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-10
Project No:	19122262-D	**Collection Date:**	05/15/19 03:00 PM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **RO**
Antimony	<0.000800	0.000800	0.00250		mg/L	1	05/22/19 03:11 PM
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:11 PM
Barium	0.0285	0.00300	0.0100		mg/L	1	05/22/19 03:11 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:11 PM
Boron	1.01	0.0100	0.0300		mg/L	1	05/22/19 03:11 PM
Cadmium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:11 PM
Calcium	249	5.00	15.0		mg/L	50	05/23/19 11:38 AM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:11 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	05/22/19 03:11 PM
Iron	0.0633	0.0300	0.100	J	mg/L	1	05/22/19 03:11 PM
Lead	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:11 PM
Lithium	0.119	0.00500	0.0100		mg/L	1	05/22/19 03:11 PM
Magnesium	163	5.00	15.0		mg/L	50	05/23/19 11:38 AM
Molybdenum	0.0124	0.00200	0.00500		mg/L	1	05/22/19 03:11 PM
Potassium	18.6	0.100	0.300		mg/L	1	05/22/19 03:11 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:11 PM
Sodium	652	5.00	15.0		mg/L	50	05/23/19 11:38 AM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/22/19 03:11 PM
MERCURY TOTAL: AQUEOUS		**SW7470A**					Analyst: **BM**
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/24/19 10:04 AM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	133	3.00	10.0		mg/L	10	05/17/19 03:37 AM
Fluoride	0.496	0.100	0.400		mg/L	1	05/16/19 08:25 PM
Nitrate-N	0.493	0.100	0.500	J	mg/L	1	05/16/19 08:25 PM
Sulfate	1820	100	300		mg/L	100	05/17/19 04:25 PM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	751	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 04:49 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 04:49 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 04:49 PM
Alkalinity, Total (As CaCO3)	751	20.0	20.0		mg/L @ pH 4.54	1	05/17/19 04:49 PM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	0.0633	0.0500	0.100	JN	mg/L	1	05/24/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/20/19 04:02 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-28
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-10
Project No:	19122262-D	**Collection Date:**	05/15/19 03:00 PM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **CC**
Phosphorus, Total Orthophosphate (As P)	0.0370	0.0300	0.100	J	mg/L	1	05/16/19 02:50 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	3610	50.0	50.0		mg/L	1	05/20/19 04:45 PM

LUMINANT

Qualifiers:	*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
	DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit
	ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
	S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-20
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-11
Project No:	19122262-D	**Collection Date:**	05/15/19 04:00 PM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **RO**
Antimony	<0.000800	0.000800	0.00250		mg/L	1	05/22/19 03:50 PM
Arsenic	0.00541	0.00200	0.00500		mg/L	1	05/22/19 03:50 PM
Barium	0.0412	0.00300	0.0100		mg/L	1	05/22/19 03:50 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:50 PM
Boron	0.979	0.0100	0.0300		mg/L	1	05/22/19 03:50 PM
Cadmium	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:50 PM
Calcium	146	2.00	6.00		mg/L	20	05/23/19 11:53 AM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:50 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	05/22/19 03:50 PM
Iron	1.28	0.0300	0.100		mg/L	1	05/22/19 03:50 PM
Lead	<0.000300	0.000300	0.00100		mg/L	1	05/22/19 03:50 PM
Lithium	0.0615	0.00500	0.0100		mg/L	1	05/22/19 03:50 PM
Magnesium	136	2.00	6.00		mg/L	20	05/23/19 11:53 AM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:50 PM
Potassium	5.21	0.100	0.300		mg/L	1	05/22/19 03:50 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	05/22/19 03:50 PM
Sodium	382	2.00	6.00		mg/L	20	05/23/19 11:53 AM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/22/19 03:50 PM
MERCURY TOTAL: AQUEOUS		**SW7470A**					Analyst: **BM**
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/24/19 10:07 AM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	426	3.00	10.0		mg/L	10	05/17/19 04:57 AM
Fluoride	0.418	0.100	0.400		mg/L	1	05/16/19 10:01 PM
Nitrate-N	0.595	0.100	0.500		mg/L	1	05/16/19 10:01 PM
Sulfate	474	10.0	30.0		mg/L	10	05/17/19 04:57 AM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	773	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 05:15 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 05:15 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	05/17/19 05:15 PM
Alkalinity, Total (As CaCO3)	773	20.0	20.0		mg/L @ pH 4.54	1	05/17/19 05:15 PM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	1.28	0.0500	0.100	N	mg/L	1	05/24/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/20/19 04:02 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *18-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-20
Project:	Luminant-A1 Landfill	**Lab ID:**	1905185-11
Project No:	19122262-D	**Collection Date:**	05/15/19 04:00 PM
Lab Order:	1905185	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **CC**
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	05/16/19 02:52 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	2030	50.0	50.0		mg/L	1	05/20/19 04:45 PM

LUMINANT

Qualifiers:	*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
	DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit
	ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
	S	Spike Recovery outside control limits	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: CETAC2_HG_190524A

The QC data in batch 91059 applies to the following samples: 1905185-01B, 1905185-02B, 1905185-03B, 1905185-04B, 1905185-05B, 1905185-06B, 1905185-07B, 1905185-08B, 1905185-09B, 1905185-10B, 1905185-11B

Sample ID	**MB-91059**	Batch ID:	**91059**	TestNo:	**SW7470A**	Units:	**mg/L**
SampType:	**MBLK**	Run ID:	**CETAC2_HG_190524A**	Analysis Date:	**5/24/2019 9:28:33 AM**	Prep Date:	**5/23/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	<0.0000800	0.000200								

Sample ID	**LCS-91059**	Batch ID:	**91059**	TestNo:	**SW7470A**	Units:	**mg/L**
SampType:	**LCS**	Run ID:	**CETAC2_HG_190524A**	Analysis Date:	**5/24/2019 9:33:05 AM**	Prep Date:	**5/23/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.00187	0.000200	0.00200	0	93.5	85	115			

Sample ID	**LCSD-91059**	Batch ID:	**91059**	TestNo:	**SW7470A**	Units:	**mg/L**
SampType:	**LCSD**	Run ID:	**CETAC2_HG_190524A**	Analysis Date:	**5/24/2019 9:35:22 AM**	Prep Date:	**5/23/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.00195	0.000200	0.00200	0	97.5	85	115	4.19	15	

Sample ID	**1905231-01A MS**	Batch ID:	**91059**	TestNo:	**SW7470A**	Units:	**mg/L**
SampType:	**MS**	Run ID:	**CETAC2_HG_190524A**	Analysis Date:	**5/24/2019 10:20:46 AM**	Prep Date:	**5/23/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.00960	0.00100	0.0100	0	96.0	80	120			

Sample ID	**1905231-01A MSD**	Batch ID:	**91059**	TestNo:	**SW7470A**	Units:	**mg/L**
SampType:	**MSD**	Run ID:	**CETAC2_HG_190524A**	Analysis Date:	**5/24/2019 10:23:02 AM**	Prep Date:	**5/23/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.00925	0.00100	0.0100	0	92.5	80	120	3.71	15	

Sample ID	**1905231-01A SD**	Batch ID:	**91059**	TestNo:	**SW7470A**	Units:	**mg/L**
SampType:	**SD**	Run ID:	**CETAC2_HG_190524A**	Analysis Date:	**5/24/2019 10:25:18 AM**	Prep Date:	**5/23/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	<0.00200	0.00500	0	0				0	10	

Sample ID	**1905231-01A PDS**	Batch ID:	**91059**	TestNo:	**SW7470A**	Units:	**mg/L**
SampType:	**PDS**	Run ID:	**CETAC2_HG_190524A**	Analysis Date:	**5/24/2019 10:27:34 AM**	Prep Date:	**5/23/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0120	0.00100	0.0125	0	95.6	85	115			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: CETAC2_HG_190524A

Sample ID	**ICV-190524**	Batch ID:	**R104261**	TestNo:	**SW7470A**	Units:	**mg/L**
SampType:	**ICV**	Run ID:	**CETAC2_HG_190524A**	Analysis Date:	**5/24/2019 9:24:00 AM**	Prep Date:	

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.00400	0.000200	0.00400	0	100	90	110			

Sample ID	**CCV1-190524**	Batch ID:	**R104261**	TestNo:	**SW7470A**	Units:	**mg/L**
SampType:	**CCV**	Run ID:	**CETAC2_HG_190524A**	Analysis Date:	**5/24/2019 10:00:18 AM**	Prep Date:	

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.00214	0.000200	0.00200	0	107	90	110			

Sample ID	**CCV2-190524**	Batch ID:	**R104261**	TestNo:	**SW7470A**	Units:	**mg/L**
SampType:	**CCV**	Run ID:	**CETAC2_HG_190524A**	Analysis Date:	**5/24/2019 10:36:42 AM**	Prep Date:	

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.00212	0.000200	0.00200	0	106	90	110			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190522D

The QC data in batch 90989 applies to the following samples: 1905185-01B, 1905185-02B, 1905185-03B, 1905185-04B, 1905185-05B, 1905185-06B, 1905185-07B, 1905185-08B, 1905185-09B, 1905185-10B, 1905185-11B

Sample ID **MB-90989** Batch ID: **90989** TestNo: **SW6020A** Units: **mg/L**
SampType: **MBLK** Run ID: **ICP-MS4_190522D** Analysis Date: **5/22/2019 2:44:00 PM** Prep Date: **5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	<0.000800	0.00250								
Arsenic	<0.00200	0.00500								
Barium	<0.00300	0.0100								
Beryllium	<0.000300	0.00100								
Boron	<0.0100	0.0300								
Cadmium	<0.000300	0.00100								
Calcium	<0.100	0.300								
Chromium	<0.00200	0.00500								
Cobalt	<0.00300	0.00500								
Iron	<0.0300	0.100								
Lead	<0.000300	0.00100								
Lithium	<0.00500	0.0100								
Magnesium	<0.100	0.300								
Molybdenum	<0.00200	0.00500								
Potassium	<0.100	0.300								
Selenium	<0.00200	0.00500								
Sodium	<0.100	0.300								
Thallium	<0.000500	0.00150								

Sample ID **LCS-90989** Batch ID: **90989** TestNo: **SW6020A** Units: **mg/L**
SampType: **LCS** Run ID: **ICP-MS4_190522D** Analysis Date: **5/22/2019 2:46:00 PM** Prep Date: **5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.202	0.00250	0.200	0	101	80	120			
Arsenic	0.201	0.00500	0.200	0	100	80	120			
Barium	0.198	0.0100	0.200	0	99.2	80	120			
Beryllium	0.198	0.00100	0.200	0	99.2	80	120			
Boron	0.202	0.0300	0.200	0	101	80	120			
Cadmium	0.199	0.00100	0.200	0	99.6	80	120			
Calcium	4.60	0.300	5.00	0	92.1	80	120			
Chromium	0.200	0.00500	0.200	0	99.8	80	120			
Cobalt	0.202	0.00500	0.200	0	101	80	120			
Iron	5.23	0.100	5.00	0	105	80	120			
Lead	0.184	0.00100	0.200	0	91.9	80	120			
Lithium	0.196	0.0100	0.200	0	98.0	80	120			
Magnesium	5.02	0.300	5.00	0	100	80	120			
Molybdenum	0.190	0.00500	0.200	0	95.1	80	120			
Potassium	5.06	0.300	5.00	0	101	80	120			
Selenium	0.209	0.00500	0.200	0	104	80	120			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190522D

Sample ID	LCS-90989	Batch ID:	90989	TestNo:	SW6020A	Units:	mg/L
SampType:	LCS	Run ID:	ICP-MS4_190522D	Analysis Date:	5/22/2019 2:46:00 PM	Prep Date:	5/20/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	5.02	0.300	5.00	0	100	80	120			
Thallium	0.202	0.00150	0.200	0	101	80	120			

Sample ID	LCSD-90989	Batch ID:	90989	TestNo:	SW6020A	Units:	mg/L
SampType:	LCSD	Run ID:	ICP-MS4_190522D	Analysis Date:	5/22/2019 2:48:00 PM	Prep Date:	5/20/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.201	0.00250	0.200	0	100	80	120	0.333	15	
Arsenic	0.203	0.00500	0.200	0	101	80	120	0.942	15	
Barium	0.199	0.0100	0.200	0	99.3	80	120	0.128	15	
Beryllium	0.198	0.00100	0.200	0	99.1	80	120	0.129	15	
Boron	0.201	0.0300	0.200	0	101	80	120	0.298	15	
Cadmium	0.198	0.00100	0.200	0	99.2	80	120	0.362	15	
Calcium	4.62	0.300	5.00	0	92.4	80	120	0.325	15	
Chromium	0.199	0.00500	0.200	0	99.7	80	120	0.085	15	
Cobalt	0.203	0.00500	0.200	0	102	80	120	0.820	15	
Iron	5.15	0.100	5.00	0	103	80	120	1.50	15	
Lead	0.185	0.00100	0.200	0	92.3	80	120	0.421	15	
Lithium	0.200	0.0100	0.200	0	100	80	120	2.22	15	
Magnesium	5.07	0.300	5.00	0	101	80	120	0.937	15	
Molybdenum	0.190	0.00500	0.200	0	95.0	80	120	0.081	15	
Potassium	5.12	0.300	5.00	0	102	80	120	1.16	15	
Selenium	0.204	0.00500	0.200	0	102	80	120	2.39	15	
Sodium	5.05	0.300	5.00	0	101	80	120	0.519	15	
Thallium	0.199	0.00150	0.200	0	99.3	80	120	1.55	15	

Sample ID	1905185-06B SD	Batch ID:	90989	TestNo:	SW6020A	Units:	mg/L
SampType:	SD	Run ID:	ICP-MS4_190522D	Analysis Date:	5/22/2019 2:54:00 PM	Prep Date:	5/20/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	<0.00400	0.0125	0	0				0	10	
Arsenic	<0.0100	0.0250	0	0				0	10	
Barium	0.0256	0.0500	0	0.0253				1.30	10	
Beryllium	<0.00150	0.00500	0	0				0	10	
Boron	0.501	0.150	0	0.449				10.8	10	R
Cadmium	<0.00150	0.00500	0	0				0	10	
Chromium	<0.0100	0.0250	0	0				0	10	
Cobalt	<0.0150	0.0250	0	0				0	10	
Iron	<0.150	0.500	0	0				0	10	
Lead	<0.00150	0.00500	0	0				0	10	
Lithium	0.109	0.0500	0	0.101				7.40	10	

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

LUMINANT

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190522D

Sample ID **1905185-06B SD** Batch ID: **90989** TestNo: **SW6020A** Units: **mg/L**
SampType: **SD** Run ID: **ICP-MS4_190522D** Analysis Date: **5/22/2019 2:54:00 PM** Prep Date: **5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Molybdenum	<0.0100	0.0250	0	0.00218				0	10	
Potassium	13.4	1.50	0	13.2				1.21	10	
Selenium	<0.0100	0.0250	0	0				0	10	
Thallium	<0.00250	0.00750	0	0				0	10	

Sample ID **1905185-06B PDS** Batch ID: **90989** TestNo: **SW6020A** Units: **mg/L**
SampType: **PDS** Run ID: **ICP-MS4_190522D** Analysis Date: **5/22/2019 3:13:00 PM** Prep Date: **5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.201	0.00250	0.200	0	100	80	120			
Arsenic	0.204	0.00500	0.200	0	102	80	120			
Barium	0.218	0.0100	0.200	0.0253	96.3	80	120			
Beryllium	0.174	0.00100	0.200	0	87.2	80	120			
Boron	0.613	0.0300	0.200	0.449	81.7	80	120			
Cadmium	0.183	0.00100	0.200	0	91.4	80	120			
Chromium	0.188	0.00500	0.200	0	94.2	80	120			
Cobalt	0.193	0.00500	0.200	0	96.4	80	120			
Iron	4.70	0.100	5.00	0	94.1	80	120			
Lead	0.186	0.00100	0.200	0	93.0	80	120			
Lithium	0.265	0.0100	0.200	0.101	81.8	80	120			
Molybdenum	0.186	0.00500	0.200	0.00218	91.9	80	120			
Potassium	17.5	0.300	5.00	13.3	84.0	80	120			
Selenium	0.213	0.00500	0.200	0	106	80	120			
Thallium	0.200	0.00150	0.200	0	100	80	120			

Sample ID **1905185-06B MS** Batch ID: **90989** TestNo: **SW6020A** Units: **mg/L**
SampType: **MS** Run ID: **ICP-MS4_190522D** Analysis Date: **5/22/2019 3:15:00 PM** Prep Date: **5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.202	0.00250	0.200	0	101	80	120			
Arsenic	0.208	0.00500	0.200	0	104	80	120			
Barium	0.226	0.0100	0.200	0.0253	100	80	120			
Beryllium	0.174	0.00100	0.200	0	87.0	80	120			
Boron	0.654	0.0300	0.200	0.449	103	80	120			
Cadmium	0.185	0.00100	0.200	0	92.7	80	120			
Calcium	197	0.300	5.00	194	64.2	80	120			S
Chromium	0.186	0.00500	0.200	0	93.0	80	120			
Cobalt	0.193	0.00500	0.200	0	96.7	80	120			
Iron	4.82	0.100	5.00	0	96.4	80	120			
Lead	0.187	0.00100	0.200	0	93.7	80	120			
Lithium	0.270	0.0100	0.200	0.101	84.2	80	120			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190522D

Sample ID **1905185-06B MS**	Batch ID: **90989**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **MS**	Run ID: **ICP-MS4_190522D**	Analysis Date: **5/22/2019 3:15:00 PM**	Prep Date: **5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	128	0.300	5.00	128	-3.79	80	120			S
Molybdenum	0.195	0.00500	0.200	0.00218	96.2	80	120			
Potassium	18.5	0.300	5.00	13.3	105	80	120			
Selenium	0.214	0.00500	0.200	0	107	80	120			
Sodium	252	0.300	5.00	257	-103	80	120			S
Thallium	0.203	0.00150	0.200	0	101	80	120			

Sample ID **1905185-06B MSD**	Batch ID: **90989**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **MSD**	Run ID: **ICP-MS4_190522D**	Analysis Date: **5/22/2019 3:17:00 PM**	Prep Date: **5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.200	0.00250	0.200	0	100	80	120	0.836	15	
Arsenic	0.208	0.00500	0.200	0	104	80	120	0.067	15	
Barium	0.227	0.0100	0.200	0.0253	101	80	120	0.141	15	
Beryllium	0.174	0.00100	0.200	0	86.8	80	120	0.265	15	
Boron	0.618	0.0300	0.200	0.449	84.6	80	120	5.65	15	
Cadmium	0.184	0.00100	0.200	0	92.1	80	120	0.555	15	
Calcium	195	0.300	5.00	194	16.8	80	120	1.21	15	S
Chromium	0.187	0.00500	0.200	0	93.6	80	120	0.569	15	
Cobalt	0.192	0.00500	0.200	0	95.8	80	120	1.00	15	
Iron	4.73	0.100	5.00	0	94.7	80	120	1.78	15	
Lead	0.190	0.00100	0.200	0	94.8	80	120	1.15	15	
Lithium	0.265	0.0100	0.200	0.101	81.8	80	120	1.82	15	
Magnesium	127	0.300	5.00	128	-17.7	80	120	0.544	15	S
Molybdenum	0.197	0.00500	0.200	0.00218	97.5	80	120	1.33	15	
Potassium	18.3	0.300	5.00	13.3	100	80	120	1.25	15	
Selenium	0.213	0.00500	0.200	0	107	80	120	0.639	15	
Sodium	256	0.300	5.00	257	-34.0	80	120	1.36	15	S
Thallium	0.206	0.00150	0.200	0	103	80	120	1.46	15	

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190522D

Sample ID **ICV-190522** Batch ID: **R104232** TestNo: **SW6020A** Units: **mg/L**
SampType: **ICV** Run ID: **ICP-MS4_190522D** Analysis Date: **5/22/2019 11:38:00 AM** Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.101	0.00250	0.100	0	101	90	110			
Arsenic	0.102	0.00500	0.100	0	102	90	110			
Barium	0.0975	0.0100	0.100	0	97.5	90	110			
Beryllium	0.0986	0.00100	0.100	0	98.6	90	110			
Boron	0.104	0.0300	0.100	0	104	90	110			
Cadmium	0.0995	0.00100	0.100	0	99.5	90	110			
Calcium	2.35	0.300	2.50	0	94.2	90	110			
Chromium	0.104	0.00500	0.100	0	104	90	110			
Cobalt	0.105	0.00500	0.100	0	105	90	110			
Iron	2.57	0.100	2.50	0	103	90	110			
Lead	0.0926	0.00100	0.100	0	92.6	90	110			
Lithium	0.103	0.0100	0.100	0	103	90	110			
Magnesium	2.45	0.300	2.50	0	98.2	90	110			
Molybdenum	0.0911	0.00500	0.100	0	91.1	90	110			
Potassium	2.52	0.300	2.50	0	101	90	110			
Selenium	0.102	0.00500	0.100	0	102	90	110			
Sodium	2.53	0.300	2.50	0	101	90	110			
Thallium	0.0926	0.00150	0.100	0	92.6	90	110			

Sample ID **LCVL-190522** Batch ID: **R104232** TestNo: **SW6020A** Units: **mg/L**
SampType: **LCVL** Run ID: **ICP-MS4_190522D** Analysis Date: **5/22/2019 11:43:00 AM** Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.00190	0.00250	0.00200	0	95.0	70	130			
Arsenic	0.00497	0.00500	0.00500	0	99.4	70	130			
Barium	0.00463	0.0100	0.00500	0	92.6	70	130			
Beryllium	0.00117	0.00100	0.00100	0	117	70	130			
Boron	0.0197	0.0300	0.0200	0	98.5	70	130			
Cadmium	0.000953	0.00100	0.00100	0	95.3	70	130			
Calcium	0.0981	0.300	0.100	0	98.1	70	130			
Chromium	0.00486	0.00500	0.00500	0	97.2	70	130			
Cobalt	0.00493	0.00500	0.00500	0	98.7	70	130			
Iron	0.111	0.100	0.100	0	111	70	130			
Lead	0.000870	0.00100	0.00100	0	87.0	70	130			
Lithium	0.00926	0.0100	0.0100	0	92.6	70	130			
Magnesium	0.0967	0.300	0.100	0	96.7	70	130			
Molybdenum	0.00458	0.00500	0.00500	0	91.5	70	130			
Potassium	0.0964	0.300	0.100	0	96.4	70	130			
Selenium	0.00494	0.00500	0.00500	0	98.8	70	130			
Sodium	0.0966	0.300	0.100	0	96.6	70	130			
Thallium	0.000843	0.00150	0.00100	0	84.3	70	130			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190522D

Sample ID **CCV4-190522** Batch ID: **R104232** TestNo: **SW6020A** Units: **mg/L**
SampType: **CCV** Run ID: **ICP-MS4_190522D** Analysis Date: **5/22/2019 2:34:00 PM** Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.203	0.00250	0.200	0	102	90	110			
Arsenic	0.209	0.00500	0.200	0	104	90	110			
Barium	0.202	0.0100	0.200	0	101	90	110			
Beryllium	0.201	0.00100	0.200	0	100	90	110			
Boron	0.215	0.0300	0.200	0	108	90	110			
Cadmium	0.202	0.00100	0.200	0	101	90	110			
Calcium	4.66	0.300	5.00	0	93.3	90	110			
Chromium	0.203	0.00500	0.200	0	102	90	110			
Cobalt	0.208	0.00500	0.200	0	104	90	110			
Iron	5.05	0.100	5.00	0	101	90	110			
Lead	0.193	0.00100	0.200	0	96.7	90	110			
Lithium	0.195	0.0100	0.200	0	97.5	90	110			
Magnesium	5.05	0.300	5.00	0	101	90	110			
Molybdenum	0.193	0.00500	0.200	0	96.4	90	110			
Potassium	5.13	0.300	5.00	0	103	90	110			
Selenium	0.212	0.00500	0.200	0	106	90	110			
Sodium	5.03	0.300	5.00	0	101	90	110			
Thallium	0.205	0.00150	0.200	0	103	90	110			

Sample ID **LCVL4-190522** Batch ID: **R104232** TestNo: **SW6020A** Units: **mg/L**
SampType: **LCVL** Run ID: **ICP-MS4_190522D** Analysis Date: **5/22/2019 2:40:00 PM** Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.00194	0.00250	0.00200	0	96.9	70	130			
Arsenic	0.00504	0.00500	0.00500	0	101	70	130			
Barium	0.00472	0.0100	0.00500	0	94.5	70	130			
Beryllium	0.00124	0.00100	0.00100	0	124	70	130			
Boron	0.0223	0.0300	0.0200	0	111	70	130			
Cadmium	0.000955	0.00100	0.00100	0	95.5	70	130			
Calcium	0.111	0.300	0.100	0	111	70	130			
Chromium	0.00487	0.00500	0.00500	0	97.4	70	130			
Cobalt	0.00501	0.00500	0.00500	0	100	70	130			
Iron	0.114	0.100	0.100	0	114	70	130			
Lead	0.000846	0.00100	0.00100	0	84.6	70	130			
Lithium	0.00964	0.0100	0.0100	0	96.4	70	130			
Magnesium	0.101	0.300	0.100	0	101	70	130			
Molybdenum	0.00453	0.00500	0.00500	0	90.7	70	130			
Potassium	0.0997	0.300	0.100	0	99.7	70	130			
Selenium	0.00427	0.00500	0.00500	0	85.3	70	130			
Sodium	0.111	0.300	0.100	0	111	70	130			
Thallium	0.000835	0.00150	0.00100	0	83.5	70	130			

LUMINANT

Qualifiers:	B	Analyte detected in the associated Method Blank	DF	Dilution Factor
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit
	ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
	RL	Reporting Limit	S	Spike Recovery outside control limits
	J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190522D

Sample ID **CCV5-190522** Batch ID: **R104232** TestNo: **SW6020A** Units: **mg/L**
SampType: **CCV** Run ID: **ICP-MS4_190522D** Analysis Date: **5/22/2019 3:26:00 PM** Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.205	0.00250	0.200	0	102	90	110			
Arsenic	0.205	0.00500	0.200	0	103	90	110			
Barium	0.200	0.0100	0.200	0	99.8	90	110			
Beryllium	0.200	0.00100	0.200	0	100	90	110			
Boron	0.220	0.0300	0.200	0	110	90	110			
Cadmium	0.202	0.00100	0.200	0	101	90	110			
Calcium	4.68	0.300	5.00	0	93.5	90	110			
Chromium	0.203	0.00500	0.200	0	101	90	110			
Cobalt	0.205	0.00500	0.200	0	102	90	110			
Iron	5.15	0.100	5.00	0	103	90	110			
Lead	0.188	0.00100	0.200	0	93.8	90	110			
Lithium	0.203	0.0100	0.200	0	102	90	110			
Magnesium	5.17	0.300	5.00	0	103	90	110			
Molybdenum	0.195	0.00500	0.200	0	97.3	90	110			
Potassium	5.20	0.300	5.00	0	104	90	110			
Selenium	0.213	0.00500	0.200	0	107	90	110			
Sodium	5.13	0.300	5.00	0	103	90	110			
Thallium	0.201	0.00150	0.200	0	101	90	110			

Sample ID **LCVL5-190522** Batch ID: **R104232** TestNo: **SW6020A** Units: **mg/L**
SampType: **LCVL** Run ID: **ICP-MS4_190522D** Analysis Date: **5/22/2019 3:46:00 PM** Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.00186	0.00250	0.00200	0	93.2	70	130			
Arsenic	0.00475	0.00500	0.00500	0	95.0	70	130			
Barium	0.00461	0.0100	0.00500	0	92.3	70	130			
Beryllium	0.000947	0.00100	0.00100	0	94.7	70	130			
Boron	0.0229	0.0300	0.0200	0	115	70	130			
Cadmium	0.000924	0.00100	0.00100	0	92.4	70	130			
Calcium	0.102	0.300	0.100	0	102	70	130			
Chromium	0.00452	0.00500	0.00500	0	90.4	70	130			
Cobalt	0.00479	0.00500	0.00500	0	95.8	70	130			
Iron	0.106	0.100	0.100	0	106	70	130			
Lead	0.000756	0.00100	0.00100	0	75.6	70	130			
Lithium	0.00948	0.0100	0.0100	0	94.8	70	130			
Magnesium	0.0981	0.300	0.100	0	98.1	70	130			
Molybdenum	0.00455	0.00500	0.00500	0	91.0	70	130			
Potassium	0.0951	0.300	0.100	0	95.1	70	130			
Selenium	0.00474	0.00500	0.00500	0	94.7	70	130			
Sodium	0.126	0.300	0.100	0	126	70	130			
Thallium	0.000763	0.00150	0.00100	0	76.3	70	130			

LUMINANT

Qualifiers:	B	Analyte detected in the associated Method Blank	DF	Dilution Factor	
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit	
	ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits	
	RL	Reporting Limit	S	Spike Recovery outside control limits	
	J	Analyte detected between SDL and RL	N	Parameter not NELAP certified	

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190522D

Sample ID **CCV6-190522**	Batch ID: **R104232**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **CCV**	Run ID: **ICP-MS4_190522D**	Analysis Date: **5/22/2019 4:12:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.208	0.00250	0.200	0	104	90	110			
Arsenic	0.211	0.00500	0.200	0	106	90	110			
Barium	0.208	0.0100	0.200	0	104	90	110			
Beryllium	0.195	0.00100	0.200	0	97.5	90	110			
Boron	0.207	0.0300	0.200	0	104	90	110			
Cadmium	0.202	0.00100	0.200	0	101	90	110			
Chromium	0.202	0.00500	0.200	0	101	90	110			
Cobalt	0.209	0.00500	0.200	0	104	90	110			
Iron	5.12	0.100	5.00	0	102	90	110			
Lead	0.192	0.00100	0.200	0	96.1	90	110			
Lithium	0.197	0.0100	0.200	0	98.7	90	110			
Molybdenum	0.197	0.00500	0.200	0	98.4	90	110			
Potassium	5.17	0.300	5.00	0	103	90	110			
Selenium	0.213	0.00500	0.200	0	107	90	110			
Thallium	0.206	0.00150	0.200	0	103	90	110			

Sample ID **LCVL6-190522**	Batch ID: **R104232**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS4_190522D**	Analysis Date: **5/22/2019 4:22:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.00200	0.00250	0.00200	0	100	70	130			
Arsenic	0.00486	0.00500	0.00500	0	97.1	70	130			
Barium	0.00495	0.0100	0.00500	0	99.0	70	130			
Beryllium	0.000939	0.00100	0.00100	0	93.9	70	130			
Boron	0.0216	0.0300	0.0200	0	108	70	130			
Cadmium	0.00101	0.00100	0.00100	0	101	70	130			
Chromium	0.00486	0.00500	0.00500	0	97.1	70	130			
Cobalt	0.00489	0.00500	0.00500	0	97.8	70	130			
Iron	0.113	0.100	0.100	0	113	70	130			
Lead	0.000805	0.00100	0.00100	0	80.5	70	130			
Lithium	0.00903	0.0100	0.0100	0	90.3	70	130			
Molybdenum	0.00464	0.00500	0.00500	0	92.8	70	130			
Potassium	0.0982	0.300	0.100	0	98.2	70	130			
Selenium	0.00531	0.00500	0.00500	0	106	70	130			
Thallium	0.000807	0.00150	0.00100	0	80.7	70	130			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190523A

The QC data in batch 90989 applies to the following samples: 1905185-01B, 1905185-02B, 1905185-03B, 1905185-04B, 1905185-05B, 1905185-06B, 1905185-07B, 1905185-08B, 1905185-09B, 1905185-10B, 1905185-11B

Sample ID **1905185-06B SD** Batch ID: **90989** TestNo: **SW6020A** Units: **mg/L**
SampType: **SD** Run ID: **ICP-MS4_190523A** Analysis Date: **5/23/2019 11:20:00 AM** Prep Date: **5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	207	30.0	0	200				3.62	10	
Magnesium	134	30.0	0	130				2.71	10	
Sodium	266	30.0	0	265				0.189	10	

Sample ID **1905185-06B PDS** Batch ID: **90989** TestNo: **SW6020A** Units: **mg/L**
SampType: **PDS** Run ID: **ICP-MS4_190523A** Analysis Date: **5/23/2019 11:40:00 AM** Prep Date: **5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	295	6.00	100	200	95.2	80	120			
Magnesium	227	6.00	100	130	96.8	80	120			
Sodium	365	6.00	100	265	99.6	80	120			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190523A

Sample ID **ICV-190523**	Batch ID: **R104240**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **ICV**	Run ID: **ICP-MS4_190523A**	Analysis Date: **5/23/2019 11:01:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.104	0.0300	0.100	0	104	90	110			
Calcium	2.39	0.300	2.50	0	95.8	90	110			
Iron	2.56	0.100	2.50	0	102	90	110			
Magnesium	2.53	0.300	2.50	0	101	90	110			
Sodium	2.56	0.300	2.50	0	102	90	110			

Sample ID **LCVL-190523**	Batch ID: **R104240**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS4_190523A**	Analysis Date: **5/23/2019 11:09:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.0214	0.0300	0.0200	0	107	70	130			
Calcium	0.0901	0.300	0.100	0	90.1	70	130			
Iron	0.105	0.100	0.100	0	105	70	130			
Magnesium	0.0985	0.300	0.100	0	98.5	70	130			
Sodium	0.0949	0.300	0.100	0	94.9	70	130			

Sample ID **CCV1-190523**	Batch ID: **R104240**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **CCV**	Run ID: **ICP-MS4_190523A**	Analysis Date: **5/23/2019 11:42:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.210	0.0300	0.200	0	105	90	110			
Calcium	4.76	0.300	5.00	0	95.2	90	110			
Iron	5.10	0.100	5.00	0	102	90	110			
Magnesium	5.21	0.300	5.00	0	104	90	110			
Sodium	5.14	0.300	5.00	0	103	90	110			

Sample ID **LCVL1-190523**	Batch ID: **R104240**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS4_190523A**	Analysis Date: **5/23/2019 11:48:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.0248	0.0300	0.0200	0	124	70	130			
Calcium	0.0899	0.300	0.100	0	89.9	70	130			
Iron	0.105	0.100	0.100	0	105	70	130			
Magnesium	0.0985	0.300	0.100	0	98.5	70	130			
Sodium	0.0973	0.300	0.100	0	97.3	70	130			

Sample ID **CCV2-190523**	Batch ID: **R104240**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **CCV**	Run ID: **ICP-MS4_190523A**	Analysis Date: **5/23/2019 12:21:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	4.79	0.300	5.00	0	95.7	90	110			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190523A

Sample ID **CCV2-190523**	Batch ID: **R104240**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **CCV**	Run ID: **ICP-MS4_190523A**	Analysis Date: **5/23/2019 12:21:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	5.29	0.300	5.00	0	106	90	110			
Sodium	5.22	0.300	5.00	0	104	90	110			

Sample ID **LCVL2-190523**	Batch ID: **R104240**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS4_190523A**	Analysis Date: **5/23/2019 12:29:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	0.101	0.300	0.100	0	101	70	130			
Magnesium	0.0985	0.300	0.100	0	98.5	70	130			
Sodium	0.0994	0.300	0.100	0	99.4	70	130			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190516B

The QC data in batch 90934 applies to the following samples: 1905185-01C, 1905185-02C, 1905185-03C, 1905185-04C, 1905185-05C, 1905185-06C, 1905185-07C, 1905185-08C, 1905185-09C, 1905185-10C, 1905185-11C

Sample ID	**MB-90934**	Batch ID:	**90934**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MBLK**	Run ID:	**IC2_190516B**	Analysis Date:	**5/16/2019 10:26:41 AM**	Prep Date:	**5/16/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	<0.300	1.00								
Fluoride	<0.100	0.400								
Nitrate-N	<0.100	0.500								
Sulfate	<1.00	3.00								

Sample ID	**LCS-90934**	Batch ID:	**90934**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**LCS**	Run ID:	**IC2_190516B**	Analysis Date:	**5/16/2019 10:42:42 AM**	Prep Date:	**5/16/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.2	1.00	10.00	0	102	90	110			
Fluoride	4.08	0.400	4.000	0	102	90	110			
Nitrate-N	5.10	0.500	5.000	0	102	90	110			
Sulfate	30.6	3.00	30.00	0	102	90	110			

Sample ID	**LCSD-90934**	Batch ID:	**90934**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**LCSD**	Run ID:	**IC2_190516B**	Analysis Date:	**5/16/2019 10:58:41 AM**	Prep Date:	**5/16/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.2	1.00	10.00	0	102	90	110	0.034	20	
Fluoride	4.08	0.400	4.000	0	102	90	110	0.128	20	
Nitrate-N	5.18	0.500	5.000	0	104	90	110	1.47	20	
Sulfate	30.8	3.00	30.00	0	103	90	110	0.343	20	

Sample ID	**1905178-02DMS**	Batch ID:	**90934**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MS**	Run ID:	**IC2_190516B**	Analysis Date:	**5/16/2019 12:59:35 PM**	Prep Date:	**5/16/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	21400	1000	20000	0	107	90	110			
Fluoride	21400	400	20000	0	107	90	110			
Nitrate-N	4620	500	4516	0	102	90	110			
Sulfate	20700	3000	20000	0	103	90	110			

Sample ID	**1905178-02DMSD**	Batch ID:	**90934**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MSD**	Run ID:	**IC2_190516B**	Analysis Date:	**5/16/2019 1:15:35 PM**	Prep Date:	**5/16/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	21000	1000	20000	0	105	90	110	2.04	20	
Fluoride	21000	400	20000	0	105	90	110	1.92	20	
Nitrate-N	4530	500	4516	0	100	90	110	2.06	20	

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190516B

Sample ID	**1905178-02DMSD**	Batch ID:	**90934**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MSD**	Run ID:	**IC2_190516B**	Analysis Date:	**5/16/2019 1:15:35 PM**	Prep Date:	**5/16/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	20200	3000	20000	0	101	90	110	2.16	20	

Sample ID	**1905178-03DMS**	Batch ID:	**90934**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MS**	Run ID:	**IC2_190516B**	Analysis Date:	**5/16/2019 1:47:35 PM**	Prep Date:	**5/16/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	24300	1000	20000	3227	105	90	110			
Fluoride	21100	400	20000	0	106	90	110			
Nitrate-N	4600	500	4516	0	102	90	110			
Sulfate	20400	3000	20000	0	102	90	110			

Sample ID	**1905178-03DMSD**	Batch ID:	**90934**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MSD**	Run ID:	**IC2_190516B**	Analysis Date:	**5/16/2019 2:03:35 PM**	Prep Date:	**5/16/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	24200	1000	20000	3227	105	90	110	0.381	20	
Fluoride	21100	400	20000	0	106	90	110	0.221	20	
Nitrate-N	4550	500	4516	0	101	90	110	1.04	20	
Sulfate	20100	3000	20000	0	101	90	110	1.20	20	

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190516B

Sample ID **ICV-190516**	Batch ID: **R104123**	TestNo: **E300**	Units: **mg/L**
SampType: **ICV**	Run ID: **IC2_190516B**	Analysis Date: **5/16/2019 9:54:41 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	26.3	1.00	25.00	0	105	90	110			
Fluoride	10.5	0.400	10.00	0	105	90	110			
Nitrate-N	13.3	0.500	12.50	0	106	90	110			
Sulfate	78.9	3.00	75.00	0	105	90	110			

Sample ID **CCV1-190516**	Batch ID: **R104123**	TestNo: **E300**	Units: **mg/L**
SampType: **CCV**	Run ID: **IC2_190516B**	Analysis Date: **5/16/2019 5:29:14 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.5	1.00	10.00	0	105	90	110			
Fluoride	4.18	0.400	4.000	0	104	90	110			
Nitrate-N	5.22	0.500	5.000	0	104	90	110			
Sulfate	31.5	3.00	30.00	0	105	90	110			

Sample ID **CCV2-190516**	Batch ID: **R104123**	TestNo: **E300**	Units: **mg/L**
SampType: **CCV**	Run ID: **IC2_190516B**	Analysis Date: **5/16/2019 9:29:14 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.5	1.00	10.00	0	105	90	110			
Fluoride	4.18	0.400	4.000	0	105	90	110			
Nitrate-N	5.22	0.500	5.000	0	104	90	110			
Sulfate	31.9	3.00	30.00	0	106	90	110			

Sample ID **CCV3-190516**	Batch ID: **R104123**	TestNo: **E300**	Units: **mg/L**
SampType: **CCV**	Run ID: **IC2_190516B**	Analysis Date: **5/17/2019 12:41:14 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.8	1.00	10.00	0	108	90	110			
Fluoride	4.24	0.400	4.000	0	106	90	110			
Nitrate-N	5.27	0.500	5.000	0	105	90	110			
Sulfate	31.9	3.00	30.00	0	106	90	110			

Sample ID **CCV4-190516**	Batch ID: **R104123**	TestNo: **E300**	Units: **mg/L**
SampType: **CCV**	Run ID: **IC2_190516B**	Analysis Date: **5/17/2019 4:25:14 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.6	1.00	10.00	0	106	90	110			
Sulfate	31.6	3.00	30.00	0	105	90	110			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190516B

Sample ID **CCV5-190516**	Batch ID: **R104123**	TestNo: **E300**	Units: **mg/L**
SampType: **CCV**	Run ID: **IC2_190516B**	Analysis Date: **5/17/2019 6:49:14 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.6	1.00	10.00	0	106	90	110			
Sulfate	31.8	3.00	30.00	0	106	90	110			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190517B

The QC data in batch 90964 applies to the following samples: 1905185-08C, 1905185-10C

Sample ID	**MB-90964**	Batch ID:	**90964**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MBLK**	Run ID:	**IC2_190517B**	Analysis Date:	**5/17/2019 10:29:03 AM**	Prep Date:	**5/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	<1.00	3.00								

Sample ID	**LCS-90964**	Batch ID:	**90964**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**LCS**	Run ID:	**IC2_190517B**	Analysis Date:	**5/17/2019 10:45:03 AM**	Prep Date:	**5/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	31.5	3.00	30.00	0	105	90	110			

Sample ID	**LCSD-90964**	Batch ID:	**90964**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**LCSD**	Run ID:	**IC2_190517B**	Analysis Date:	**5/17/2019 11:01:03 AM**	Prep Date:	**5/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	31.6	3.00	30.00	0	105	90	110	0.320	20	

Sample ID	**1905169-06BMS**	Batch ID:	**90964**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MS**	Run ID:	**IC2_190517B**	Analysis Date:	**5/17/2019 3:37:12 PM**	Prep Date:	**5/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	388	30.0	200.0	177.5	105	90	110			

Sample ID	**1905169-06BMSD**	Batch ID:	**90964**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MSD**	Run ID:	**IC2_190517B**	Analysis Date:	**5/17/2019 3:53:11 PM**	Prep Date:	**5/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	394	30.0	200.0	177.5	108	90	110	1.58	20	

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190517B

Sample ID **ICV-190517**	Batch ID: **R104148**	TestNo: **E300**	Units: **mg/L**
SampType: **ICV**	Run ID: **IC2_190517B**	Analysis Date: **5/17/2019 9:57:03 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	80.5	3.00	75.00	0	107	90	110			

Sample ID **CCV1-190517**	Batch ID: **R104148**	TestNo: **E300**	Units: **mg/L**
SampType: **CCV**	Run ID: **IC2_190517B**	Analysis Date: **5/17/2019 7:21:11 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	31.9	3.00	30.00	0	106	90	110			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: TITRATOR_190517A

The QC data in batch 90967 applies to the following samples: 1905185-01C, 1905185-02C, 1905185-03C, 1905185-04C, 1905185-05C, 1905185-06C, 1905185-07C, 1905185-08C, 1905185-09C, 1905185-10C, 1905185-11C

Sample ID **MB-90967** Batch ID: **90967** TestNo: **M2320 B** Units: **mg/L @ pH 4.18**
SampType: **MBLK** Run ID: **TITRATOR_190517A** Analysis Date: **5/17/2019 10:37:00 AM** Prep Date: **5/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	<10.0	20.0								
Alkalinity, Carbonate (As CaCO3)	<10.0	20.0								
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0								
Alkalinity, Total (As CaCO3)	<20.0	20.0								

Sample ID **LCS-90967** Batch ID: **90967** TestNo: **M2320 B** Units: **mg/L @ pH 4.07**
SampType: **LCS** Run ID: **TITRATOR_190517A** Analysis Date: **5/17/2019 10:42:00 AM** Prep Date: **5/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	52.8	20.0	50.00	0	106	74	129			

Sample ID **LCSD-90967** Batch ID: **90967** TestNo: **M2320 B** Units: **mg/L @ pH 4.09**
SampType: **LCSD** Run ID: **TITRATOR_190517A** Analysis Date: **5/17/2019 11:23:00 AM** Prep Date: **5/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	52.7	20.0	50.00	0	105	74	129	0.152	20	

Sample ID **1905178-02D DUP** Batch ID: **90967** TestNo: **M2320 B** Units: **mg/L @ pH 4.53**
SampType: **DUP** Run ID: **TITRATOR_190517A** Analysis Date: **5/17/2019 12:39:00 PM** Prep Date: **5/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	460	20.0	0	469.5				2.04	20	
Alkalinity, Carbonate (As CaCO3)	<10.0	20.0	0	0				0	20	
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0	0				0	20	
Alkalinity, Total (As CaCO3)	460	20.0	0	469.5				2.04	20	

Sample ID **1905185-03C DUP** Batch ID: **90967** TestNo: **M2320 B** Units: **mg/L @ pH 4.54**
SampType: **DUP** Run ID: **TITRATOR_190517A** Analysis Date: **5/17/2019 2:20:00 PM** Prep Date: **5/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	469	20.0	0	473.7				1.06	20	
Alkalinity, Carbonate (As CaCO3)	<10.0	20.0	0	0				0	20	
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0	0				0	20	
Alkalinity, Total (As CaCO3)	469	20.0	0	473.7				1.06	20	

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: TITRATOR_190517A

Sample ID **ICV-190517**	Batch ID: **R104143**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.21**
SampType: **ICV**	Run ID: **TITRATOR_190517A**	Analysis Date: **5/17/2019 10:16:00 AM**	Prep Date: **5/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	10.2	20.0	0							
Alkalinity, Carbonate (As CaCO3)	88.2	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0							
Alkalinity, Total (As CaCO3)	98.3	20.0	100.0	0	98.3	98	102			

Sample ID **CCV1-190517**	Batch ID: **R104143**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.25**
SampType: **CCV**	Run ID: **TITRATOR_190517A**	Analysis Date: **5/17/2019 1:41:00 PM**	Prep Date: **5/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	25.5	20.0	0							
Alkalinity, Carbonate (As CaCO3)	73.1	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0							
Alkalinity, Total (As CaCO3)	98.6	20.0	100.0	0	98.6	90	110			

Sample ID **CCV2-190517**	Batch ID: **R104143**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.22**
SampType: **CCV**	Run ID: **TITRATOR_190517A**	Analysis Date: **5/17/2019 5:20:00 PM**	Prep Date: **5/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	14.9	20.0	0							
Alkalinity, Carbonate (As CaCO3)	84.2	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0							
Alkalinity, Total (As CaCO3)	99.0	20.0	100.0	0	99.0	90	110			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190516B

The QC data in batch 90950 applies to the following samples: 1905185-01C, 1905185-02C, 1905185-03C, 1905185-04C, 1905185-05C, 1905185-06C, 1905185-07C, 1905185-08C, 1905185-09C, 1905185-10C, 1905185-11C

Sample ID	**MB-90950**	Batch ID:	**90950**	TestNo:	**M4500-P E**	Units:	**mg/L**
SampType:	**MBLK**	Run ID:	**UV/VIS_2_190516B**	Analysis Date:	**5/16/2019 2:45:00 PM**	Prep Date:	**5/16/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	<0.0300	0.100								

Sample ID	**LCS-90950**	Batch ID:	**90950**	TestNo:	**M4500-P E**	Units:	**mg/L**
SampType:	**LCS**	Run ID:	**UV/VIS_2_190516B**	Analysis Date:	**5/16/2019 2:45:00 PM**	Prep Date:	**5/16/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.523	0.100	0.5000	0	105	80	120			

Sample ID	**LCSD-90950**	Batch ID:	**90950**	TestNo:	**M4500-P E**	Units:	**mg/L**
SampType:	**LCSD**	Run ID:	**UV/VIS_2_190516B**	Analysis Date:	**5/16/2019 2:46:00 PM**	Prep Date:	**5/16/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.496	0.100	0.5000	0	99.2	80	120	5.30	15	

Sample ID	**1905185-01CMS**	Batch ID:	**90950**	TestNo:	**M4500-P E**	Units:	**mg/L**
SampType:	**MS**	Run ID:	**UV/VIS_2_190516B**	Analysis Date:	**5/16/2019 2:46:00 PM**	Prep Date:	**5/16/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.647	0.100	0.5000	0.05100	119	80	120			

Sample ID	**1905185-01CMSD**	Batch ID:	**90950**	TestNo:	**M4500-P E**	Units:	**mg/L**
SampType:	**MSD**	Run ID:	**UV/VIS_2_190516B**	Analysis Date:	**5/16/2019 2:47:00 PM**	Prep Date:	**5/16/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.614	0.100	0.5000	0.05100	113	80	120	5.23	15	

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190516B

Sample ID **ICV-190516**	Batch ID: **R104109**	TestNo: **M4500-P E**	Units: **mg/L**
SampType: **ICV**	Run ID: **UV/VIS_2_190516B**	Analysis Date: **5/16/2019 2:44:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.204	0.100	0.2000	0	102	85	115			

Sample ID **CCV1-190516**	Batch ID: **R104109**	TestNo: **M4500-P E**	Units: **mg/L**
SampType: **CCV**	Run ID: **UV/VIS_2_190516B**	Analysis Date: **5/16/2019 2:51:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.510	0.100	0.5000	0	102	85	115			

Sample ID **CCV2-190516**	Batch ID: **R104109**	TestNo: **M4500-P E**	Units: **mg/L**
SampType: **CCV**	Run ID: **UV/VIS_2_190516B**	Analysis Date: **5/16/2019 2:53:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.485	0.100	0.5000	0	97.0	85	115			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190520A

The QC data in batch 91002 applies to the following samples: 1905185-01A, 1905185-02A, 1905185-03A, 1905185-04A, 1905185-05A, 1905185-06A, 1905185-07A, 1905185-08A, 1905185-09A, 1905185-10A, 1905185-11A

Sample ID	**MB-91002**	Batch ID:	**91002**	TestNo:	**M3500-Fe D**	Units:	**mg/L**
SampType:	**MBLK**	Run ID:	**UV/VIS_2_190520A**	Analysis Date:	**5/20/2019 3:53:00 PM**	Prep Date:	**5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	<0.0500	0.100								N

Sample ID	**LCS-91002**	Batch ID:	**91002**	TestNo:	**M3500-Fe D**	Units:	**mg/L**
SampType:	**LCS**	Run ID:	**UV/VIS_2_190520A**	Analysis Date:	**5/20/2019 3:53:00 PM**	Prep Date:	**5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.0888	0.100	0.1000	0	88.8	85	115			N

Sample ID	**LCSD-91002**	Batch ID:	**91002**	TestNo:	**M3500-Fe D**	Units:	**mg/L**
SampType:	**LCSD**	Run ID:	**UV/VIS_2_190520A**	Analysis Date:	**5/20/2019 3:53:00 PM**	Prep Date:	**5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.0879	0.100	0.1000	0	87.9	85	115	1.05	15	N

Sample ID	**1905185-11AMS**	Batch ID:	**91002**	TestNo:	**M3500-Fe D**	Units:	**mg/L**
SampType:	**MS**	Run ID:	**UV/VIS_2_190520A**	Analysis Date:	**5/20/2019 4:03:00 PM**	Prep Date:	**5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.0860	0.100	0.1000	0	86.0	85	115			N

Sample ID	**1905185-11AMSD**	Batch ID:	**91002**	TestNo:	**M3500-Fe D**	Units:	**mg/L**
SampType:	**MSD**	Run ID:	**UV/VIS_2_190520A**	Analysis Date:	**5/20/2019 4:03:00 PM**	Prep Date:	**5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.0861	0.100	0.1000	0	86.1	85	115	0.116	15	N

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190520A

Sample ID **ICV-190520**	Batch ID: **R104177**	TestNo: **M3500-Fe D**	Units: **mg/L**
SampType: **ICV**	Run ID: **UV/VIS_2_190520A**	Analysis Date: **5/20/2019 3:52:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.0875	0.100	0.1000	0	87.5	85	115			N

Sample ID **CCV1-190520**	Batch ID: **R104177**	TestNo: **M3500-Fe D**	Units: **mg/L**
SampType: **CCV**	Run ID: **UV/VIS_2_190520A**	Analysis Date: **5/20/2019 3:59:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.197	0.100	0.2000	0	98.4	85	115			N

Sample ID **CCV2-190520**	Batch ID: **R104177**	TestNo: **M3500-Fe D**	Units: **mg/L**
SampType: **CCV**	Run ID: **UV/VIS_2_190520A**	Analysis Date: **5/20/2019 4:12:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.183	0.100	0.2000	0	91.7	85	115			N

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905185
Project: Luminant-A1 Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: WC_190520A

The QC data in batch 91001 applies to the following samples: 1905185-01C, 1905185-02C, 1905185-03C, 1905185-04C, 1905185-05C, 1905185-06C, 1905185-07C, 1905185-08C, 1905185-09C, 1905185-10C, 1905185-11C

Sample ID	**MB-91001**	Batch ID:	**91001**	TestNo:	**M2540C**	Units:	**mg/L**
SampType:	**MBLK**	Run ID:	**WC_190520A**	Analysis Date:	**5/20/2019 4:45:00 PM**	Prep Date:	**5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	<10.0	10.0								

Sample ID	**LCS-91001**	Batch ID:	**91001**	TestNo:	**M2540C**	Units:	**mg/L**
SampType:	**LCS**	Run ID:	**WC_190520A**	Analysis Date:	**5/20/2019 4:45:00 PM**	Prep Date:	**5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	751	10.0	745.6	0	101	90	113			

Sample ID	**1905182-01D-DUP**	Batch ID:	**91001**	TestNo:	**M2540C**	Units:	**mg/L**
SampType:	**DUP**	Run ID:	**WC_190520A**	Analysis Date:	**5/20/2019 4:45:00 PM**	Prep Date:	**5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	6840	200	0	6820				0.293	5	

Sample ID	**1905182-02D-DUP**	Batch ID:	**91001**	TestNo:	**M2540C**	Units:	**mg/L**
SampType:	**DUP**	Run ID:	**WC_190520A**	Analysis Date:	**5/20/2019 4:45:00 PM**	Prep Date:	**5/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	5030	50.0	0	5065				0.693	5	

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

June 18, 2019

DHL Analytical, Inc.

Sample Delivery Group:	L1100977
Samples Received:	05/21/2019
Project Number:	1905185
Description:	

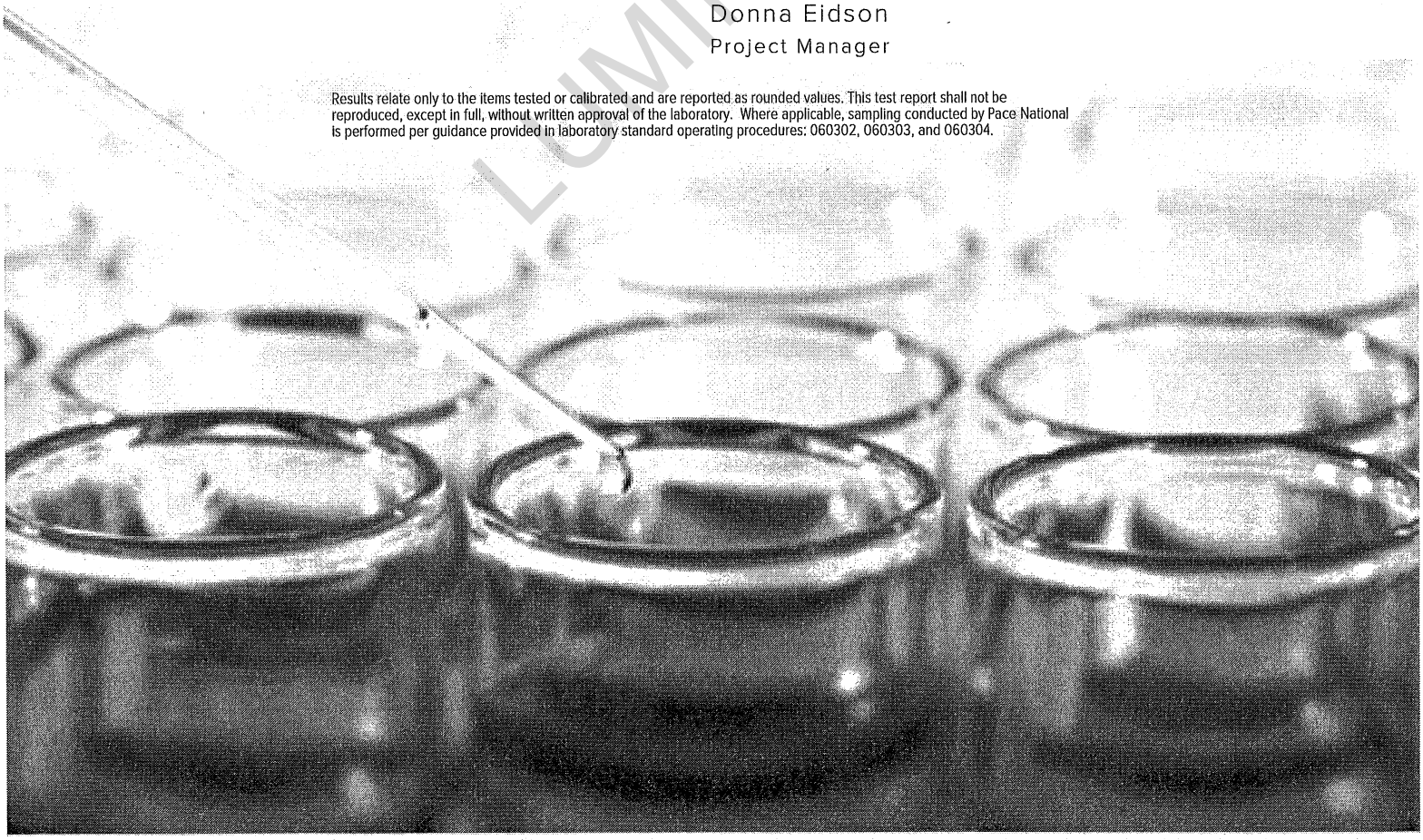
Report To: John DuPont
2300 Double Creek Drive
Round Rock, TX 78664

Entire Report Reviewed By: Donna Eidson

Donna Eidson
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

LUMINANT



Cp: Cover Page 1
Tc: Table of Contents 2
Ss: Sample Summary 3
Cn: Case Narrative 5
Sr: Sample Results 6
BMW-24 L1100977-01 6
BMW-23 L1100977-02 7
BMW-22 L1100977-03 8
BMW-21 L1100977-04 9
BMW-27 L1100977-05 10
BMW-26 L1100977-06 11
BMW-11AR L1100977-07 12
BMW-19 L1100977-08 13
BMW-18 L1100977-09 14
BMW-28 L1100977-10 15
BMW-20 L1100977-11 16
Qc: Quality Control Summary 17
Radiochemistry by Method 904 17
Radiochemistry by Method SM7500Ra B M 18
Gl: Glossary of Terms 19
Al: Accreditations & Locations 20
Sc: Sample Chain of Custody 21

LUMINANT

BMW-24 L1100977-01 Non-Potable Water

Collected by | Collected date/time 05/15/19 07:35 | Received date/time 05/21/19 10:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1285651	1	05/24/19 09:05	05/30/19 12:10	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1285448	1	05/28/19 16:20	05/30/19 13:00	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1285448	1	05/28/19 16:20	05/30/19 13:00	RGT	Mt. Juliet, TN

BMW-23 L1100977-02 Non-Potable Water

Collected by | Collected date/time 05/15/19 08:25 | Received date/time 05/21/19 10:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1285651	1	05/24/19 09:05	06/13/19 16:05	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1285448	1	05/28/19 16:20	06/13/19 16:05	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1285448	1	05/28/19 16:20	05/30/19 13:00	RGT	Mt. Juliet, TN

BMW-22 L1100977-03 Non-Potable Water

Collected by | Collected date/time 05/15/19 09:15 | Received date/time 05/21/19 10:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1285651	1	05/24/19 09:05	05/30/19 12:10	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1285448	1	05/28/19 16:20	05/30/19 13:00	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1285448	1	05/28/19 16:20	05/30/19 13:00	RGT	Mt. Juliet, TN

BMW-21 L1100977-04 Non-Potable Water

Collected by | Collected date/time 05/15/19 09:55 | Received date/time 05/21/19 10:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1285651	1	05/24/19 09:05	05/30/19 12:10	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1285448	1	05/28/19 16:20	05/30/19 13:00	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1285448	1	05/28/19 16:20	05/30/19 13:00	RGT	Mt. Juliet, TN

BMW-27 L1100977-05 Non-Potable Water

Collected by | Collected date/time 05/15/19 10:55 | Received date/time 05/21/19 10:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1285651	1	05/24/19 09:05	05/30/19 12:10	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1285448	1	05/28/19 16:20	05/30/19 17:30	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1285448	1	05/28/19 16:20	05/30/19 17:30	RGT	Mt. Juliet, TN

BMW-26 L1100977-06 Non-Potable Water

Collected by | Collected date/time 05/15/19 11:40 | Received date/time 05/21/19 10:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1285651	1	05/24/19 09:05	05/30/19 12:10	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1285448	1	05/28/19 16:20	05/30/19 17:30	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1285448	1	05/28/19 16:20	05/30/19 17:30	RGT	Mt. Juliet, TN

LUMINANT

BMW-11AR L1100977-07 Non-Potable Water

			Collected by	Collected date/time	Received date/time	
				05/15/19 12:35	05/21/19 10:10	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1285651	1	05/24/19 09:05	05/30/19 12:10	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1285448	1	05/28/19 16:20	05/30/19 17:30	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1285448	1	05/28/19 16:20	05/30/19 17:30	RGT	Mt. Juliet, TN

BMW-19 L1100977-08 Non-Potable Water

			Collected by	Collected date/time	Received date/time	
				05/15/19 13:25	05/21/19 10:10	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1285651	1	05/24/19 09:05	05/30/19 12:10	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1285448	1	05/28/19 16:20	05/30/19 17:30	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1285448	1	05/28/19 16:20	05/30/19 17:30	RGT	Mt. Juliet, TN

BMW-18 L1100977-09 Non-Potable Water

			Collected by	Collected date/time	Received date/time	
				05/15/19 14:10	05/21/19 10:10	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1285651	1	05/24/19 09:05	05/30/19 12:10	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1285448	1	05/28/19 16:20	05/30/19 17:30	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1285448	1	05/28/19 16:20	05/30/19 17:30	RGT	Mt. Juliet, TN

BMW-28 L1100977-10 Non-Potable Water

			Collected by	Collected date/time	Received date/time	
				05/15/19 15:00	05/21/19 10:10	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1285651	1	05/24/19 09:05	05/31/19 11:10	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1285448	1	05/28/19 16:20	05/31/19 11:10	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1285448	1	05/28/19 16:20	05/30/19 17:30	RGT	Mt. Juliet, TN

BMW-20 L1100977-11 Non-Potable Water

			Collected by	Collected date/time	Received date/time	
				05/15/19 16:00	05/21/19 10:10	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1285651	1	05/24/19 09:05	05/31/19 11:10	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1285448	1	05/28/19 16:20	05/31/19 11:10	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1285448	1	05/28/19 16:20	05/30/19 17:30	RGT	Mt. Juliet, TN

LUMINANT

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Donna Eidson
Project Manager

LUMINANT

Radiochemistry by Method 904

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-228	-0.0695		0.728	1.21	05/30/2019 12:10	WG1285651
(T) Barium	*109*			*62.0-143*	*05/30/2019 12:10*	WG1285651
(T) Yttrium	*113*			*79.0-136*	*05/30/2019 12:10*	WG1285651

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	1.45		1.23	1.48	05/30/2019 13:00	WG1285448

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	1.45		0.499	0.265	05/30/2019 13:00	WG1285448
(T) Barium-133	*80.0*			*30.0-143*	*05/30/2019 13:00*	WG1285448

LUMINANT

Radiochemistry by Method 904

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-228	1.00		0.384	0.82	06/13/2019 16:05	WG1285651
(T) Barium	*88.9*			*62.0-143*	*06/13/2019 16:05*	WG1285651
(T) Yttrium	*104*			*79.0-136*	*06/13/2019 16:05*	WG1285651

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	3.54		1.14	1.55	06/13/2019 16:05	WG1285448

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	2.54		0.757	0.731	05/30/2019 13:00	WG1285448
(T) Barium-133	*89.6*			*30.0-143*	*05/30/2019 13:00*	WG1285448

LUMINANT

Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
RADIUM-228	1.64		0.361	0.547	05/30/2019 12:10	WG1285651
(T) Barium	*112*			*62.0-143*	*05/30/2019 12:10*	WG1285651
(T) Yttrium	*113*			*79.0-136*	*05/30/2019 12:10*	WG1285651

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
Combined Radium	5.00		1.19	0.945	05/30/2019 13:00	WG1285448

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
RADIUM-226	3.36		0.831	0.398	05/30/2019 13:00	WG1285448
(T) Barium-133	*79.4*			*30.0-143*	*05/30/2019 13:00*	WG1285448

LUMINANT

Radiochemistry by Method 904

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-228	1.07		0.398	0.586	05/30/2019 12:10	WG1285651
(T) Barium	*108*			*62.0-143*	*05/30/2019 12:10*	WG1285651
(T) Yttrium	*120*			*79.0-136*	*05/30/2019 12:10*	WG1285651

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	1.31		0.656	0.908	05/30/2019 13:00	WG1285448

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	0.245		0.258	0.322	05/30/2019 13:00	WG1285448
(T) Barium-133	*73.1*			*30.0-143*	*05/30/2019 13:00*	WG1285448

LUMINANT

Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
RADIUM-228	0.962		0.387	0.609	05/30/2019 12:10	WG1285651
(T) Barium	*112*			*62.0-143*	*05/30/2019 12:10*	WG1285651
(T) Yttrium	*115*			*79.0-136*	*05/30/2019 12:10*	WG1285651

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
Combined Radium	1.02		0.499	0.804	05/30/2019 17:30	WG1285448

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
RADIUM-226	0.0591		0.112	0.195	05/30/2019 17:30	WG1285448
(T) Barium-133	*90.6*			*30.0-143*	*05/30/2019 17:30*	WG1285448

LUMINANT

Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
RADIUM-228	1.13		0.329	0.524	05/30/2019 12:10	WG1285651
(T) Barium	*114*			*62.0-143*	*05/30/2019 12:10*	WG1285651
(T) Yttrium	*120*			*79.0-136*	*05/30/2019 12:10*	WG1285651

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
Combined Radium	1.59		0.595	0.737	05/30/2019 17:30	WG1285448

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
RADIUM-226	0.457		0.266	0.213	05/30/2019 17:30	WG1285448
(T) Barium-133	*86.2*			*30.0-143*	*05/30/2019 17:30*	WG1285448

LUMINANT

Radiochemistry by Method 904

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-228	4.89		0.423	0.671	05/30/2019 12:10	WG1285651
(T) Barium	*103*			*62.0-143*	*05/30/2019 12:10*	WG1285651
(T) Yttrium	*116*			*79.0-136*	*05/30/2019 12:10*	WG1285651

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	5.71		0.795	0.964	05/30/2019 17:30	WG1285448

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	0.830		0.372	0.293	05/30/2019 17:30	WG1285448
(T) Barium-133	*87.9*			*30.0-143*	*05/30/2019 17:30*	WG1285448

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

LUMINANT

Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
RADIUM-228	4.66		0.515	0.78	05/30/2019 12:10	WG1285651
(T) Barium	*99.1*			*62.0-143*	*05/30/2019 12:10*	WG1285651
(T) Yttrium	*118*			*79.0-136*	*05/30/2019 12:10*	WG1285651

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
Combined Radium	5.47		1.05	1.23	05/30/2019 17:30	WG1285448

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
RADIUM-226	0.487		0.321	0.268	05/30/2019 17:30	WG1285448
(T) Barium-133	*71.8*			*30.0-143*	*05/30/2019 17:30*	WG1285448

LUMINANT

Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
RADIUM-228	3.95		0.414	0.603	05/30/2019 12:10	WG1285651
(T) Barium	*96.9*			*62.0-143*	*05/30/2019 12:10*	WG1285651
(T) Yttrium	*118*			*79.0-136*	*05/30/2019 12:10*	WG1285651

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
Combined Radium	4.06		0.584	0.867	05/30/2019 17:30	WG1285448

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
RADIUM-226	0.107		0.170	0.264	05/30/2019 17:30	WG1285448
(T) Barium-133	*84.7*			*30.0-143*	*05/30/2019 17:30*	WG1285448

LUMINANT

Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.924		0.410	0.59	05/31/2019 11:10	WG1285651
(T) Barium	*122*			*62.0-143*	*05/31/2019 11:10*	WG1285651
(T) Yttrium	*96.5*			*79.0-136*	*05/31/2019 11:10*	WG1285651

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.12		0.635	0.879	05/31/2019 11:10	WG1285448

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.197		0.225	0.289	05/30/2019 17:30	WG1285448
(T) Barium-133	*55.5*			*30.0-143*	*05/30/2019 17:30*	WG1285448

LUMINANT

Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
RADIUM-228	0.174		0.384	0.657	05/31/2019 11:10	WG1285651
(T) Barium	*85.3*			*62.0-143*	*05/31/2019 11:10*	WG1285651
(T) Yttrium	*108*			*79.0-136*	*05/31/2019 11:10*	WG1285651

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
Combined Radium	1.36		0.877	1.01	05/31/2019 11:10	WG1285448

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+/-	pCi/l	date / time	
RADIUM-226	1.18		0.493	0.349	05/30/2019 17:30	WG1285448
(T) Barium-133	*73.8*			*30.0-143*	*05/30/2019 17:30*	WG1285448

LUMINANT

Method Blank (MB)

(MB) R3417363-1 05/30/19 12:10

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-228	-0.0581		0.396
(T) Barium	*105*		
(T) Yttrium	*110*		

L1100977-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1100977-01 05/30/19 12:10 • (DUP) R3417363-5 05/30/19 12:10

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-228	-0.0695	0.650	1	200	0.741		20	3
(T) Barium	*109*	*111*						
(T) Yttrium	*113*	*107*						

Laboratory Control Sample (LCS)

(LCS) R3417363-2 05/30/19 12:10

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	5.29	106	80.0-120	
(T) Barium			*104*		
(T) Yttrium			*114*		

L1100989-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1100989-01 05/31/19 11:10 • (MS) R3417363-3 05/30/19 12:10 • (MSD) R3417363-4 05/30/19 12:10

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-228	20.0	0.531	20.9	19.5	102	94.8	1	70.0-130			7.08		20
(T) Barium		*120*			*102*	*115*							
(T) Yttrium		*93.0*			*117*	*114*							

LUMINANT

Method Blank (MB)

(MB) R3418748-1 05/30/19 13:00

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-226	0.0330		0.399
(T) Barium-133	*58.0*		

L1102014-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1102014-01 05/30/19 17:30 • (DUP) R3418748-5 05/30/19 13:00

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-226	0.955	0.488	1	64.8	0.623		20	3
(T) Barium-133	*41.0*	*37.0*						

Laboratory Control Sample (LCS)

(LCS) R3418748-2 05/30/19 13:00

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	20.1	19.8	98.4	80.0-120	
(T) Barium-133			*57.4*		

L1102014-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1102014-02 05/30/19 17:30 • (MS) R3418748-3 05/30/19 13:00 • (MSD) R3418748-4 05/30/19 13:00

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-226	20.1	0.487	22.6	23.9	110	116	1	75.0-125			5.68		20
(T) Barium-133		*59.1*			*47.0*	*45.7*							

LUMINANT

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDA	Minimum Detectable Activity.
Rec.	Recovery.
RER	Replicate Error Ratio.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(T)	Tracer - A radioisotope of known concentration added to a solution of chemically equivalent radioisotopes at a known concentration to assist in monitoring the yield of the chemical separation.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

DRAFT

ACCREDITATIONS & LOCATIONS

ONE LAB. NATIONWIDE.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

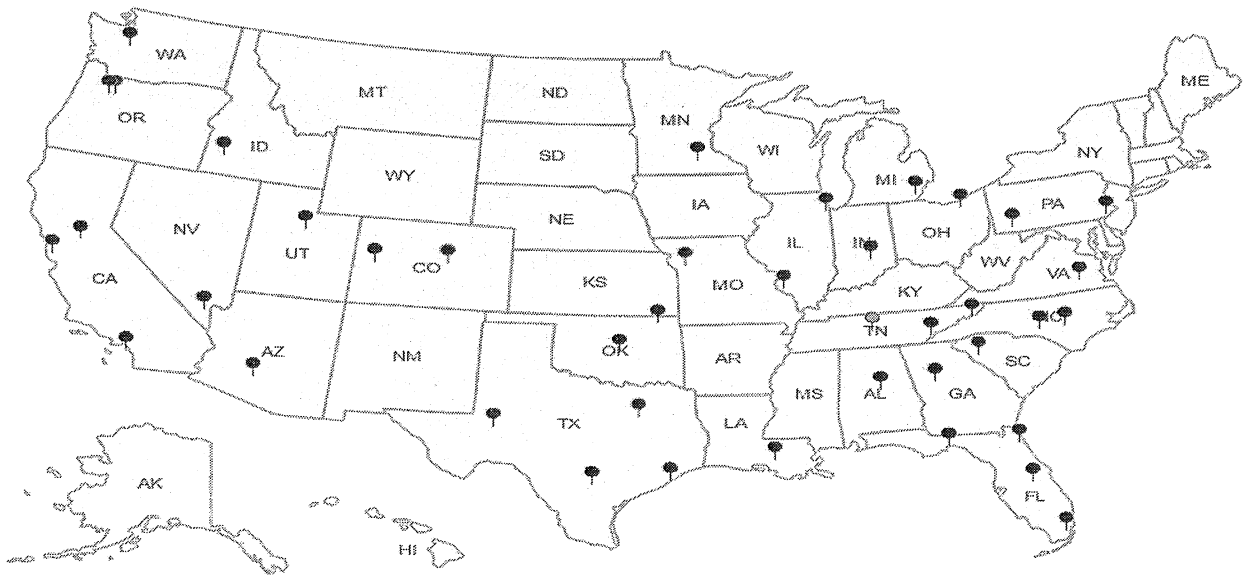
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

LUMINAIT

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



Pace Analytical National Center for Testing & Innovation
Cooler Receipt Form

Client: DHURTX		SDG#:	1100977
Cooler Received/Opened On: 5/21/19		Temperature:	Amb
Received By: Brock Fariss			
Signature: [signature] Fariss			

Receipt Check List	NP	Yes	No
COC Seal Present / Intact?	✓		
COC Signed / Accurate?		✓	
Bottles arrive intact?		✓	
Correct bottles used?		✓	
Sufficient volume sent?		✓	
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?		✓	

LUMINANT

Pace Analytical®
National Center for Testing & Innovation

Login #:L1100977	Client:DHLRRTX	Date:05/21	Evaluated by:Kelsey S

Non-Conformance (check applicable items)

	Sample Integrity		Chain of Custody Clarification		
	Parameter(s) past holding time		Login Clarification Needed		**If Broken Container:**
	Temperature not in range		Chain of custody is incomplete		Insufficient packing material around container
	Improper container type		Please specify Metals requested.		Insufficient packing material inside cooler
	pH not in range.		Please specify TCLP requested.		Improper handling by carrier (FedEx / UPS / Courier
	Insufficient sample volume.		Received additional samples not listed on coc.		Sample was frozen
	Sample is biphasic.		Sample ids on containers do not match ids on coc		Container lid not intact
	Vials received with headspace.		Trip Blank not received.		**If no Chain of Custody:**
	Broken container		Client did not "X" analysis.		Received by:
	Broken container:		Chain of Custody is missing		Date/Time:
	Sufficient sample remains				Temp./Cont. Rec./pH:
					Carrier:
					Tracking#

LEVIATHAN

Login Comments:
Sample BMW-23,-22,-11AR, and -19 were received ith a pH oh 5
Samples BMW- 21,-27,-26,-28,-20 were received with a pH pf 8

Client informed by:		Call		Email		Voice Mail		Date:	Time:
TSR Initials:	Client Contact:								

Login Instructions:

Noted

DE 5/21/19 1547

1100977

DHL Analytical, Inc.
2300 Double Creek Drive
Round Rock, TX 78664
TEL: *(512) 388-8222* FAX: *(512) 388-8229*

CHAIN-OF-CUSTODY RECORD

H006

Work Order: 1905185

Subcontractor:

Pace Analytical
12065 Lebanon Rd
Mt. Juliet, TN 37122

TEL: (615) 773-5923
FAX:
Acct #: DHLRRTX

c2 c2

16-May-19

Sample Id	Matrix	DHL#	Date Collected	Bottle Type	Ra-228 E904.0	Ra-226 M7500 Ra B M	Requested Tests			
BMW-24	Aqueous	-01D	05/15/19 07:35 AM	1LHDPEHNO3		1				-01
BMW-24	Aqueous	-01E	05/15/19 07:35 AM	1LHDPEHNO3	1					
BMW-23	Aqueous	-02D	05/15/19 08:25 AM	1LHDPEHNO3		1				02
BMW-23	Aqueous	-02E	05/15/19 08:25 AM	1LHDPEHNO3	1					
BMW-22	Aqueous	-03D	05/15/19 09:15 AM	1LHDPEHNO3		1				03
BMW-22	Aqueous	-03E	05/15/19 09:15 AM	1LHDPEHNO3	1					
BMW-21	Aqueous	-04D	05/15/19 09:55 AM	1LHDPEHNO3		1				04
BMW-21	Aqueous	-04E	05/15/19 09:55 AM	1LHDPEHNO3	1					
BMW-27	Aqueous	-05D	05/15/19 10:55 AM	1LHDPEHNO3		1				05
BMW-27	Aqueous	-05E	05/15/19 10:55 AM	1LHDPEHNO3	1					
BMW-26	Aqueous	-06D	05/15/19 11:40 AM	1LHDPEHNO3		1				06
BMW-26	Aqueous	-06E	05/15/19 11:40 AM	1LHDPEHNO3	1					
BMW-11AR	Aqueous	-07D	05/15/19 12:35 PM	1LHDPEHNO3		1				07
BMW-11AR	Aqueous	-07E	05/15/19 12:35 PM	1LHDPEHNO3	1					
BMW-19	Aqueous	-08D	05/15/19 01:25 PM	1LHDPEHNO3		1				08
BMW-19	Aqueous	-08E	05/15/19 01:25 PM	1LHDPEHNO3	1					
BMW-18	Aqueous	-09D	05/15/19 02:10 PM	1LHDPEHNO3		1				09
BMW-18	Aqueous	-09E	05/15/19 02:10 PM	1LHDPEHNO3	1					

COMPLIANT

General Comments:

Please analyze these samples with Normal Turnaround Time.
Report RA-226, Ra-228 & Combined per Specs.
Quality Control Package Needed: Standard - NELAC Rad Test compliant
Email to cac@dhlanalytical.com & dupont@dhlanalytical.com

UPS
Rec: 22

	Date/Time		Date/Time
Relinquished by:	5/17/19 1700	Received by:	5/21/19 0815
Relinquished by:		Received by:	

pH adj @ 1457

Any RAD SCREEN: <0.5 mR/hr

1160977

DHL Analytical, Inc.
2300 Double Creek Drive
Round Rock, TX 78664
TEL: *(512) 388-8222* FAX: *(512) 388-8229*

CHAIN-OF-CUSTODY RECORD

Work Order: 1905185

Subcontractor:
Pace Analytical
12065 Lebanon Rd
Mt. Juliet, TN 37122

TEL: (615) 773-5923
FAX:
Acct #: DHLRRTX

< 2 < 2

16-May-19

Sample Id	Matrix	DHL#	Date Collected	Bottle Type	Ra-228 E904.0	Ra-226 M7500 Ra B M	Requested Tests			
BMW-28	Aqueous	-10D	05/15/19 03:00 PM	1LHDPEHNO3		1				10
BMW-28	Aqueous	-10E	05/15/19 03:00 PM	1LHDPEHNO3	1					
BMW-20	Aqueous	-11D	05/15/19 04:00 PM	1LHDPEHNO3		1				11
BMW-20	Aqueous	-11E	05/15/19 04:00 PM	1LHDPEHNO3	1					

LUMINANT

General Comments:
Please analyze these samples with Normal Turnaround Time.
Report RA-226, Ra-228 & Combined per Specs.
Quality Control Package Needed: Standard - NELAC Rad Test compliant
Email to cac@dhlanalytical.com & dupont@dhlanalytical.com

UPS
Rec: 22

	Date/Time		Date/Time
Relinquished by:		Received by:	5/21/19 1010
Relinquished by:		Received by:	

Amb

RAD SCREEN: <0.5 mR/hr

June 21, 2019

Will Vienne
Golder
2201 Double Creek Dr #4004
Round Rock, Texas 78664
TEL: (512) 671-3434
FAX (512) 671-3446

Order No.: 1906152

RE: A1 Area Landfill

Dear Will Vienne:

DHL Analytical, Inc. received 6 sample(s) on 6/14/2019 for the analyses presented in the following report.

There were no problems with the analyses and all data met requirements of NELAP except where noted in the Case Narrative. All non-NELAP methods will be identified accordingly in the case narrative and all estimated uncertainties of test results are within method or EPA specifications.

If you have any questions regarding these tests results, please feel free to call. Thank you for using DHL Analytical.

Sincerely,

John DuPont
General Manager

LUMINANT

This report was performed under the accreditation of the State of Texas Laboratory Certification Number: T104704211-19-24

Table of Contents

Miscellaneous Documents **3**

CaseNarrative 1906152 ..... **8**

WorkOrderSampleSummary 1906152 ..... **9**

PrepDatesReport 1906152 ..... **10**

AnalyticalDatesReport 1906152 ..... **13**

Analytical Report 1906152 ..... **16**

AnalyticalQCSummaryReport 1906152 ..... **22**

LUMINANT

DHL ANALYTICAL
2300 Double Creek Dr. ■ Round Rock, TX 78664
Phone (512) 388-8222 ■ FAX (512) 388-8229
Web: www.dhlanalytical.com
E-Mail: login@dhlanalytical.com

№ 83013

CHAIN-OF-CUSTODY

CLIENT: Golder Associates
ADDRESS: 5416 Plaza Dr Texarkana TX 75501
PHONE: 903-794-0625 FAX/E-MAIL:
DATA REPORTED TO:
ADDITIONAL REPORT COPIES TO:

DATE: PAGE 1 OF 1
PO #: 9122434-D DHL WORK ORDER #: 1906152
PROJECT LOCATION OR NAME: AI Area Landfill
CLENT PROJECT #: 9122434-D COLLECTOR: Alex Gonzales

Authorize 5% surcharge for TRRP Report? ☐ Yes ☐ No

S=SOIL W=WATER A=AIR L=LIQUID SE=SEDIMENT
P=PAINT SL=SLUDGE O=OTHER SO=SOLID

PRESERVATION: HCl | HNO_3 | H_2SO_4 ☐ NaOH ☐ | ICE | UNPRESERVED

ANALYSES: BTEX ☐ MTBE ☐ [METHOD 8021] | TPH 1005 ☐ TPH 1006 ☐ HOLD 1006 ☐ | GRO [METHOD 8015] ☐ DRO [METHOD 8105] ☐ | VOC 8260 ☐ VOC 624 ☐ VOC 8260/5035 ☐ | SVOC 8270 ☐ PAH 8270 ☐ HOLD PAH ☐ SVOC 625 ☐ | 8270 PEST ☐ 625 PEST/PCB ☐ 608 PCB ☐ 608 PCB ☐ 8270 PCB ☐ | 8270 O-P PEST ☐ 8082 PCB ☐ T PHOS, AMMONIA ☐ | 8321 HERB ☐ T PHOS, AMMONIA ☐ | METALS 6020 ☐ METALS 200.8 ☐ DISS. METALS ☐ | RCRA ☐ TX11 ☐ ☐ | PH ☐ HEX CHROM ☐ ALKALINITY ☐ COD ☐ | CHLORIDE ☐ ANIONS ☐ | TCLP-SVOC ☐ VOC ☐ PEST ☐ HERB ☐ | TCLP-METALS ☐ RCRA 8 ☐ TX-11 ☐ Pb ☐ | RCI ☐ FLASHPOINT ☐ DGAS ☐ | TDS ☐ TSS ☐ % MOISTURE ☐ CYANIDE ☐ | Cobalt, Sulfate, Lithium | Lithium, Sulfate | Barium | Arsenic | Alk, NO3, P, SO4, Cl, Ortho P, TDS | Ca, Mg, K, Na, Fe | Ferrous, Ferric | FIELD NOTES

Field Sample I.D.	DHL Lab #	Date	Time	Matrix	Container Type	# of Containers	HCl	HNO_3	H_2SO_4	ICE	UNPRESERVED	Cobalt, Sulfate	Lithium, Sulfate	Barium	Arsenic	Alk, NO3, P, SO4, Cl, Ortho P, TDS	Ca, Mg, K, Na, Fe	Ferrous, Ferric	FIELD NOTES
BMW-25	01	6/13	0930	W		7		X		X	X	X			X	X	X		
BMW-29	02	6/13	1030	W		7		X		X	X		X		X	X	X		
BMW-30	03	6/13	1250	W		7		X		X	X			X	X	X	X		
BMW-31	04	6/13	1430	W		7		X		X	X		X		X	X	X		
BMW-32	05	6/13	0730	W		7		X		X	X	X			X	X	X		
BMW-33	06	6/13	0815	W		7		X		X	X	X		X	X	X	X		add per Will Vienne (JO) 06/14/19

RELINQUISHED BY: (Signature) Alex Gonzales DATE/TIME 6/13/19 1730 RECEIVED BY: (Signature) FedEx
RELINQUISHED BY: (Signature) FedEx DATE/TIME 6/14/19 10:08 RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature) DATE/TIME RECEIVED BY: (Signature)

☐ DHL DISPOSAL @ $5.00 each ☐ Return

3

TURN AROUND TIME
RUSH ☐ CALL FIRST
1 DAY ☐ CALL FIRST
2 DAY ☐
NORMAL ☑
OTHER ☐

LABORATORY USE ONLY:
RECEIVING TEMP: 18°C / 1.6°C THERM #: 78
CUSTODY SEALS: ☐ BROKEN ☒ INTACT ☐ NOT USED
CARRIER: ☐ LONE STAR ☐ FEDEX ☐ UPS ☐ OTHER
☐ COURIER DELIVERY
☐ HAND DELIVERED

DHL COC Rev 1 | FEB 2010

LUBINAT

Eric Lau

From: John DuPont
Sent: Tuesday, May 28, 2019 11:35 AM
To: Eric Lau
Subject: FW: CCR Analysis

Appendix III Parameters:
Metals (Ca and B)
Anions (Cl, F, and SO4)
TDS

Appendix IV Parameters:

Metals (As, Ba, Be, Cd, Co, Cr, Hg, Li, Mo, Pb, Sb, Se, and Tl)
Ra-226
Ra-228

From: Vienne, Will [mailto:William_Vienne@golder.com]
Sent: Tuesday, April 09, 2019 12:48 PM
To: John DuPont <dupont@dhlanalytical.com>
Subject: CCR Analysis

LUMINANT

ORIGIN ID:GGGA (903) 794-0625
GOLDER ASSOCIATES

5416 PLAZA DR

TEXARKANA, TX 75501
UNITED STATES US

SHIP DATE: 13JUN15
ACTWGT: 39.50 LB
CAD: 006994167/SSFE2002
DIMS: 27x14x14 IN

BILL THIRD PARTY

TO SAMPLE RECEIVING
DHL 19122434-D FOR A1
2300 DOUBLE CREEK DR

ROUND ROCK TX 78664
(512) 388-8222 REF:
INV:
PO: DEPT:

FedEx Express

FRI - 14 JUN 10:30A
PRIORITY OVERNIGHT

TRK# 0201 7878 7609 9128

A8 BSMA

78664
TX-US AUS

CUSTODY SEAL
DATE
SIGNATURE

QEC
Quality Environmental Containers
800-255-3950 • www.qecusa.com

LUMINANT

ORIGIN ID:GGGA (903) 794-0625
GOLDER ASSOCIATES

5416 PLAZA DR

TEXARKANA, TX 75501
UNITED STATES US

SHIP DATE: 13JUN19
ACTWGT: 58.00 LB
CAD: 006994167/SSFE2002
DIMS: 27x14x14 IN

BILL THIRD PARTY

TO SAMPLE RECEIVING
DHL 19122434 – D FOR A1
2300 DOUBLE CREEK DR

ROUND ROCK TX 78664
(512) 388-8222 REF:
INV:
PO: DEPT:

FedEx
Express

TRK# 0201 7878 7612 6607

FRI – 14 JUN 10:30A
PRIORITY OVERNIGHT

A8 BSMA

78664
TX-US AUS

CUSTODY SEAL
DATE
SIGNATURE

QEC
Quality Environmental Containers
800-255-3950 • www.qecusa.com

DOMINANT

DHL Analytical, Inc.

Sample Receipt Checklist

Client Name **Golder** Date Received: **6/14/2019**

Work Order Number **1906152** Received by **EL**

Checklist completed by: _____ 6/14/2019 Reviewed by (DZ) 6/14/2019
Signature Date Initials Date

Carrier name FedEx 1day

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shippping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	**1.6** °C
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH<2 acceptable upon receipt?	Yes ☑	No ☐	NA ☐ LOT # 11837
	Adjusted? no		Checked by EL
Water - ph>9 (S) or ph>10 (CN) acceptable upon receipt?	Yes ☐	No ☐	NA ☑ LOT #
	Adjusted? _____		Checked by _____

LUMINANT

Any No response must be detailed in the comments section below.

Client contacted _____ Date contacted: _____ Person contacted _____

Contacted by: _____ Regarding: _____

Comments: _____

Corrective Action _____

DHL Analytical, Inc. **Date:** *21-Jun-19*

CLIENT: Golder
Project: A1 Area Landfill
Lab Order: 1906152

CASE NARRATIVE

Samples were analyzed using the methods outlined in the following references:

Method SW6020A - Metals Analysis
Method E300 - Anions Analysis
Method M2320 B - Alkalinity Analysis
Method M3500-Fe D - Ferrous Iron Analysis (this parameter is not NELAP certified)
Method M3500-Fe D - Ferric Iron (calculation) (this calculation is not NELAP certified).
Method M4500-P E - Orthophosphate Analysis
Method M2540C - TDS Analysis

LOG IN

The samples were received and log-in performed on 6/14/19. A total of 6 samples were received. On 6/14/19 several test parameters were added to all samples as per the client. These were performed as reque3sted. The samples arrived in good condition and were properly packaged.

METALS ANALYSIS

For Metals analysis performed on 6/19/19 the matrix spike and matrix spike duplicate recoveries were below control limits for Sodium. These are flagged accordingly in the QC summary report. The sample selected for the matrix spike and matrix spike duplicate was not from this work order. The LCS was within control limits for this analyte. No further corrective actions were taken.

For Metals analysis performed on 6/19/19 the PDS recovery was out of control limits for Sodium. This is flagged accordingly. The serial dilution was within control limits for this analyte. No further corrective actions were taken.

FERRIC IRON CALCULATION

The Ferric Iron is calculated as the Total Iron minus the Ferrous Iron.

LUMINANT

DHL Analytical, Inc.

Date: *21-Jun-19*

CLIENT: Golder
Project: A1 Area Landfill
Lab Order: 1906152

Work Order Sample Summary

Lab Smp ID	Client Sample ID	Tag Number	Date Collected	Date Recved
1906152-01	BMW-25		06/13/19 09:30 AM	6/14/2019
1906152-02	BMW-29		06/13/19 10:30 AM	6/14/2019
1906152-03	BMW-30		06/13/19 12:50 PM	6/14/2019
1906152-04	BMW-31		06/13/19 02:30 PM	6/14/2019
1906152-05	BMW-32		06/13/19 07:30 AM	6/14/2019
1906152-06	BMW-33		06/13/19 08:15 AM	6/14/2019

LUMINANT

Lab Order: 1906152
Client: Golder
Project: A1 Area Landfill

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1906152-01A	BMW-25	06/13/19 09:30 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	06/14/19 02:08 PM	91344
1906152-01B	BMW-25	06/13/19 09:30 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
	BMW-25	06/13/19 09:30 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
	BMW-25	06/13/19 09:30 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
1906152-01C	BMW-25	06/13/19 09:30 AM	Aqueous	M2320 B	Alkalinity Preparation	06/17/19 08:32 AM	91346
	BMW-25	06/13/19 09:30 AM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-25	06/13/19 09:30 AM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-25	06/13/19 09:30 AM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-25	06/13/19 09:30 AM	Aqueous	M4500-P E	Orthophosphate Prep	06/14/19 11:55 AM	91343
	BMW-25	06/13/19 09:30 AM	Aqueous	M2540C	TDS Preparation	06/18/19 01:25 PM	91377
1906152-02A	BMW-29	06/13/19 10:30 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	06/14/19 02:08 PM	91344
1906152-02B	BMW-29	06/13/19 10:30 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
	BMW-29	06/13/19 10:30 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
1906152-02C	BMW-29	06/13/19 10:30 AM	Aqueous	M2320 B	Alkalinity Preparation	06/17/19 08:32 AM	91346
	BMW-29	06/13/19 10:30 AM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-29	06/13/19 10:30 AM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-29	06/13/19 10:30 AM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-29	06/13/19 10:30 AM	Aqueous	M4500-P E	Orthophosphate Prep	06/14/19 11:55 AM	91343
	BMW-29	06/13/19 10:30 AM	Aqueous	M2540C	TDS Preparation	06/18/19 01:25 PM	91377
1906152-03A	BMW-30	06/13/19 12:50 PM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	06/14/19 02:08 PM	91344
1906152-03B	BMW-30	06/13/19 12:50 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
	BMW-30	06/13/19 12:50 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
1906152-03C	BMW-30	06/13/19 12:50 PM	Aqueous	M2320 B	Alkalinity Preparation	06/17/19 08:32 AM	91346
	BMW-30	06/13/19 12:50 PM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-30	06/13/19 12:50 PM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-30	06/13/19 12:50 PM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-30	06/13/19 12:50 PM	Aqueous	M4500-P E	Orthophosphate Prep	06/14/19 11:55 AM	91343
	BMW-30	06/13/19 12:50 PM	Aqueous	M2540C	TDS Preparation	06/18/19 01:25 PM	91377

LUMINANT

Lab Order: 1906152
Client: Golder
Project: A1 Area Landfill

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1906152-04A	BMW-31	06/13/19 02:30 PM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	06/14/19 02:08 PM	91344
1906152-04B	BMW-31	06/13/19 02:30 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
	BMW-31	06/13/19 02:30 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
	BMW-31	06/13/19 02:30 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
1906152-04C	BMW-31	06/13/19 02:30 PM	Aqueous	M2320 B	Alkalinity Preparation	06/17/19 08:32 AM	91346
	BMW-31	06/13/19 02:30 PM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-31	06/13/19 02:30 PM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-31	06/13/19 02:30 PM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-31	06/13/19 02:30 PM	Aqueous	M4500-P E	Orthophosphate Prep	06/14/19 11:55 AM	91343
	BMW-31	06/13/19 02:30 PM	Aqueous	M2540C	TDS Preparation	06/18/19 01:25 PM	91377
1906152-05A	BMW-32	06/13/19 07:30 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	06/14/19 02:08 PM	91344
1906152-05B	BMW-32	06/13/19 07:30 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
	BMW-32	06/13/19 07:30 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
	BMW-32	06/13/19 07:30 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
1906152-05C	BMW-32	06/13/19 07:30 AM	Aqueous	M2320 B	Alkalinity Preparation	06/17/19 08:32 AM	91346
	BMW-32	06/13/19 07:30 AM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-32	06/13/19 07:30 AM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-32	06/13/19 07:30 AM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-32	06/13/19 07:30 AM	Aqueous	M4500-P E	Orthophosphate Prep	06/14/19 11:55 AM	91343
	BMW-32	06/13/19 07:30 AM	Aqueous	M2540C	TDS Preparation	06/18/19 01:25 PM	91377
1906152-06A	BMW-33	06/13/19 08:15 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	06/14/19 02:08 PM	91344
1906152-06B	BMW-33	06/13/19 08:15 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
	BMW-33	06/13/19 08:15 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/18/19 08:21 AM	91364
1906152-06C	BMW-33	06/13/19 08:15 AM	Aqueous	M2320 B	Alkalinity Preparation	06/17/19 08:32 AM	91346
	BMW-33	06/13/19 08:15 AM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-33	06/13/19 08:15 AM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-33	06/13/19 08:15 AM	Aqueous	E300	Anion Preparation	06/14/19 11:45 AM	91339
	BMW-33	06/13/19 08:15 AM	Aqueous	M4500-P E	Orthophosphate Prep	06/14/19 11:55 AM	91343

LUMINANT

Lab Order: 1906152
Client: Golder
Project: A1 Area Landfill

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1906152-06C	BMW-33	06/13/19 08:15 AM	Aqueous	M2540C	TDS Preparation	06/18/19 01:25 PM	91377

LUMINANT

Lab Order: 1906152
Client: Golder
Project: A1 Area Landfill

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1906152-01A	BMW-25	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91344	1	06/21/19	UV/VIS_2_190621A
	BMW-25	Aqueous	M3500-Fe D	Ferrous Iron	91344	1	06/14/19 02:57 PM	UV/VIS_2_190614C
1906152-01B	BMW-25	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	10	06/19/19 02:34 PM	ICP-MS4_190619B
	BMW-25	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	20	06/19/19 02:37 PM	ICP-MS4_190619B
	BMW-25	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	1	06/19/19 12:25 PM	ICP-MS5_190619B
1906152-01C	BMW-25	Aqueous	M2320 B	Alkalinity	91346	1	06/17/19 10:31 AM	TITRATOR_190617A
	BMW-25	Aqueous	E300	Anions by IC method - Water	91339	100	06/14/19 12:17 PM	IC2_190614A
	BMW-25	Aqueous	E300	Anions by IC method - Water	91339	10	06/14/19 02:57 PM	IC2_190614A
	BMW-25	Aqueous	E300	Anions by IC method - Water	91339	1	06/14/19 05:37 PM	IC2_190614A
	BMW-25	Aqueous	M4500-P E	Orthophosphate	91343	1	06/14/19 12:26 PM	UV/VIS_2_190614B
	BMW-25	Aqueous	M2540C	Total Dissolved Solids	91377	1	06/18/19 03:40 PM	WC_190618A
1906152-02A	BMW-29	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91344	1	06/21/19	UV/VIS_2_190621A
	BMW-29	Aqueous	M3500-Fe D	Ferrous Iron	91344	1	06/14/19 02:57 PM	UV/VIS_2_190614C
1906152-02B	BMW-29	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	1	06/19/19 12:27 PM	ICP-MS5_190619B
	BMW-29	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	20	06/19/19 02:39 PM	ICP-MS4_190619B
1906152-02C	BMW-29	Aqueous	M2320 B	Alkalinity	91346	1	06/17/19 11:00 AM	TITRATOR_190617A
	BMW-29	Aqueous	E300	Anions by IC method - Water	91339	100	06/14/19 12:33 PM	IC2_190614A
	BMW-29	Aqueous	E300	Anions by IC method - Water	91339	10	06/14/19 03:13 PM	IC2_190614A
	BMW-29	Aqueous	E300	Anions by IC method - Water	91339	1	06/14/19 05:53 PM	IC2_190614A
	BMW-29	Aqueous	M4500-P E	Orthophosphate	91343	1	06/14/19 12:27 PM	UV/VIS_2_190614B
	BMW-29	Aqueous	M2540C	Total Dissolved Solids	91377	1	06/18/19 03:40 PM	WC_190618A
1906152-03A	BMW-30	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91344	1	06/21/19	UV/VIS_2_190621A
	BMW-30	Aqueous	M3500-Fe D	Ferrous Iron	91344	1	06/14/19 02:57 PM	UV/VIS_2_190614C
1906152-03B	BMW-30	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	10	06/19/19 02:41 PM	ICP-MS4_190619B
	BMW-30	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	1	06/19/19 12:29 PM	ICP-MS5_190619B
1906152-03C	BMW-30	Aqueous	M2320 B	Alkalinity	91346	1	06/17/19 11:15 AM	TITRATOR_190617A
	BMW-30	Aqueous	E300	Anions by IC method - Water	91339	100	06/14/19 12:49 PM	IC2_190614A
	BMW-30	Aqueous	E300	Anions by IC method - Water	91339	10	06/14/19 03:29 PM	IC2_190614A

LUMINANT

Lab Order: 1906152
Client: Golder
Project: A1 Area Landfill

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1906152-03C	BMW-30	Aqueous	E300	Anions by IC method - Water	91339	1	06/14/19 06:09 PM	IC2_190614A
	BMW-30	Aqueous	M4500-P E	Orthophosphate	91343	1	06/14/19 12:27 PM	UV/VIS_2_190614B
	BMW-30	Aqueous	M2540C	Total Dissolved Solids	91377	1	06/18/19 03:40 PM	WC_190618A
1906152-04A	BMW-31	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91344	1	06/21/19	UV/VIS_2_190621A
	BMW-31	Aqueous	M3500-Fe D	Ferrous Iron	91344	1	06/14/19 02:58 PM	UV/VIS_2_190614C
1906152-04B	BMW-31	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	1	06/19/19 02:43 PM	ICP-MS4_190619B
	BMW-31	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	10	06/19/19 02:45 PM	ICP-MS4_190619B
	BMW-31	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	1	06/19/19 12:31 PM	ICP-MS5_190619B
1906152-04C	BMW-31	Aqueous	M2320 B	Alkalinity	91346	1	06/17/19 11:19 AM	TITRATOR_190617A
	BMW-31	Aqueous	E300	Anions by IC method - Water	91339	10	06/14/19 03:45 PM	IC2_190614A
	BMW-31	Aqueous	E300	Anions by IC method - Water	91339	1	06/14/19 06:25 PM	IC2_190614A
	BMW-31	Aqueous	E300	Anions by IC method - Water	91339	100	06/14/19 01:05 PM	IC2_190614A
	BMW-31	Aqueous	M4500-P E	Orthophosphate	91343	1	06/14/19 12:28 PM	UV/VIS_2_190614B
	BMW-31	Aqueous	M2540C	Total Dissolved Solids	91377	1	06/18/19 03:40 PM	WC_190618A
1906152-05A	BMW-32	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91344	1	06/21/19	UV/VIS_2_190621A
	BMW-32	Aqueous	M3500-Fe D	Ferrous Iron	91344	1	06/14/19 02:58 PM	UV/VIS_2_190614C
1906152-05B	BMW-32	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	1	06/19/19 12:34 PM	ICP-MS5_190619B
	BMW-32	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	10	06/19/19 02:47 PM	ICP-MS4_190619B
	BMW-32	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	20	06/19/19 03:12 PM	ICP-MS4_190619B
1906152-05C	BMW-32	Aqueous	M2320 B	Alkalinity	91346	1	06/17/19 11:46 AM	TITRATOR_190617A
	BMW-32	Aqueous	E300	Anions by IC method - Water	91339	100	06/14/19 01:21 PM	IC2_190614A
	BMW-32	Aqueous	E300	Anions by IC method - Water	91339	10	06/14/19 04:01 PM	IC2_190614A
	BMW-32	Aqueous	E300	Anions by IC method - Water	91339	1	06/14/19 06:41 PM	IC2_190614A
	BMW-32	Aqueous	M4500-P E	Orthophosphate	91343	1	06/14/19 12:28 PM	UV/VIS_2_190614B
	BMW-32	Aqueous	M2540C	Total Dissolved Solids	91377	1	06/18/19 03:40 PM	WC_190618A
1906152-06A	BMW-33	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	91344	1	06/21/19	UV/VIS_2_190621A
	BMW-33	Aqueous	M3500-Fe D	Ferrous Iron	91344	1	06/14/19 02:59 PM	UV/VIS_2_190614C
1906152-06B	BMW-33	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	10	06/19/19 02:51 PM	ICP-MS4_190619B

LUMINANT

Lab Order: 1906152
Client: Golder
Project: A1 Area Landfill

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1906152-06B	BMW-33	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91364	1	06/19/19 12:36 PM	ICP-MS5_190619B
1906152-06C	BMW-33	Aqueous	M2320 B	Alkalinity	91346	1	06/17/19 12:05 PM	TITRATOR_190617A
	BMW-33	Aqueous	E300	Anions by IC method - Water	91339	100	06/14/19 01:37 PM	IC2_190614A
	BMW-33	Aqueous	E300	Anions by IC method - Water	91339	10	06/14/19 04:17 PM	IC2_190614A
	BMW-33	Aqueous	E300	Anions by IC method - Water	91339	1	06/14/19 06:57 PM	IC2_190614A
	BMW-33	Aqueous	M4500-P E	Orthophosphate	91343	1	06/14/19 12:28 PM	UV/VIS_2_190614B
	BMW-33	Aqueous	M2540C	Total Dissolved Solids	91377	1	06/18/19 03:40 PM	WC_190618A

LUMINANT

DHL Analytical, Inc.

Date: *21-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-25
Project:	A1 Area Landfill	**Lab ID:**	1906152-01
Project No:	19122434-D	**Collection Date:**	06/13/19 09:30 AM
Lab Order:	1906152	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **SP**
Calcium	167	1.00	3.00		mg/L	10	06/19/19 02:34 PM
Cobalt	0.0130	0.00300	0.00500		mg/L	1	06/19/19 12:25 PM
Iron	0.354	0.0300	0.100		mg/L	1	06/19/19 12:25 PM
Lithium	0.0501	0.00500	0.0100		mg/L	1	06/19/19 12:25 PM
Magnesium	106	1.00	3.00		mg/L	10	06/19/19 02:34 PM
Potassium	7.77	1.00	3.00		mg/L	10	06/19/19 02:34 PM
Sodium	253	2.00	6.00		mg/L	20	06/19/19 02:37 PM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	65.0	3.00	10.0		mg/L	10	06/14/19 02:57 PM
Fluoride	0.142	0.100	0.400	J	mg/L	1	06/14/19 05:37 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	06/14/19 05:37 PM
Sulfate	556	10.0	30.0		mg/L	10	06/14/19 02:57 PM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	771	10.0	20.0		mg/L @ pH 4.54	1	06/17/19 10:31 AM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	06/17/19 10:31 AM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	06/17/19 10:31 AM
Alkalinity, Total (As CaCO3)	771	20.0	20.0		mg/L @ pH 4.54	1	06/17/19 10:31 AM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	0.354	0.0500	0.100	N	mg/L	1	06/21/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	06/14/19 02:57 PM
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **BTJ**
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	06/14/19 12:26 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	1650	50.0	50.0		mg/L	1	06/18/19 03:40 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *21-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-29
Project:	A1 Area Landfill	**Lab ID:**	1906152-02
Project No:	19122434-D	**Collection Date:**	06/13/19 10:30 AM
Lab Order:	1906152	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **SP**
Calcium	176	2.00	6.00		mg/L	20	06/19/19 02:39 PM
Iron	1.01	0.0300	0.100		mg/L	1	06/19/19 12:27 PM
Lithium	0.114	0.00500	0.0100		mg/L	1	06/19/19 12:27 PM
Magnesium	94.5	2.00	6.00		mg/L	20	06/19/19 02:39 PM
Potassium	15.3	2.00	6.00		mg/L	20	06/19/19 02:39 PM
Sodium	429	2.00	6.00		mg/L	20	06/19/19 02:39 PM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	36.6	3.00	10.0		mg/L	10	06/14/19 03:13 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	06/14/19 05:53 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	06/14/19 05:53 PM
Sulfate	867	10.0	30.0		mg/L	10	06/14/19 03:13 PM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	819	10.0	20.0		mg/L @ pH 4.54	1	06/17/19 11:00 AM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	06/17/19 11:00 AM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	06/17/19 11:00 AM
Alkalinity, Total (As CaCO3)	819	20.0	20.0		mg/L @ pH 4.54	1	06/17/19 11:00 AM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	0.668	0.0500	0.100	N	mg/L	1	06/21/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	0.342	0.0500	0.100	N	mg/L	1	06/14/19 02:57 PM
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **BTJ**
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	06/14/19 12:27 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	2100	50.0	50.0		mg/L	1	06/18/19 03:40 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *21-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-30
Project:	A1 Area Landfill	**Lab ID:**	1906152-03
Project No:	19122434-D	**Collection Date:**	06/13/19 12:50 PM
Lab Order:	1906152	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **SP**
Barium	0.0982	0.00300	0.0100		mg/L	1	06/19/19 12:29 PM
Calcium	147	1.00	3.00		mg/L	10	06/19/19 02:41 PM
Iron	3.01	0.0300	0.100		mg/L	1	06/19/19 12:29 PM
Magnesium	65.9	1.00	3.00		mg/L	10	06/19/19 02:41 PM
Potassium	7.05	1.00	3.00		mg/L	10	06/19/19 02:41 PM
Sodium	158	1.00	3.00		mg/L	10	06/19/19 02:41 PM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	79.5	3.00	10.0		mg/L	10	06/14/19 03:29 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	06/14/19 06:09 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	06/14/19 06:09 PM
Sulfate	574	10.0	30.0		mg/L	10	06/14/19 03:29 PM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	315	10.0	20.0		mg/L @ pH 4.53	1	06/17/19 11:15 AM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.53	1	06/17/19 11:15 AM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.53	1	06/17/19 11:15 AM
Alkalinity, Total (As CaCO3)	315	20.0	20.0		mg/L @ pH 4.53	1	06/17/19 11:15 AM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	3.01	0.0500	0.100	N	mg/L	1	06/21/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	06/14/19 02:57 PM
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **BTJ**
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	06/14/19 12:27 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	1320	50.0	50.0		mg/L	1	06/18/19 03:40 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *21-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-31
Project:	A1 Area Landfill	**Lab ID:**	1906152-04
Project No:	19122434-D	**Collection Date:**	06/13/19 02:30 PM
Lab Order:	1906152	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **SP**
Calcium	1.70	0.100	0.300		mg/L	1	06/19/19 02:43 PM
Iron	0.102	0.0300	0.100		mg/L	1	06/19/19 12:31 PM
Lithium	0.0203	0.00500	0.0100		mg/L	1	06/19/19 12:31 PM
Magnesium	1.52	0.100	0.300		mg/L	1	06/19/19 12:31 PM
Potassium	0.238	0.100	0.300	J	mg/L	1	06/19/19 02:43 PM
Sodium	43.3	1.00	3.00		mg/L	10	06/19/19 02:45 PM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	24.7	0.300	1.00		mg/L	1	06/14/19 06:25 PM
Fluoride	0.255	0.100	0.400	J	mg/L	1	06/14/19 06:25 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	06/14/19 06:25 PM
Sulfate	34.4	1.00	3.00		mg/L	1	06/14/19 06:25 PM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	30.4	10.0	20.0		mg/L @ pH 4.49	1	06/17/19 11:19 AM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.49	1	06/17/19 11:19 AM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.49	1	06/17/19 11:19 AM
Alkalinity, Total (As CaCO3)	30.4	20.0	20.0		mg/L @ pH 4.49	1	06/17/19 11:19 AM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	0.102	0.0500	0.100	N	mg/L	1	06/21/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	06/14/19 02:58 PM
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **BTJ**
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	06/14/19 12:28 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	327	10.0	10.0		mg/L	1	06/18/19 03:40 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *21-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-32
Project:	A1 Area Landfill	**Lab ID:**	1906152-05
Project No:	19122434-D	**Collection Date:**	06/13/19 07:30 AM
Lab Order:	1906152	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **SP**
Calcium	134	1.00	3.00		mg/L	10	06/19/19 02:47 PM
Cobalt	0.00705	0.00300	0.00500		mg/L	1	06/19/19 12:34 PM
Iron	4.61	0.0300	0.100		mg/L	1	06/19/19 12:34 PM
Lithium	0.115	0.00500	0.0100		mg/L	1	06/19/19 12:34 PM
Magnesium	102	1.00	3.00		mg/L	10	06/19/19 02:47 PM
Potassium	4.56	1.00	3.00		mg/L	10	06/19/19 02:47 PM
Sodium	266	2.00	6.00		mg/L	20	06/19/19 03:12 PM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	364	3.00	10.0		mg/L	10	06/14/19 04:01 PM
Fluoride	0.822	0.100	0.400		mg/L	1	06/14/19 06:41 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	06/14/19 06:41 PM
Sulfate	446	10.0	30.0		mg/L	10	06/14/19 04:01 PM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	456	10.0	20.0		mg/L @ pH 4.54	1	06/17/19 11:46 AM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	06/17/19 11:46 AM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	06/17/19 11:46 AM
Alkalinity, Total (As CaCO3)	456	20.0	20.0		mg/L @ pH 4.54	1	06/17/19 11:46 AM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	4.61	0.0500	0.100	N	mg/L	1	06/21/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	06/14/19 02:58 PM
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **BTJ**
Phosphorus, Total Orthophosphate (As P)	0.0340	0.0300	0.100	J	mg/L	1	06/14/19 12:28 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	1720	50.0	50.0		mg/L	1	06/18/19 03:40 PM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *21-Jun-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-33
Project:	A1 Area Landfill	**Lab ID:**	1906152-06
Project No:	19122434-D	**Collection Date:**	06/13/19 08:15 AM
Lab Order:	1906152	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **SP**
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	06/19/19 12:36 PM
Calcium	97.5	1.00	3.00		mg/L	10	06/19/19 02:51 PM
Cobalt	0.0176	0.00300	0.00500		mg/L	1	06/19/19 12:36 PM
Iron	2.83	0.0300	0.100		mg/L	1	06/19/19 12:36 PM
Lithium	0.0206	0.00500	0.0100		mg/L	1	06/19/19 12:36 PM
Magnesium	56.5	1.00	3.00		mg/L	10	06/19/19 02:51 PM
Potassium	6.29	1.00	3.00		mg/L	10	06/19/19 02:51 PM
Sodium	207	1.00	3.00		mg/L	10	06/19/19 02:51 PM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JL**
Chloride	83.8	3.00	10.0		mg/L	10	06/14/19 04:17 PM
Fluoride	0.342	0.100	0.400	J	mg/L	1	06/14/19 06:57 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	06/14/19 06:57 PM
Sulfate	256	10.0	30.0		mg/L	10	06/14/19 04:17 PM
ALKALINITY		**M2320 B**					Analyst: **CC**
Alkalinity, Bicarbonate (As CaCO3)	528	10.0	20.0		mg/L @ pH 4.53	1	06/17/19 12:05 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.53	1	06/17/19 12:05 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.53	1	06/17/19 12:05 PM
Alkalinity, Total (As CaCO3)	528	20.0	20.0		mg/L @ pH 4.53	1	06/17/19 12:05 PM
FERRIC IRON (CALCULATED)		**M3500-FE D**					Analyst: **CAC**
Iron, Ferric	2.83	0.0500	0.100	N	mg/L	1	06/21/19
FERROUS IRON		**M3500-FE D**					Analyst: **BTJ**
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	06/14/19 02:59 PM
ORTHOPHOSPHATE		**M4500-P E**					Analyst: **BTJ**
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	06/14/19 12:28 PM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **JS**
Total Dissolved Solids (Residue, Filterable)	1100	50.0	50.0		mg/L	1	06/18/19 03:40 PM

LUMINANT

Qualifiers:	*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
	DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit
	ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
	S	Spike Recovery outside control limits	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190619B

The QC data in batch 91364 applies to the following samples: 1906152-01B, 1906152-02B, 1906152-03B, 1906152-04B, 1906152-05B, 1906152-06B

Sample ID **MB-91364** Batch ID: **91364** TestNo: **SW6020A** Units: **mg/L**
SampType: **MBLK** Run ID: **ICP-MS4_190619B** Analysis Date: **6/19/2019 2:20:00 PM** Prep Date: **6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	<0.100	0.300								
Potassium	<0.100	0.300								
Sodium	<0.100	0.300								

Sample ID **LCS-91364** Batch ID: **91364** TestNo: **SW6020A** Units: **mg/L**
SampType: **LCS** Run ID: **ICP-MS4_190619B** Analysis Date: **6/19/2019 2:22:00 PM** Prep Date: **6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	4.85	0.300	5.00	0	97.0	80	120			
Potassium	4.93	0.300	5.00	0	98.6	80	120			
Sodium	5.25	0.300	5.00	0	105	80	120			

Sample ID **LCSD-91364** Batch ID: **91364** TestNo: **SW6020A** Units: **mg/L**
SampType: **LCSD** Run ID: **ICP-MS4_190619B** Analysis Date: **6/19/2019 2:24:00 PM** Prep Date: **6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	4.83	0.300	5.00	0	96.6	80	120	0.496	15	
Potassium	5.07	0.300	5.00	0	101	80	120	2.80	15	
Sodium	5.32	0.300	5.00	0	106	80	120	1.32	15	

Sample ID **1906156-01A SD** Batch ID: **91364** TestNo: **SW6020A** Units: **mg/L**
SampType: **SD** Run ID: **ICP-MS4_190619B** Analysis Date: **6/19/2019 2:32:00 PM** Prep Date: **6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	8.18	1.50	0	8.11				0.846	10	
Potassium	2.17	1.50	0	2.15				0.715	10	
Sodium	76.4	1.50	0	73.6				3.77	10	

Sample ID **1906156-01A PDS** Batch ID: **91364** TestNo: **SW6020A** Units: **mg/L**
SampType: **PDS** Run ID: **ICP-MS4_190619B** Analysis Date: **6/19/2019 2:53:00 PM** Prep Date: **6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	12.4	0.300	5.00	8.11	86.2	80	120			
Potassium	6.91	0.300	5.00	2.15	95.1	80	120			
Sodium	73.3	0.300	5.00	73.6	-5.52	80	120			S

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190619B

Sample ID **1906156-01A MS**	Batch ID: **91364**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **MS**	Run ID: **ICP-MS4_190619B**	Analysis Date: **6/19/2019 2:55:00 PM**	Prep Date: **6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	12.8	0.300	5.00	8.11	92.9	80	120			
Potassium	7.18	0.300	5.00	2.15	100	80	120			
Sodium	76.9	0.300	5.00	73.6	67.1	80	120			S

Sample ID **1906156-01A MSD**	Batch ID: **91364**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **MSD**	Run ID: **ICP-MS4_190619B**	Analysis Date: **6/19/2019 2:57:00 PM**	Prep Date: **6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	12.7	0.300	5.00	8.11	92.7	80	120	0.075	15	
Potassium	7.12	0.300	5.00	2.15	99.2	80	120	0.869	15	
Sodium	75.0	0.300	5.00	73.6	29.2	80	120	2.49	15	S

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190619B

Sample ID **ICV-190619**	Batch ID: **R104661**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **ICV**	Run ID: **ICP-MS4_190619B**	Analysis Date: **6/19/2019 11:08:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	2.53	0.300	2.50	0	101	90	110			
Magnesium	2.44	0.300	2.50	0	97.7	90	110			
Potassium	2.53	0.300	2.50	0	101	90	110			
Sodium	2.61	0.300	2.50	0	104	90	110			

Sample ID **LCVL-190619**	Batch ID: **R104661**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS4_190619B**	Analysis Date: **6/19/2019 11:12:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	0.101	0.300	0.100	0	101	70	130			
Magnesium	0.0980	0.300	0.100	0	98.0	70	130			
Potassium	0.0981	0.300	0.100	0	98.1	70	130			
Sodium	0.104	0.300	0.100	0	104	70	130			

Sample ID **CCV1-190619**	Batch ID: **R104661**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **CCV**	Run ID: **ICP-MS4_190619B**	Analysis Date: **6/19/2019 11:46:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	4.77	0.300	5.00	0	95.3	90	110			
Magnesium	4.91	0.300	5.00	0	98.2	90	110			
Potassium	4.90	0.300	5.00	0	98.0	90	110			
Sodium	5.18	0.300	5.00	0	104	90	110			

Sample ID **LCVL1-190619**	Batch ID: **R104661**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS4_190619B**	Analysis Date: **6/19/2019 11:53:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	0.101	0.300	0.100	0	101	70	130			
Magnesium	0.0993	0.300	0.100	0	99.3	70	130			
Potassium	0.0994	0.300	0.100	0	99.4	70	130			
Sodium	0.124	0.300	0.100	0	124	70	130			

Sample ID **CCV2-190619**	Batch ID: **R104661**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **CCV**	Run ID: **ICP-MS4_190619B**	Analysis Date: **6/19/2019 2:59:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	4.77	0.300	5.00	0	95.4	90	110			
Magnesium	4.95	0.300	5.00	0	99.1	90	110			
Potassium	4.94	0.300	5.00	0	98.9	90	110			
Sodium	5.19	0.300	5.00	0	104	90	110			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190619B

Sample ID **LCVL2-190619**	Batch ID: **R104661**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS4_190619B**	Analysis Date: **6/19/2019 3:06:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	0.0955	0.300	0.100	0	95.5	70	130			
Magnesium	0.0994	0.300	0.100	0	99.4	70	130			
Potassium	0.0956	0.300	0.100	0	95.6	70	130			
Sodium	0.112	0.300	0.100	0	112	70	130			

Sample ID **CCV3-190619**	Batch ID: **R104661**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **CCV**	Run ID: **ICP-MS4_190619B**	Analysis Date: **6/19/2019 3:14:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	5.12	0.300	5.00	0	102	90	110			

Sample ID **LCVL3-190619**	Batch ID: **R104661**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS4_190619B**	Analysis Date: **6/19/2019 3:21:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	0.109	0.300	0.100	0	109	70	130			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190619B

The QC data in batch 91364 applies to the following samples: 1906152-01B, 1906152-02B, 1906152-03B, 1906152-04B, 1906152-05B, 1906152-06B

Sample ID **MB-91364** Batch ID: **91364** TestNo: **SW6020A** Units: **mg/L**
SampType: **MBLK** Run ID: **ICP-MS5_190619B** Analysis Date: **6/19/2019 12:04:00 PM** Prep Date: **6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	<0.00200	0.00500								
Barium	<0.00300	0.0100								
Cobalt	<0.00300	0.00500								
Iron	<0.0300	0.100								
Lithium	<0.00500	0.0100								
Magnesium	<0.100	0.300								

Sample ID **LCS-91364** Batch ID: **91364** TestNo: **SW6020A** Units: **mg/L**
SampType: **LCS** Run ID: **ICP-MS5_190619B** Analysis Date: **6/19/2019 12:07:00 PM** Prep Date: **6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.206	0.00500	0.200	0	103	80	120			
Barium	0.202	0.0100	0.200	0	101	80	120			
Cobalt	0.211	0.00500	0.200	0	105	80	120			
Iron	5.08	0.100	5.00	0	102	80	120			
Lithium	0.203	0.0100	0.200	0	102	80	120			
Magnesium	4.99	0.300	5.00	0	99.9	80	120			

Sample ID **LCSD-91364** Batch ID: **91364** TestNo: **SW6020A** Units: **mg/L**
SampType: **LCSD** Run ID: **ICP-MS5_190619B** Analysis Date: **6/19/2019 12:09:00 PM** Prep Date: **6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.208	0.00500	0.200	0	104	80	120	0.963	15	
Barium	0.201	0.0100	0.200	0	101	80	120	0.125	15	
Cobalt	0.210	0.00500	0.200	0	105	80	120	0.544	15	
Iron	5.10	0.100	5.00	0	102	80	120	0.434	15	
Lithium	0.201	0.0100	0.200	0	101	80	120	0.963	15	
Magnesium	5.10	0.300	5.00	0	102	80	120	2.20	15	

Sample ID **1906156-01A SD** Batch ID: **91364** TestNo: **SW6020A** Units: **mg/L**
SampType: **SD** Run ID: **ICP-MS5_190619B** Analysis Date: **6/19/2019 12:16:00 PM** Prep Date: **6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	<0.0100	0.0250	0	0				0	10	
Barium	0.190	0.0500	0	0.188				1.33	10	
Cobalt	0.0257	0.0250	0	0.0256				0.487	10	
Iron	0.159	0.500	0	0.161				1.10	10	
Lithium	<0.0250	0.0500	0	0.0130				0	10	
Magnesium	4.47	1.50	0	4.44				0.596	10	

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190619B

Sample ID **1906156-01A PDS**	Batch ID: **91364**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **PDS**	Run ID: **ICP-MS5_190619B**	Analysis Date: **6/19/2019 12:38:00 PM**	Prep Date: **6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.187	0.00500	0.200	0	93.5	80	120			
Barium	0.374	0.0100	0.200	0.188	93.3	80	120			
Cobalt	0.221	0.00500	0.200	0.0256	97.5	80	120			
Iron	5.30	0.100	5.00	0.161	103	80	120			
Lithium	0.218	0.0100	0.200	0.0130	102	80	120			
Magnesium	9.48	0.300	5.00	4.44	101	80	120			

Sample ID **1906156-01A MS**	Batch ID: **91364**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **MS**	Run ID: **ICP-MS5_190619B**	Analysis Date: **6/19/2019 12:40:00 PM**	Prep Date: **6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.193	0.00500	0.200	0	96.6	80	120			
Barium	0.384	0.0100	0.200	0.188	97.9	80	120			
Cobalt	0.225	0.00500	0.200	0.0256	99.6	80	120			
Iron	5.29	0.100	5.00	0.161	103	80	120			
Lithium	0.216	0.0100	0.200	0.0130	102	80	120			
Magnesium	9.65	0.300	5.00	4.44	104	80	120			

Sample ID **1906156-01A MSD**	Batch ID: **91364**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **MSD**	Run ID: **ICP-MS5_190619B**	Analysis Date: **6/19/2019 12:42:00 PM**	Prep Date: **6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.194	0.00500	0.200	0	96.9	80	120	0.339	15	
Barium	0.387	0.0100	0.200	0.188	99.8	80	120	0.972	15	
Cobalt	0.226	0.00500	0.200	0.0256	100	80	120	0.650	15	
Iron	5.29	0.100	5.00	0.161	103	80	120	0.019	15	
Lithium	0.216	0.0100	0.200	0.0130	101	80	120	0.236	15	
Magnesium	9.55	0.300	5.00	4.44	102	80	120	0.948	15	

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190619B

Sample ID **ICV-190619**	Batch ID: **R104660**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **ICV**	Run ID: **ICP-MS5_190619B**	Analysis Date: **6/19/2019 10:49:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.102	0.00500	0.100	0	102	90	110			
Barium	0.0979	0.0100	0.100	0	97.9	90	110			
Cobalt	0.102	0.00500	0.100	0	102	90	110			
Iron	2.48	0.100	2.50	0	99.4	90	110			
Lithium	0.101	0.0100	0.100	0	101	90	110			
Magnesium	2.45	0.300	2.50	0	98.2	90	110			

Sample ID **LCVL-190619**	Batch ID: **R104660**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS5_190619B**	Analysis Date: **6/19/2019 11:01:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.00481	0.00500	0.00500	0	96.2	70	130			
Barium	0.00509	0.0100	0.00500	0	102	70	130			
Cobalt	0.00504	0.00500	0.00500	0	101	70	130			
Iron	0.0961	0.100	0.100	0	96.1	70	130			
Lithium	0.0101	0.0100	0.0100	0	101	70	130			
Magnesium	0.0951	0.300	0.100	0	95.1	70	130			

Sample ID **CCV1-190619**	Batch ID: **R104660**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **CCV**	Run ID: **ICP-MS5_190619B**	Analysis Date: **6/19/2019 11:50:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.203	0.00500	0.200	0	102	90	110			
Barium	0.202	0.0100	0.200	0	101	90	110			
Cobalt	0.207	0.00500	0.200	0	103	90	110			
Iron	5.05	0.100	5.00	0	101	90	110			
Lithium	0.201	0.0100	0.200	0	100	90	110			
Magnesium	5.02	0.300	5.00	0	100	90	110			

Sample ID **LCVL1-190619**	Batch ID: **R104660**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS5_190619B**	Analysis Date: **6/19/2019 11:56:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.00500	0.00500	0.00500	0	100	70	130			
Barium	0.00470	0.0100	0.00500	0	94.1	70	130			
Cobalt	0.00498	0.00500	0.00500	0	99.5	70	130			
Iron	0.0962	0.100	0.100	0	96.2	70	130			
Lithium	0.0101	0.0100	0.0100	0	101	70	130			
Magnesium	0.100	0.300	0.100	0	100	70	130			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190619B

Sample ID **CCV2-190619**	Batch ID: **R104660**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **CCV**	Run ID: **ICP-MS5_190619B**	Analysis Date: **6/19/2019 12:45:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.202	0.00500	0.200	0	101	90	110			
Barium	0.201	0.0100	0.200	0	101	90	110			
Cobalt	0.209	0.00500	0.200	0	105	90	110			
Iron	5.12	0.100	5.00	0	102	90	110			
Lithium	0.203	0.0100	0.200	0	101	90	110			
Magnesium	5.09	0.300	5.00	0	102	90	110			

Sample ID **LCVL2-190619**	Batch ID: **R104660**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS5_190619B**	Analysis Date: **6/19/2019 12:50:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.00496	0.00500	0.00500	0	99.3	70	130			
Barium	0.00514	0.0100	0.00500	0	103	70	130			
Cobalt	0.00512	0.00500	0.00500	0	102	70	130			
Iron	0.0963	0.100	0.100	0	96.3	70	130			
Lithium	0.0104	0.0100	0.0100	0	104	70	130			
Magnesium	0.0964	0.300	0.100	0	96.4	70	130			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190614A

The QC data in batch 91339 applies to the following samples: 1906152-01C, 1906152-02C, 1906152-03C, 1906152-04C, 1906152-05C, 1906152-06C

Sample ID	**MB-91339**	Batch ID:	**91339**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MBLK**	Run ID:	**IC2_190614A**	Analysis Date:	**6/14/2019 10:18:32 AM**	Prep Date:	**6/14/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	<0.300	1.00								
Fluoride	<0.100	0.400								
Nitrate-N	<0.100	0.500								
Sulfate	<1.00	3.00								

Sample ID	**LCS-91339**	Batch ID:	**91339**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**LCS**	Run ID:	**IC2_190614A**	Analysis Date:	**6/14/2019 10:34:32 AM**	Prep Date:	**6/14/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.0	1.00	10.00	0	100	90	110			
Fluoride	3.99	0.400	4.000	0	99.8	90	110			
Nitrate-N	5.09	0.500	5.000	0	102	90	110			
Sulfate	30.3	3.00	30.00	0	101	90	110			

Sample ID	**LCSD-91339**	Batch ID:	**91339**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**LCSD**	Run ID:	**IC2_190614A**	Analysis Date:	**6/14/2019 10:50:32 AM**	Prep Date:	**6/14/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.1	1.00	10.00	0	101	90	110	0.555	20	
Fluoride	4.01	0.400	4.000	0	100	90	110	0.489	20	
Nitrate-N	5.10	0.500	5.000	0	102	90	110	0.295	20	
Sulfate	30.5	3.00	30.00	0	102	90	110	0.758	20	

Sample ID	**1906110-04BMS**	Batch ID:	**91339**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MS**	Run ID:	**IC2_190614A**	Analysis Date:	**6/14/2019 11:26:46 AM**	Prep Date:	**6/14/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	2380	100	2000	317.4	103	90	110			
Fluoride	2080	40.0	2000	0	104	90	110			
Nitrate-N	451	50.0	451.6	0	99.8	90	110			
Sulfate	4020	300	2000	2016	100	90	110			

Sample ID	**1906110-04BMSD**	Batch ID:	**91339**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MSD**	Run ID:	**IC2_190614A**	Analysis Date:	**6/14/2019 11:42:46 AM**	Prep Date:	**6/14/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	2390	100	2000	317.4	103	90	110	0.283	20	
Fluoride	2090	40.0	2000	0	104	90	110	0.334	20	
Nitrate-N	452	50.0	451.6	0	100	90	110	0.221	20	
Sulfate	4040	300	2000	2016	101	90	110	0.513	20	

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190614A

Sample ID **ICV-190614**	Batch ID: **R104590**	TestNo: **E300**	Units: **mg/L**
SampType: **ICV**	Run ID: **IC2_190614A**	Analysis Date: **6/14/2019 9:46:32 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	25.7	1.00	25.00	0	103	90	110			
Fluoride	10.2	0.400	10.00	0	102	90	110			
Nitrate-N	13.1	0.500	12.50	0	105	90	110			
Sulfate	77.5	3.00	75.00	0	103	90	110			

Sample ID **CCV1-190614**	Batch ID: **R104590**	TestNo: **E300**	Units: **mg/L**
SampType: **CCV**	Run ID: **IC2_190614A**	Analysis Date: **6/14/2019 2:25:37 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.2	1.00	10.00	0	102	90	110			
Fluoride	4.09	0.400	4.000	0	102	90	110			
Nitrate-N	5.17	0.500	5.000	0	103	90	110			
Sulfate	30.9	3.00	30.00	0	103	90	110			

Sample ID **CCV2-190614**	Batch ID: **R104590**	TestNo: **E300**	Units: **mg/L**
SampType: **CCV**	Run ID: **IC2_190614A**	Analysis Date: **6/14/2019 5:05:37 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.3	1.00	10.00	0	103	90	110			
Fluoride	4.13	0.400	4.000	0	103	90	110			
Nitrate-N	5.22	0.500	5.000	0	104	90	110			
Sulfate	31.2	3.00	30.00	0	104	90	110			

Sample ID **CCV3-190614**	Batch ID: **R104590**	TestNo: **E300**	Units: **mg/L**
SampType: **CCV**	Run ID: **IC2_190614A**	Analysis Date: **6/14/2019 7:45:37 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.4	1.00	10.00	0	104	90	110			
Fluoride	4.17	0.400	4.000	0	104	90	110			
Nitrate-N	5.25	0.500	5.000	0	105	90	110			
Sulfate	31.6	3.00	30.00	0	105	90	110			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: TITRATOR_190617A

The QC data in batch 91346 applies to the following samples: 1906152-01C, 1906152-02C, 1906152-03C, 1906152-04C, 1906152-05C, 1906152-06C

Sample ID **MB-91346**	Batch ID: **91346**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.53**
SampType: **MBLK**	Run ID: **TITRATOR_190617A**	Analysis Date: **6/17/2019 9:13:00 AM**	Prep Date: **6/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	<10.0	20.0								
Alkalinity, Carbonate (As CaCO3)	<10.0	20.0								
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0								
Alkalinity, Total (As CaCO3)	<20.0	20.0								

Sample ID **LCS-91346**	Batch ID: **91346**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.23**
SampType: **LCS**	Run ID: **TITRATOR_190617A**	Analysis Date: **6/17/2019 9:17:00 AM**	Prep Date: **6/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	51.5	20.0	50.00	0	103	74	129			

Sample ID **1906152-04C DUP**	Batch ID: **91346**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.5**
SampType: **DUP**	Run ID: **TITRATOR_190617A**	Analysis Date: **6/17/2019 11:22:00 AM**	Prep Date: **6/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	30.3	20.0	0	30.40				0.329	20	
Alkalinity, Carbonate (As CaCO3)	<10.0	20.0	0	0				0	20	
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0	0				0	20	
Alkalinity, Total (As CaCO3)	30.3	20.0	0	30.40				0.329	20	

Sample ID **1906152-06C DUP**	Batch ID: **91346**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.53**
SampType: **DUP**	Run ID: **TITRATOR_190617A**	Analysis Date: **6/17/2019 12:24:00 PM**	Prep Date: **6/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	525	20.0	0	527.6				0.418	20	
Alkalinity, Carbonate (As CaCO3)	<10.0	20.0	0	0				0	20	
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0	0				0	20	
Alkalinity, Total (As CaCO3)	525	20.0	0	527.6				0.418	20	

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: TITRATOR_190617A

Sample ID **ICV-190617**	Batch ID: **R104621**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.34**
SampType: **ICV**	Run ID: **TITRATOR_190617A**	Analysis Date: **6/17/2019 9:10:00 AM**	Prep Date: **6/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	7.60	20.0	0							
Alkalinity, Carbonate (As CaCO3)	92.5	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0							
Alkalinity, Total (As CaCO3)	100	20.0	100.0	0	100	98	102			

Sample ID **CCV1-190617**	Batch ID: **R104621**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.33**
SampType: **CCV**	Run ID: **TITRATOR_190617A**	Analysis Date: **6/17/2019 11:27:00 AM**	Prep Date: **6/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	24.5	20.0	0							
Alkalinity, Carbonate (As CaCO3)	74.1	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0							
Alkalinity, Total (As CaCO3)	98.6	20.0	100.0	0	98.6	90	110			

Sample ID **CCV2-190617**	Batch ID: **R104621**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.37**
SampType: **CCV**	Run ID: **TITRATOR_190617A**	Analysis Date: **6/17/2019 12:53:00 PM**	Prep Date: **6/17/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	33.0	20.0	0							
Alkalinity, Carbonate (As CaCO3)	65.8	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0							
Alkalinity, Total (As CaCO3)	98.8	20.0	100.0	0	98.8	90	110			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190614B

The QC data in batch 91343 applies to the following samples: 1906152-01C, 1906152-02C, 1906152-03C, 1906152-04C, 1906152-05C, 1906152-06C

Sample ID **MB-91343**	Batch ID: **91343**		TestNo: **M4500-P E**				Units: **mg/L**				
SampType: **MBLK**	Run ID: **UV/VIS_2_190614B**		Analysis Date: **6/14/2019 12:25:00 PM**				Prep Date: **6/14/2019**				
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Phosphorus, Total Orthophosphate (As	<0.0300	0.100									

Sample ID **LCS-91343**	Batch ID: **91343**		TestNo: **M4500-P E**				Units: **mg/L**				
SampType: **LCS**	Run ID: **UV/VIS_2_190614B**		Analysis Date: **6/14/2019 12:25:00 PM**				Prep Date: **6/14/2019**				
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Phosphorus, Total Orthophosphate (As	0.479	0.100	0.5000	0	95.8	80	120				

Sample ID **LCSD-91343**	Batch ID: **91343**		TestNo: **M4500-P E**				Units: **mg/L**				
SampType: **LCSD**	Run ID: **UV/VIS_2_190614B**		Analysis Date: **6/14/2019 12:25:00 PM**				Prep Date: **6/14/2019**				
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Phosphorus, Total Orthophosphate (As	0.477	0.100	0.5000	0	95.4	80	120	0.418	15		

Sample ID **1906152-01CMS**	Batch ID: **91343**		TestNo: **M4500-P E**				Units: **mg/L**				
SampType: **MS**	Run ID: **UV/VIS_2_190614B**		Analysis Date: **6/14/2019 12:26:00 PM**				Prep Date: **6/14/2019**				
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Phosphorus, Total Orthophosphate (As	0.514	0.100	0.5000	0	103	80	120				

Sample ID **1906152-01CMSD**	Batch ID: **91343**		TestNo: **M4500-P E**				Units: **mg/L**				
SampType: **MSD**	Run ID: **UV/VIS_2_190614B**		Analysis Date: **6/14/2019 12:26:00 PM**				Prep Date: **6/14/2019**				
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Phosphorus, Total Orthophosphate (As	0.516	0.100	0.5000	0	103	80	120	0.388	15		

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190614B

Sample ID **ICV-190614**	Batch ID: **R104598**	TestNo: **M4500-P E**	Units: **mg/L**
SampType: **ICV**	Run ID: **UV/VIS_2_190614B**	Analysis Date: **6/14/2019 12:24:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.197	0.100	0.2000	0	98.5	85	115			

Sample ID **CCV1-190614**	Batch ID: **R104598**	TestNo: **M4500-P E**	Units: **mg/L**
SampType: **CCV**	Run ID: **UV/VIS_2_190614B**	Analysis Date: **6/14/2019 12:29:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.547	0.100	0.5000	0	109	85	115			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190614C

The QC data in batch 91344 applies to the following samples: 1906152-01A, 1906152-02A, 1906152-03A, 1906152-04A, 1906152-05A, 1906152-06A

Sample ID **MB-91344**	Batch ID: **91344**	TestNo: **M3500-Fe D**	Units: **mg/L**
SampType: **MBLK**	Run ID: **UV/VIS_2_190614C**	Analysis Date: **6/14/2019 2:51:00 PM**	Prep Date: **6/14/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	<0.0500	0.100								N

Sample ID **LCS-91344**	Batch ID: **91344**	TestNo: **M3500-Fe D**	Units: **mg/L**
SampType: **LCS**	Run ID: **UV/VIS_2_190614C**	Analysis Date: **6/14/2019 2:52:00 PM**	Prep Date: **6/14/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.0968	0.100	0.1000	0	96.8	85	115			N

Sample ID **LCSD-91344**	Batch ID: **91344**	TestNo: **M3500-Fe D**	Units: **mg/L**
SampType: **LCSD**	Run ID: **UV/VIS_2_190614C**	Analysis Date: **6/14/2019 2:52:00 PM**	Prep Date: **6/14/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.0877	0.100	0.1000	0	87.7	85	115	9.92	15	N

Sample ID **1906089-01AMS**	Batch ID: **91344**	TestNo: **M3500-Fe D**	Units: **mg/L**
SampType: **MS**	Run ID: **UV/VIS_2_190614C**	Analysis Date: **6/14/2019 2:54:00 PM**	Prep Date: **6/14/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.0880	0.100	0.1000	0	88.0	85	115			N

Sample ID **1906089-01AMSD**	Batch ID: **91344**	TestNo: **M3500-Fe D**	Units: **mg/L**
SampType: **MSD**	Run ID: **UV/VIS_2_190614C**	Analysis Date: **6/14/2019 2:54:00 PM**	Prep Date: **6/14/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.0896	0.100	0.1000	0	89.6	85	115	1.77	15	N

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190614C

Sample ID **ICV-190614**	Batch ID: **R104612**	TestNo: **M3500-Fe D**	Units: **mg/L**
SampType: **ICV**	Run ID: **UV/VIS_2_190614C**	Analysis Date: **6/14/2019 2:50:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.0902	0.100	0.1000	0	90.2	85	115			N

Sample ID **CCV1-190614**	Batch ID: **R104612**	TestNo: **M3500-Fe D**	Units: **mg/L**
SampType: **CCV**	Run ID: **UV/VIS_2_190614C**	Analysis Date: **6/14/2019 3:01:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.192	0.100	0.2000	0	96.1	85	115			N

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1906152
Project: A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: WC_190618A

The QC data in batch 91377 applies to the following samples: 1906152-01C, 1906152-02C, 1906152-03C, 1906152-04C, 1906152-05C, 1906152-06C

Sample ID	**MB-91377**	Batch ID:	**91377**	TestNo:	**M2540C**	Units:	**mg/L**
SampType:	**MBLK**	Run ID:	**WC_190618A**	Analysis Date:	**6/18/2019 3:40:00 PM**	Prep Date:	**6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	<10.0	10.0								

Sample ID	**LCS-91377**	Batch ID:	**91377**	TestNo:	**M2540C**	Units:	**mg/L**
SampType:	**LCS**	Run ID:	**WC_190618A**	Analysis Date:	**6/18/2019 3:40:00 PM**	Prep Date:	**6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	756	10.0	745.6	0	101	90	113			

Sample ID	**1906152-01C-DUP**	Batch ID:	**91377**	TestNo:	**M2540C**	Units:	**mg/L**
SampType:	**DUP**	Run ID:	**WC_190618A**	Analysis Date:	**6/18/2019 3:40:00 PM**	Prep Date:	**6/18/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	1620	50.0	0	1645				1.84	5	

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

July 19, 2019

Will Vienne
Golder
2201 Double Creek Dr #4004
Round Rock, Texas 78664
TEL: (512) 671-3434
FAX (512) 671-3446

Order No.: 1907114

RE: Luminant-MLSES-A1 Area Landfill

Dear Will Vienne:

DHL Analytical, Inc. received 4 sample(s) on 7/10/2019 for the analyses presented in the following report.

There were no problems with the analyses and all data met requirements of NELAP except where noted in the Case Narrative. All non-NELAP methods will be identified accordingly in the case narrative and all estimated uncertainties of test results are within method or EPA specifications.

If you have any questions regarding these tests results, please feel free to call. Thank you for using DHL Analytical.

Sincerely,

John DuPont
General Manager

LUMINANT

This report was performed under the accreditation of the State of Texas Laboratory Certification Number: T104704211-19-24

Table of Contents

Miscellaneous Documents **3**

CaseNarrative 1907114 ..... **6**

WorkOrderSampleSummary 1907114 ..... **7**

PrepDatesReport 1907114 ..... **8**

AnalyticalDatesReport 1907114 ..... **9**

Analytical Report 1907114 ..... **10**

AnalyticalQCSummaryReport 1907114 ..... **14**

LUMINANT

DHL ANALYTICAL
2300 Double Creek Dr. ■ Round Rock, TX 78664
Phone (512) 388-8222 ■ FAX (512) 388-8229
Web: www.dhlanalytical.com
E-Mail: login@dhlanalytical.com

№ 83671

CHAIN-OF-CUSTODY

CLIENT: GOLDER
ADDRESS: 2201 DOUBLE CREEK DR ROUND ROCK, TX 78664
PHONE: 512-671-3434 FAX/E-MAIL: 512-671-3446
DATA REPORTED TO: WILL VIENNE
ADDITIONAL REPORT COPIES TO:

DATE: 7-9-19 PAGE 1 OF 1
PO #: 19122262-D DHL WORK ORDER #: 1907114
PROJECT LOCATION OR NAME: LUMINANT - MLSES - A1 AREA LANDFILL
CLENT PROJECT #: 19122262-D COLLECTOR: J. BRAMTON

Authorize 5% surcharge for TRRP Report? ☐ Yes ☐ No

S=SOIL W=WATER A=AIR L=LIQUID SE=SEDIMENT P=PAINT SL=SLUDGE O=OTHER SO=SOLID

Field Sample I.D.	DHL Lab #	Date	Time	Matrix	Container Type	# of Containers	PRESERVATION: HCl	HNO_3	H_2SO_4 ☐ NaOH ☐	ICE	UNPRESERVED	ANALYSES: LITHIUM	COBALT	FIELD NOTES
BMW-29	01	7-8-19	0945	W	P	1		X		X		X		
BMW-32	02	↓	1420	W	P	1		X		X		X		
BMW-25	03		1255	W	P	1		X		X			X	
AIV-18-OB-95	04	↓	1135	W	P	1		X		X		X		

LUMINANT

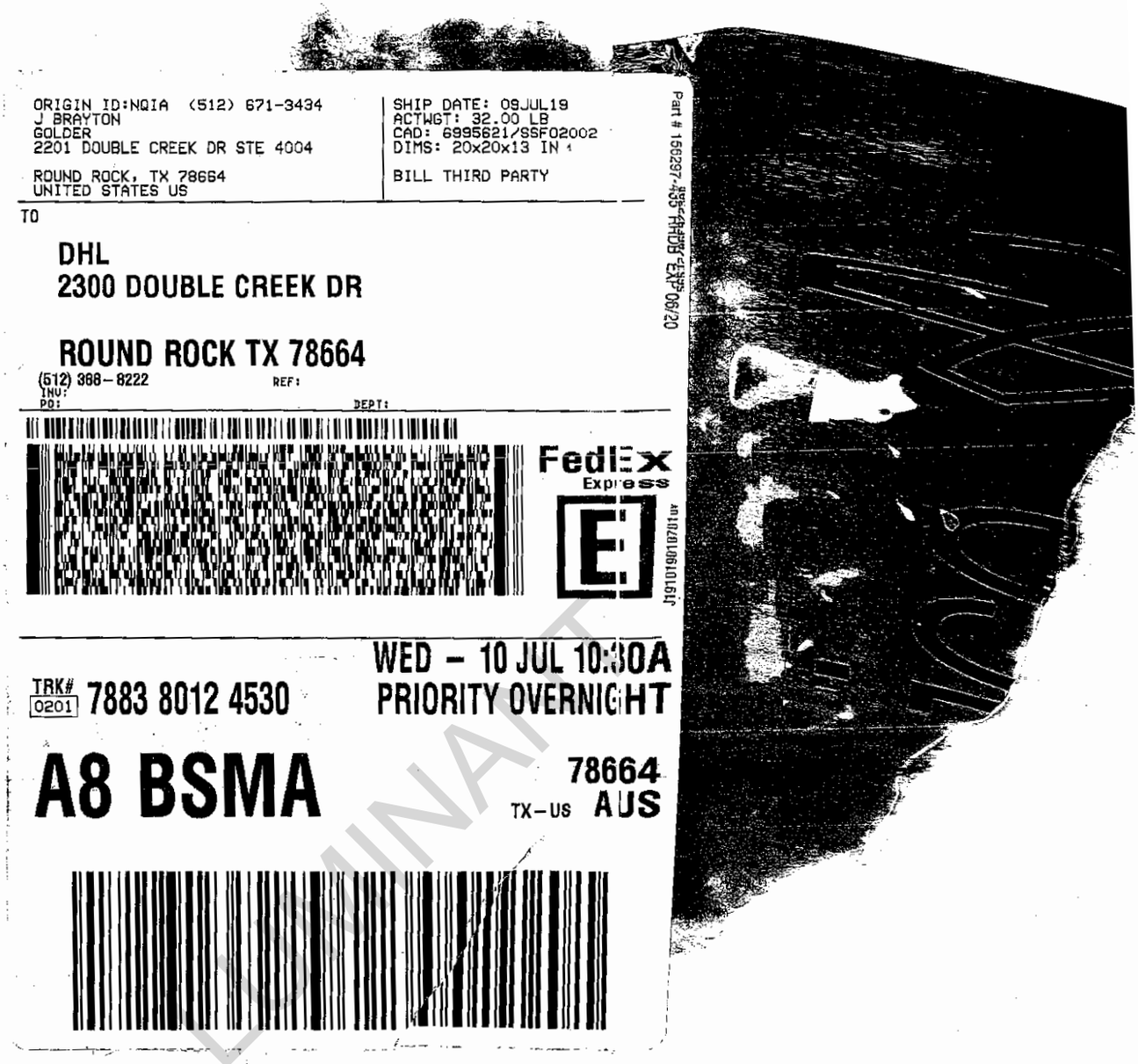
RELINQUISHED BY: (Signature) DATE/TIME 7-9-19 1800 RECEIVED BY: (Signature) FedEx
RELINQUISHED BY: (Signature) FedEx DATE/TIME 7/10/19 1011 RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature) DATE/TIME RECEIVED BY: (Signature)

☐ DHL DISPOSAL @ $5.00 each ☐ Return

TURN AROUND TIME
RUSH ☐ CALL FIRST
1 DAY ☐ CALL FIRST
2 DAY ☐
NORMAL ☒
OTHER ☐ _____

LABORATORY USE ONLY:
RECEIVING TEMP: 1.4°C THERM #: 78
CUSTODY SEALS: ☐ BROKEN ☐ INTACT ☑ NOT USED
CARRIER: ☐ LONE STAR ☑ FEDEX ☐ UPS ☐ OTHER
☐ COURIER DELIVERY
☐ HAND DELIVERED

DHL COC Rev 1 | FEB 2010



ORIGIN ID:NQIA (512) 671-3434
J BRAYTON
GOLDER
2201 DOUBLE CREEK DR STE 4004

ROUND ROCK, TX 78664
UNITED STATES US

SHIP DATE: 09JUL19
ACTWGT: 32.00 LB
CAD: 6995621/SSF02002
DIMS: 20x20x13 IN

BILL THIRD PARTY

TO

DHL
2300 DOUBLE CREEK DR

ROUND ROCK TX 78664
(512) 388-8222 REF:
INV:
PO: DEPT:

FedEx Express

TRK# 0201 7883 8012 4530

WED - 10 JUL 10:30A
PRIORITY OVERNIGHT

A8 BSMA

78664
TX-US AUS

Part # 166297-4[illegible] RATED EXP 06/20

DOMINANT

DHL Analytical, Inc.

Sample Receipt Checklist

Client Name Golder | Date Received: 7/10/2019

Work Order Number 1907114 | Received by JW

Checklist completed by: Signature 7/10/2019 Date | Reviewed by Initials 7/10/2019 Date

Carrier name FedEx 1day

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shippping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	1.4 °C
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH<2 acceptable upon receipt?	Yes ☐	No ☐	NA ☑ LOT #
	Adjusted?		Checked by
Water - ph>9 (S) or ph>10 (CN) acceptable upon receipt?	Yes ☐	No ☐	NA ☑ LOT #
	Adjusted?		Checked by

Any No response must be detailed in the comments section below.

Client contacted _____ Date contacted: _____ Person contacted _____

Contacted by: _____ Regarding: _____

Comments: _____

Corrective Action _____

LUMINART

DHL Analytical, Inc. **Date:** *19-Jul-19*

CLIENT: Golder
Project: Luminant-MLSES-A1 Area Landfill
Lab Order: 1907114

CASE NARRATIVE

Samples were analyzed using the methods outlined in the following references:

Method SW6020A - Metals Analysis

LOG IN

The samples were received and log-in performed on 7/10/2019. A total of 4 samples were received and analyzed. The samples arrived in good condition and were properly packaged. All method blanks, laboratory spikes, and/or matrix spikes met quality assurance objectives.

LUMINANT

DHL Analytical, Inc.

Date: *19-Jul-19*

CLIENT: Golder
Project: Luminant-MLSES-A1 Area Landfill
Lab Order: 1907114

Work Order Sample Summary

Lab Smp ID	Client Sample ID	Tag Number	Date Collected	Date Recved
1907114-01	BMW-29		07/08/19 09:45 AM	7/10/2019
1907114-02	BMW-32		07/08/19 02:20 PM	7/10/2019
1907114-03	BMW-25		07/08/19 12:55 PM	7/10/2019
1907114-04	A1V-18-OB-95		07/08/19 11:35 AM	7/10/2019

LUMINANT

Lab Order: 1907114
Client: Golder
Project: Luminant-MLSES-A1 Area Landfi

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1907114-01A	BMW-29	07/08/19 09:45 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	07/12/19 10:48 AM	91752
1907114-02A	BMW-32	07/08/19 02:20 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	07/12/19 10:48 AM	91752
1907114-03A	BMW-25	07/08/19 12:55 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	07/12/19 10:48 AM	91752
1907114-04A	A1V-18-OB-95	07/08/19 11:35 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	07/12/19 10:48 AM	91752
	A1V-18-OB-95	07/08/19 11:35 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	07/12/19 10:48 AM	91752

LUMINANT

Lab Order: 1907114
Client: Golder
Project: Luminant-MLSES-A1 Area Landfi

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1907114-01A	BMW-29	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91752	1	07/15/19 11:41 AM	ICP-MS5_190715A
1907114-02A	BMW-32	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91752	1	07/15/19 11:43 AM	ICP-MS5_190715A
1907114-03A	BMW-25	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91752	1	07/15/19 11:45 AM	ICP-MS5_190715A
1907114-04A	A1V-18-OB-95	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91752	1	07/15/19 11:32 AM	ICP-MS5_190715A
	A1V-18-OB-95	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91752	1	07/16/19 11:00 AM	ICP-MS4_190716A

LUMINANT

DHL Analytical, Inc.

Date: *19-Jul-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-29
Project:	Luminant-MLSES-A1 Area Landfill	**Lab ID:**	1907114-01
Project No:	19122262-D	**Collection Date:**	07/08/19 09:45 AM
Lab Order:	1907114	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **SP**
Lithium	0.104	0.00500	0.0100		mg/L	1	07/15/19 11:41 AM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *19-Jul-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-32
Project:	Luminant-MLSES-A1 Area Landfill	**Lab ID:**	1907114-02
Project No:	19122262-D	**Collection Date:**	07/08/19 02:20 PM
Lab Order:	1907114	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **SP**
Lithium	0.116	0.00500	0.0100		mg/L	1	07/15/19 11:43 AM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *19-Jul-19*

CLIENT:	Golder	**Client Sample ID:**	BMW-25
Project:	Luminant-MLSES-A1 Area Landfill	**Lab ID:**	1907114-03
Project No:	19122262-D	**Collection Date:**	07/08/19 12:55 PM
Lab Order:	1907114	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **SP**
Cobalt	0.00514	0.00300	0.00500		mg/L	1	07/15/19 11:45 AM

LUMINANT

Qualifiers:	*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
	DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
	J	Analyte detected between MDL and RL	MDL	Method Detection Limit
	ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
	S	Spike Recovery outside control limits	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *19-Jul-19*

CLIENT:	Golder	**Client Sample ID:**	A1V-18-OB-95
Project:	Luminant-MLSES-A1 Area Landfill	**Lab ID:**	1907114-04
Project No:	19122262-D	**Collection Date:**	07/08/19 11:35 AM
Lab Order:	1907114	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **SP**
Lithium	0.0454	0.00500	0.0100		mg/L	1	07/15/19 11:32 AM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	C	Sample Result or QC discussed in the Case Narrative
DF	Dilution Factor	E	TPH pattern not Gas or Diesel Range Pattern
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	RL	Reporting Limit
S	Spike Recovery outside control limits	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1907114
Project: Luminant-MLSES-A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190715A

The QC data in batch 91752 applies to the following samples: 1907114-01A, 1907114-02A, 1907114-03A, 1907114-04A

Sample ID **MB-91752** Batch ID: **91752** TestNo: **SW6020A** Units: **mg/L**
SampType: **MBLK** Run ID: **ICP-MS5_190715A** Analysis Date: **7/15/2019 11:23:00 AM** Prep Date: **7/12/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	<0.00300	0.00500								
Lithium	<0.00500	0.0100								

Sample ID **LCS-91752** Batch ID: **91752** TestNo: **SW6020A** Units: **mg/L**
SampType: **LCS** Run ID: **ICP-MS5_190715A** Analysis Date: **7/15/2019 11:26:00 AM** Prep Date: **7/12/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.205	0.00500	0.200	0	102	80	120			
Lithium	0.201	0.0100	0.200	0	100	80	120			

Sample ID **LCSD-91752** Batch ID: **91752** TestNo: **SW6020A** Units: **mg/L**
SampType: **LCSD** Run ID: **ICP-MS5_190715A** Analysis Date: **7/15/2019 11:28:00 AM** Prep Date: **7/12/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.205	0.00500	0.200	0	102	80	120	0.097	15	
Lithium	0.200	0.0100	0.200	0	100	80	120	0.171	15	

Sample ID **1907114-04A SD** Batch ID: **91752** TestNo: **SW6020A** Units: **mg/L**
SampType: **SD** Run ID: **ICP-MS5_190715A** Analysis Date: **7/15/2019 11:34:00 AM** Prep Date: **7/12/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	<0.0150	0.0250	0	0				0	10	
Lithium	0.0460	0.0500	0	0.0454				1.23	10	

Sample ID **1907114-04A PDS** Batch ID: **91752** TestNo: **SW6020A** Units: **mg/L**
SampType: **PDS** Run ID: **ICP-MS5_190715A** Analysis Date: **7/15/2019 11:56:00 AM** Prep Date: **7/12/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.189	0.00500	0.200	0	94.7	80	120			
Lithium	0.247	0.0100	0.200	0.0454	101	80	120			

Sample ID **1907114-04A MS** Batch ID: **91752** TestNo: **SW6020A** Units: **mg/L**
SampType: **MS** Run ID: **ICP-MS5_190715A** Analysis Date: **7/15/2019 11:58:00 AM** Prep Date: **7/12/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.191	0.00500	0.200	0	95.3	80	120			
Lithium	0.244	0.0100	0.200	0.0454	99.4	80	120			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1907114
Project: Luminant-MLSES-A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: **ICP-MS5_190715A**

Sample ID **1907114-04A MSD**	Batch ID: **91752**	TestNo: **SW6020A**	Units: **mg/L**		
SampType: **MSD**	Run ID: **ICP-MS5_190715A**	Analysis Date: **7/15/2019 12:01:00 PM**	Prep Date: **7/12/2019**		

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.190	0.00500	0.200	0	94.9	80	120	0.463	15	
Lithium	0.242	0.0100	0.200	0.0454	98.1	80	120	1.07	15	

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1907114
Project: Luminant-MLSES-A1 Area Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190715A

Sample ID **ICV-190715**	Batch ID: **R105116**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **ICV**	Run ID: **ICP-MS5_190715A**	Analysis Date: **7/15/2019 11:07:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.101	0.00500	0.100	0	101	90	110			
Lithium	0.103	0.0100	0.100	0	103	90	110			

Sample ID **LCVL-190715**	Batch ID: **R105116**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS5_190715A**	Analysis Date: **7/15/2019 11:15:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.00489	0.00500	0.00500	0	97.7	70	130			
Lithium	0.0103	0.0100	0.0100	0	103	70	130			

Sample ID **CCV1-190715**	Batch ID: **R105116**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **CCV**	Run ID: **ICP-MS5_190715A**	Analysis Date: **7/15/2019 12:03:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.192	0.00500	0.200	0	96.1	90	110			
Lithium	0.197	0.0100	0.200	0	98.7	90	110			

Sample ID **LCVL1-190715**	Batch ID: **R105116**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS5_190715A**	Analysis Date: **7/15/2019 12:08:00 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.00495	0.00500	0.00500	0	98.9	70	130			
Lithium	0.00992	0.0100	0.0100	0	99.2	70	130			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

August 20, 2019

Will Vienne
Golder
2201 Double Creek Dr #4004
Round Rock, Texas 78664
TEL: (512) 671-3434
FAX (512) 671-3446

Order No.: 1908174

RE: Luminant-A1 Area

Dear Will Vienne:

DHL Analytical, Inc. received 2 sample(s) on 8/16/2019 for the analyses presented in the following report.

There were no problems with the analyses and all data met requirements of NELAP except where noted in the Case Narrative. All non-NELAP methods will be identified accordingly in the case narrative and all estimated uncertainties of test results are within method or EPA specifications.

If you have any questions regarding these tests results, please feel free to call. Thank you for using DHL Analytical.

Sincerely,

John DuPont
General Manager

LUMINANT

This report was performed under the accreditation of the State of Texas Laboratory Certification Number: T104704211-19-24

Table of Contents

Miscellaneous Documents 3

CaseNarrative 1908174 9

WorkOrderSampleSummary 1908174 10

PrepDatesReport 1908174 11

AnalyticalDatesReport 1908174 12

Analytical Report 1908174 13

AnalyticalQCSummaryReport 1908174 15

MQLSummaryReport 1908174 19

LUMINANT

DHL ANALYTICAL
2300 Double Creek Dr. ■ Round Rock, TX 78664
Phone (512) 388-8222 ■ FAX (512) 388-8229
Web: www.dhlanalytical.com
E-Mail: login@dhlanalytical.com

№ 85327

CHAIN-OF-CUSTODY

CLIENT: GOLDER
ADDRESS: 2201 DOUBLE CREEK DR ROUND ROCK, TX 78664
PHONE: 512-671-3434 FAX/E-MAIL: 512-671-3446
DATA REPORTED TO: WILL VIENNE
ADDITIONAL REPORT COPIES TO:

DATE: 8-14-19 PAGE 1 OF 1
PO #: 1912226.2-C DHL WORK ORDER #: 1908174
PROJECT LOCATION OR NAME: LUMINANT - A1 AREA
CLENT PROJECT #: 1912226.2-C COLLECTOR: J. BRAYTON

Authorize 5% surcharge for TRRP Report? ☐ Yes ☐ No

S=SOIL W=WATER A=AIR L=LIQUID SE=SEDIMENT
P=PAINT SL=SLUDGE O=OTHER SO=SOLID

Field Sample I.D.	DHL Lab #	Date	Time	Matrix	Container Type	# of Containers	PRESERVATION: HCl	HNO_3	H_2SO_4 ☐ NaOH ☐	ICE	UNPRESERVED	COBALT LITHIUM	FIELD NOTES
A1-2-DB	01	8-14-19	1100		P	1		X				XX	
A1-17-SPOIL	02	8-14-19	1205		P	1		X				XX	

ANALYSES: BTEX ☐ MTBE ☐ (METHOD 8021) TPH 1005 ☐ TPH 1006 ☐ HOLD 1006 ☐ GRO (METHOD 8015) ☐ DRO (METHOD 8105) ☐ VOC 8260 ☐ VOC 624 ☐ VOC 8260/5035 ☐ SVOC 8270 ☐ PAH 8270 ☐ HOLD PAH ☐ SVOC 625 ☐ 8270 PEST ☐ 625 PEST/PCB ☐ 608 PCB ☐ 8270 PCB ☐ 8270 O-P PEST ☐ 8082 PCB ☐ 8270 PCB ☐ 8321 HERB ☐ TPHOS, AMMONIA ☐ METALS 6020 ☐ METALS 200.8 ☐ DISS. METALS ☐ RCRA ☐ TX11 ☐ _____ PH ☐ HEX CHROM ☐ ALKALINITY ☐ COD ☐ CHLORIDE ☐ ANIONS _____ ☐ TCLP-SVOC ☐ VOC ☐ PEST ☐ HERB ☐ TCLP-METALS ☐ RCRA 8 ☐ TX-11 ☐ Pb ☐ RCI ☐ FLASHPOINT ☐ DGAS ☐ TDS ☐ TSS ☐ % MOISTURE ☐ CYANIDE ☐

LUMINANT

RELINQUISHED BY: (Signature) DATE/TIME 8-15-19 1730 RECEIVED BY: (Signature) FedEx
RELINQUISHED BY: (Signature) DATE/TIME 8/16/19 0943 RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature) DATE/TIME RECEIVED BY: (Signature)

☐ DHL DISPOSAL @ $5.00 each ☐ Return

TURN AROUND TIME
RUSH ☒ CALL FIRST
1 DAY ☐ CALL FIRST
2 DAY ☐
~~NORMAL~~ X per WO 8/16/19
OTHER ☐ _____

LABORATORY USE ONLY:
RECEIVING TEMP: 1.4°C THERM #: 78
CUSTODY SEALS: ☐ BROKEN ☐ INTACT ☒ NOT USED
CARRIER: ☐ LONE STAR ☒ FEDEX ☐ UPS ☐ OTHER
☐ COURIER DELIVERY
☐ HAND DELIVERED

DHL COC Rev 1 | FEB 2010

ORIGIN ID:FWHA (512) 671-3434
JIBRAYTON
GOLDER
2201 DOUBLE CREECK DR

ROUND ROCK, TX 78664
UNITED STATES US

SHIP DATE: 15AUG19
ACTWGT: 18.30 LB
CAD: 6995323/SSFO2002
DIMS: 13x15x10 IN

BILL THIRD PARTY

TO DHL ANALYTICAL
DHL ANALYTICAL
2300 DOUBLE CREEK DR

ROUND ROCK TX 78664
(512) 388-8222 REF:
INV:
PO: DEPT:

FedEx Express

TRK# 0201 7891 6544 7941

FRI - 16 AUG 10:30A
PRIORITY OVERNIGHT

A8 BSMA

78664
TX-US AUS

LUMINANT

DHL Analytical, Inc.

Sample Receipt Checklist

Client Name Golder

Date Received: 8/16/2019

Work Order Number 1908174

Received by

Checklist completed by: _____ 8/16/2019 Reviewed by JD 8/16/2019
Signature Date Initials Date

Carrier name FedEx 1day

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shippping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	1.4 °C
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH<2 acceptable upon receipt?	Yes ☑	No ☐	NA ☐ LOT # 13171
	Adjusted? NO		Checked by EL
Water - ph>9 (S) or ph>10 (CN) acceptable upon receipt?	Yes ☐	No ☐	NA ☑ LOT #
	Adjusted?		Checked by

Any No response must be detailed in the comments section below.

Client contacted Date contacted: Person contacted

Contacted by: Regarding:

Comments:

Corrective Action

LUMINANT

Laboratory Name: DHL Analytical, Inc.

Laboratory Review Checklist: Reportable Data

Project Name: Luminant-A1 Area	**LRC Date:** 8/20/2019
Reviewer Name: Angie O'Donnell	**Laboratory Work Order: 1908174**
Prep Batch Number(s): See Prep Dates Report	**Run Batch:** See Analytical Dates Report

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
		Chain-of-Custody (C-O-C)					
R1	OI	**1)** Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	**X**				**R1-01**
		2) Were all departures from standard conditions described in an exception report?			**X**		
R2	OI	**Sample and Quality Control (QC) Identification**					
		1) Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	**X**				
		2) Are all laboratory ID numbers cross-referenced to the corresponding QC data?	**X**				
R3	OI	**Test Reports**					
		1) Were all samples prepared and analyzed within holding times?	**X**				
		2) Other than those results < MQL, were all other raw values bracketed by calibration standards?	**X**				
		3) Were calculations checked by a peer or supervisor?	**X**				
		4) Were all analyte identifications checked by a peer or supervisor?	**X**				
		5) Were sample detection limits reported for all analytes not detected?	**X**				
		6) Were all results for soil and sediment samples reported on a dry weight basis?			**X**		
		7) Were % moisture (or solids) reported for all soil and sediment samples?			**X**		
		8) Were bulk soils/solids samples for volatile analysis extracted with methanol per EPA Method 5035?			**X**		
		9) If required for the project, TICs reported?			**X**		
R4	O	**Surrogate Recovery Data**					
		1) Were surrogates added prior to extraction?			**X**		
		2) Were surrogate percent recoveries in all samples within the laboratory QC limits?			**X**		
R5	OI	**Test Reports/Summary Forms for Blank Samples**					
		1) Were appropriate type(s) of blanks analyzed?	**X**				
		2) Were blanks analyzed at the appropriate frequency?	**X**				
		3) Where method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	**X**				
		4) Were blank concentrations < MDL?	**X**				
		5) For analyte(s) detected in a blank sample, was the concentration, unadjusted for sample specific factors, in all associated field samples, **greater** than 10 times the concentration in the blank sample?			**X**		
R6	OI	**Laboratory Control Samples (LCS):**					
		1) Were all COCs included in the LCS?	**X**				
		2) Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	**X**				
		3) Were LCSs analyzed at the required frequency?	**X**				
		4) Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	**X**				
		5) Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	**X**				
		6) Was the LCSD RPD within QC limits (if applicable)?	**X**				
R7	OI	**Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Data**					
		1) Were the project/method specified analytes included in the MS and MSD?	**X**				
		2) Were MS/MSD analyzed at the appropriate frequency?	**X**				
		3) Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		**X**			**R7-03**
		4) Were MS/MSD RPDs within laboratory QC limits?	**X**				
R8	OI	**Analytical Duplicate Data**					
		1) Were appropriate analytical duplicates analyzed for each matrix?			**X**		
		2) Were analytical duplicates analyzed at the appropriate frequency?			**X**		
		3) Were RPDs or relative standard deviations within the laboratory QC limits?			**X**		
R9	OI	**Method Quantitation Limits (MQLs):**					
		1) Are the MQLs for each method analyte included in the laboratory data package?	**X**				
		2) Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	**X**				
		3) Are unadjusted MQLs and DCSs included in the laboratory data package?	**X**				
R10	OI	**Other Problems/Anomalies**					
		1) Are all known problems/anomalies/special conditions noted in this LRC and ER?	**X**				
		2) Was applicable and available technology used to lower the SDL to minimize the matrix interference affects on the sample results?	**X**				
		3) Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	**X**				

LUMINANT

Laboratory Name: DHL Analytical, Inc.

Laboratory Review Checklist (continued): Supporting Data

Project Name: Luminant-A1 Area	**LRC Date:** 8/20/2019
Reviewer Name: Angie O'Donnell	**Laboratory Work Order: 1908174**
Prep Batch Number(s): See Prep Dates Report	**Run Batch:** See Analytical Dates Report

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	**Initial Calibration (ICAL)**					
		1) Were response factors and/or relative response factors for each analyte within QC limits?	X				
		2) Were percent RSDs or correlation coefficient criteria met?	X				
		3) Was the number of standards recommended in the method used for all analytes?	X				
		4) Were all points generated between the lowest and highest standard used to calculate the curve?	X				
		5) Are ICAL data available for all instruments used?	X				
		6) Has the initial calibration curve been verified using an appropriate second source standard?	X				
S2	OI	**Initial and Continuing calibration Verification (ICCV and CCV) and Continuing Calibration blank (CCB):**					
		1) Was the CCV analyzed at the method-required frequency?	X				
		2) Were percent differences for each analyte within the method-required QC limits?	X				
		3) Was the ICAL curve verified for each analyte?	X				
		4) Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
S3	O	**Mass Spectral Tuning:**					
		1) Was the appropriate compound for the method used for tuning?	X				
		2) Were ion abundance data within the method-required QC limits?	X				
S4	O	**Internal Standards (IS):**					
		1) Were IS area counts and retention times within the method-required QC limits?	X				
S5	OI	**Raw Data (NELAC Section 5.5.10)**					
		1) Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
		2) Were data associated with manual integrations flagged on the raw data?	X				
S6	O	**Dual Column Confirmation**					
		1) Did dual column confirmation results meet the method-required QC?			X		
S7	O	**Tentatively Identified Compounds (TICs):**					
		1) If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
S8	I	**Interference Check Sample (ICS) Results:**					
		1) Were percent recoveries within method QC limits?	X				
S9	I	**Serial Dilutions, Post Digestion Spikes, and Method of Standard Additions**					
		1) Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	X				
S10	OI	**Method Detection Limit (MDL) Studies**					
		1) Was a MDL study performed for each reported analyte?	X				
		2) Is the MDL either adjusted or supported by the analysis of DCSs?	X				
S11	OI	**Proficiency Test Reports:**					
		1) Was the lab's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
S12	OI	**Standards Documentation**					
		1) Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
S13	OI	**Compound/Analyte Identification Procedures**					
		1) Are the procedures for compound/analyte identification documented?	X				
S14	OI	**Demonstration of Analyst Competency (DOC)**					
		1) Was DOC conducted consistent with NELAC Chapter 5 – Appendix C?	X				
		2) Is documentation of the analyst's competency up-to-date and on file?	X				
S15	OI	**Verification/Validation Documentation for Methods** (NELAC Chapter 5)					
		1) Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
S16	OI	**Laboratory Standard Operating Procedures (SOPs):**					
		1) Are laboratory SOPs current and on file for each method performed?	X				

LUMINANT

1 Items identified by the letter "R" should be included in the laboratory data package submitted to the TCEQ in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2 O = organic analyses; I = inorganic analyses (and general chemistry, when applicable).
3 NA = Not applicable.
4 NR = Not Reviewed.
5 ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Data Package Signature Page – RG-366/TRRP-13

This data package consists of:

This signature page, the laboratory review checklist, and the following reportable data:

R1 Field chain-of-custody documentation;
R2 Sample identification cross-reference;
R3 Test reports (analytical data sheets) for each environmental sample that includes:
  a) Items consistent with NELAC Chapter 5,
  b) dilution factors,
  c) preparation methods,
  d) cleanup methods, and
  e) if required for the project, tentatively identified compounds (TICs).
R4 Surrogate recovery data including:
  a) Calculated recovery (%R), and
  b) The laboratory's surrogate QC limits.
R5 Test reports/summary forms for blank samples;
R6 Test reports/summary forms for laboratory control samples (LCSs) including:
  a) LCS spiking amounts,
  b) Calculated %R for each analyte, and
  c) The laboratory's LCS QC limits.
R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
  a) Samples associated with the MS/MSD clearly identified,
  b) MS/MSD spiking amounts,
  c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,
  d) Calculated %Rs and relative percent differences (RPDs), and
  e) The laboratory's MS/MSD QC limits
R8 Laboratory analytical duplicate (if applicable) recovery and precision:
  a) The amount of analyte measured in the duplicate,
  b) The calculated RPD, and
  c) The laboratory's QC limits for analytical duplicates.
R9 List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix;
R10 Other problems or anomalies.

The Exception Report for each "No" or "Not Reviewed (NR)" item in the Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory is not accredited under the Texas Laboratory Accreditation Program.

LUMINANT

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge that all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information or data affecting the quality of the data has been knowingly withheld.

This laboratory was last inspected by TCEQ on February 25-28, 2019. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Name: John DuPont
Official Title: General Manager

Signature

08/20/19
Date

Name: Dr. Derhsing Luu
Official Title: Technical Director

DHL Analytical, Inc. **Date:** *20-Aug-19*

CLIENT: Golder
Project: Luminant-A1 Area
Lab Order: 1908174

CASE NARRATIVE

Samples were analyzed using the following references:

Method SW6020A - Metals Analysis

Exception Report R1-01

The samples were received and log-in performed on 8/16/2019. A total of 2 samples were received and analyzed. The samples arrived in good condition and were properly packaged.

Exception Report R7-03

For Metals Analysis, the recovery of Lithium for the Matrix Spike and Matrix Spike Duplicate (1908175-03 MS/MSD) was outside of the method control limits. This is flagged accordingly in the QC Summary Report. This analyte was within method control limits in the associated LCS. No further corrective action was taken.

LUMINANT

DHL Analytical, Inc.

Date: *20-Aug-19*

CLIENT: Golder
Project: Luminant-A1 Area
Lab Order: 1908174

Work Order Sample Summary

Lab Smp ID	Client Sample ID	Tag Number	Date Collected	Date Recved
1908174-01	A1-2-OB		08/14/19 11:00 AM	8/16/2019
1908174-02	A1-17-Spoil		08/14/19 12:05 PM	8/16/2019

LUMINANT

Lab Order: 1908174
Client: Golder
Project: Luminant-A1 Area

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1908174-01A	A1-2-OB	08/14/19 11:00 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	08/19/19 08:43 AM	92407
1908174-02A	A1-17-Spoil	08/14/19 12:05 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	08/19/19 08:43 AM	92407

LUMINANT

Lab Order: 1908174
Client: Golder
Project: Luminant-A1 Area

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1908174-01A	A1-2-OB	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	92407	1	08/20/19 11:17 AM	ICP-MS5_190820A
1908174-02A	A1-17-Spoil	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	92407	1	08/20/19 11:19 AM	ICP-MS5_190820A

LUMINANT

DHL Analytical, Inc.

Date: *20-Aug-19*

CLIENT:	Golder	**Client Sample ID:**	A1-2-OB
Project:	Luminant-A1 Area	**Lab ID:**	1908174-01
Project No:	19122262-C	**Collection Date:**	08/14/19 11:00 AM
Lab Order:	1908174	**Matrix:**	AQUEOUS

Analyses	Result	SDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **SP**
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	08/20/19 11:17 AM
Lithium	<0.00500	0.00500	0.0100		mg/L	1	08/20/19 11:17 AM

LUMINANT

Qualifiers:

- ND - Not Detected at the SDL
- J - Analyte detected between SDL and RL
- B - Analyte detected in the associated Method Blank
- DF- Dilution Factor
- N - Parameter not NELAP certified
- See Final Page of Report for MQLs and MDLs
- S - Spike Recovery outside control limits
- C - Sample Result or QC discussed in Case Narrative
- RL - Reporting Limit (MQL adjusted for moisture and sample size)
- SDL - Sample Detection Limit
- E - TPH pattern not Gas or Diesel Range Pattern

DHL Analytical, Inc.

Date: *20-Aug-19*

CLIENT:	Golder	**Client Sample ID:**	A1-17-Spoil
Project:	Luminant-A1 Area	**Lab ID:**	1908174-02
Project No:	19122262-C	**Collection Date:**	08/14/19 12:05 PM
Lab Order:	1908174	**Matrix:**	AQUEOUS

Analyses	Result	SDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **SP**
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	08/20/19 11:19 AM
Lithium	0.0394	0.00500	0.0100		mg/L	1	08/20/19 11:19 AM

LUMINANT

Qualifiers:

- ND - Not Detected at the SDL
- J - Analyte detected between SDL and RL
- B - Analyte detected in the associated Method Blank
- DF- Dilution Factor
- N - Parameter not NELAP certified
- See Final Page of Report for MQLs and MDLs
- S - Spike Recovery outside control limits
- C - Sample Result or QC discussed in Case Narrative
- RL - Reporting Limit (MQL adjusted for moisture and sample size)
- SDL - Sample Detection Limit
- E - TPH pattern not Gas or Diesel Range Pattern

CLIENT: Golder
Work Order: 1908174
Project: Luminant-A1 Area

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190621A

Sample ID **DCS3-91398**	Batch ID: **91398**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **DCS3**	Run ID: **ICP-MS5_190621A**	Analysis Date: **6/21/2019 11:16:00 AM**	Prep Date: **6/20/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.00516	0.00500	0.00500	0	103	70	130	0	0	
Lithium	0.00535	0.0100	0.00500	0	107	70	130	0	0	

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1908174
Project: Luminant-A1 Area

ANALYTICAL QC SUMMARY REPORT

RunID: **ICP-MS5_190820A**

The QC data in batch 92407 applies to the following samples: 1908174-01A, 1908174-02A

Sample ID	**MB-92407**	Batch ID:	**92407**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**MBLK**	Run ID:	**ICP-MS5_190820A**	Analysis Date:	**8/20/2019 11:00:00 AM**	Prep Date:	**8/19/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	<0.00300	0.00500								
Lithium	<0.00500	0.0100								

Sample ID	**LCS-92407**	Batch ID:	**92407**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**LCS**	Run ID:	**ICP-MS5_190820A**	Analysis Date:	**8/20/2019 11:03:00 AM**	Prep Date:	**8/19/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.194	0.00500	0.200	0	97.1	80	120			
Lithium	0.201	0.0100	0.200	0	100	80	120			

Sample ID	**LCSD-92407**	Batch ID:	**92407**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**LCSD**	Run ID:	**ICP-MS5_190820A**	Analysis Date:	**8/20/2019 11:05:00 AM**	Prep Date:	**8/19/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.191	0.00500	0.200	0	95.5	80	120	1.60	15	
Lithium	0.201	0.0100	0.200	0	101	80	120	0.137	15	

Sample ID	**1908175-03A SD**	Batch ID:	**92407**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**SD**	Run ID:	**ICP-MS5_190820A**	Analysis Date:	**8/20/2019 11:12:00 AM**	Prep Date:	**8/19/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.101	0.0250	0	0.0985				2.91	10	
Lithium	1.17	0.0500	0	1.10				6.21	10	

Sample ID	**1908175-03A PDS**	Batch ID:	**92407**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**PDS**	Run ID:	**ICP-MS5_190820A**	Analysis Date:	**8/20/2019 11:26:00 AM**	Prep Date:	**8/19/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.270	0.00500	0.200	0.0985	85.9	80	120			
Lithium	1.29	0.0100	0.200	1.10	94.0	80	120			

Sample ID	**1908175-03A MS**	Batch ID:	**92407**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**MS**	Run ID:	**ICP-MS5_190820A**	Analysis Date:	**8/20/2019 11:28:00 AM**	Prep Date:	**8/19/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.274	0.00500	0.200	0.0985	87.5	80	120			
Lithium	1.36	0.0100	0.200	1.10	131	80	120			S

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1908174
Project: Luminant-A1 Area

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190820A

Sample ID	**1908175-03A MSD**	Batch ID:	**92407**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**MSD**	Run ID:	**ICP-MS5_190820A**	Analysis Date:	**8/20/2019 11:30:00 AM**	Prep Date:	**8/19/2019**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.263	0.00500	0.200	0.0985	82.5	80	120	3.78	15	
Lithium	1.24	0.0100	0.200	1.10	71.2	80	120	9.15	15	S

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

CLIENT: Golder
Work Order: 1908174
Project: Luminant-A1 Area

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190820A

Sample ID **ICV-190820**	Batch ID: **R105890**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **ICV**	Run ID: **ICP-MS5_190820A**	Analysis Date: **8/20/2019 10:46:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.0990	0.00500	0.100	0	99.0	90	110			
Lithium	0.106	0.0100	0.100	0	106	90	110			

Sample ID **LCVL-190820**	Batch ID: **R105890**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS5_190820A**	Analysis Date: **8/20/2019 10:54:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.00494	0.00500	0.00500	0	98.7	70	130			
Lithium	0.0107	0.0100	0.0100	0	107	70	130			

Sample ID **CCV1-190820**	Batch ID: **R105890**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **CCV**	Run ID: **ICP-MS5_190820A**	Analysis Date: **8/20/2019 11:41:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.198	0.00500	0.200	0	98.9	90	110			
Lithium	0.215	0.0100	0.200	0	108	90	110			

Sample ID **LCVL1-190820**	Batch ID: **R105890**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **LCVL**	Run ID: **ICP-MS5_190820A**	Analysis Date: **8/20/2019 11:50:00 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.00510	0.00500	0.00500	0	102	70	130			
Lithium	0.0122	0.0100	0.0100	0	122	70	130			

LUMINANT

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAP certified

DHL Analytical, Inc.

Date: *20-Aug-19*

CLIENT: Golder
Work Order: 1908174
Project: Luminant-A1 Area

MQL SUMMARY REPORT

TestNo: SW6020A	MDL	MQL
Analyte	**mg/L**	**mg/L**
Cobalt	0.00300	0.00500
Lithium	0.00500	0.0100

LUMINANT

Qualifiers: MQL -Method Quantitation Limit as defined by TRRP
MDL -Method Detection Limit as defined by TRRP

Quantitative X-Ray Diffraction by Rietveld Refinement

Report Prepared for:	*Golder Associates - Will Vienne*
Project Number/ LIMS No.	*17431-01 / MI7013-JUN19*
Batch:	*Martin Lake A1 Area Landfill*
Sample Receipt:	*June 13, 2019*
Sample Analysis:	*June 28, 2019*
Reporting Date:	*July 19, 2019*
Instrument:	Panalytical X'pert Pro Diffractometer
Test Conditions:	Co radiation, 40 kV, 45 mA Regular Scanning: Step: 0.033°, Step time:0.15s, 2θ range: 6-70°
Interpretations :	HighScore Plus software using Crystallography Open Database (COD) and Joint Committee on Powder Diffraction Standards -International Center for Diffraction Data (JCPDS-ICDD).
Detection Limit :	0.5-2%. Strongly dependent on crystallinity.

LUMINANT

Contents:

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

Ben Eaton
Junior Mineralogist

Lain Glossop H.B.Sc
Senior Mineralogist

Method Summary

Mineral Identification and Interpretation:

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

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

Quantitative Rietveld Analysis:

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

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

LUMINANT

DISCLAIMER: This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

WARNING: The sample(s) to which the findings recorded herein (the "Findings") relate was(were) drawn and / or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativeness of any goods and strictly relate to the sample(s). The Company accepts no liability with regard to the origin or source from which the sample(s) is/are said to be extracted.

Summary of Rietveld Quantitative Analysis X-ray Diffraction Results

Quantitative X-ray Diffraction Results

Mineral/Compound	1 BMW-29 (30-31)	2 BMW-30 (40-41)	3 BMW-31 (14-15)	4 BMW-32 (25-26)	5 BMW-33 (38-39)
	(wt %)	(wt %)	(wt %)	(wt %)	(wt %)
Quartz	61.8	82.3	90.3	81.7	68.0
Albite	14.3	0.0	2.1	6.6	17.1
K-Feldspar	2.9	7.3	5.6	7.6	3.0
Chlorite	3.1	1.6	0.1	0.0	1.7
*Kaolinite	3.9	3.9	0.0	2.5	3.4
*Montmorillonite	0.3	0.0	0.1	0.0	0.6
Muscovite	5.7	1.5	0.7	0.8	4.0
Biotite	0.0	0.0	0.0	0.0	0.0
Illite	7.7	2.1	1.0	0.6	2.1
*Vermiculite	0.2	0.0	0.1	0.1	0.2
Titanomagnetite	--	0.2	--	--	--
Ilmenite	--	1.0	--	--	--
TOTAL	100	100	100	100	100

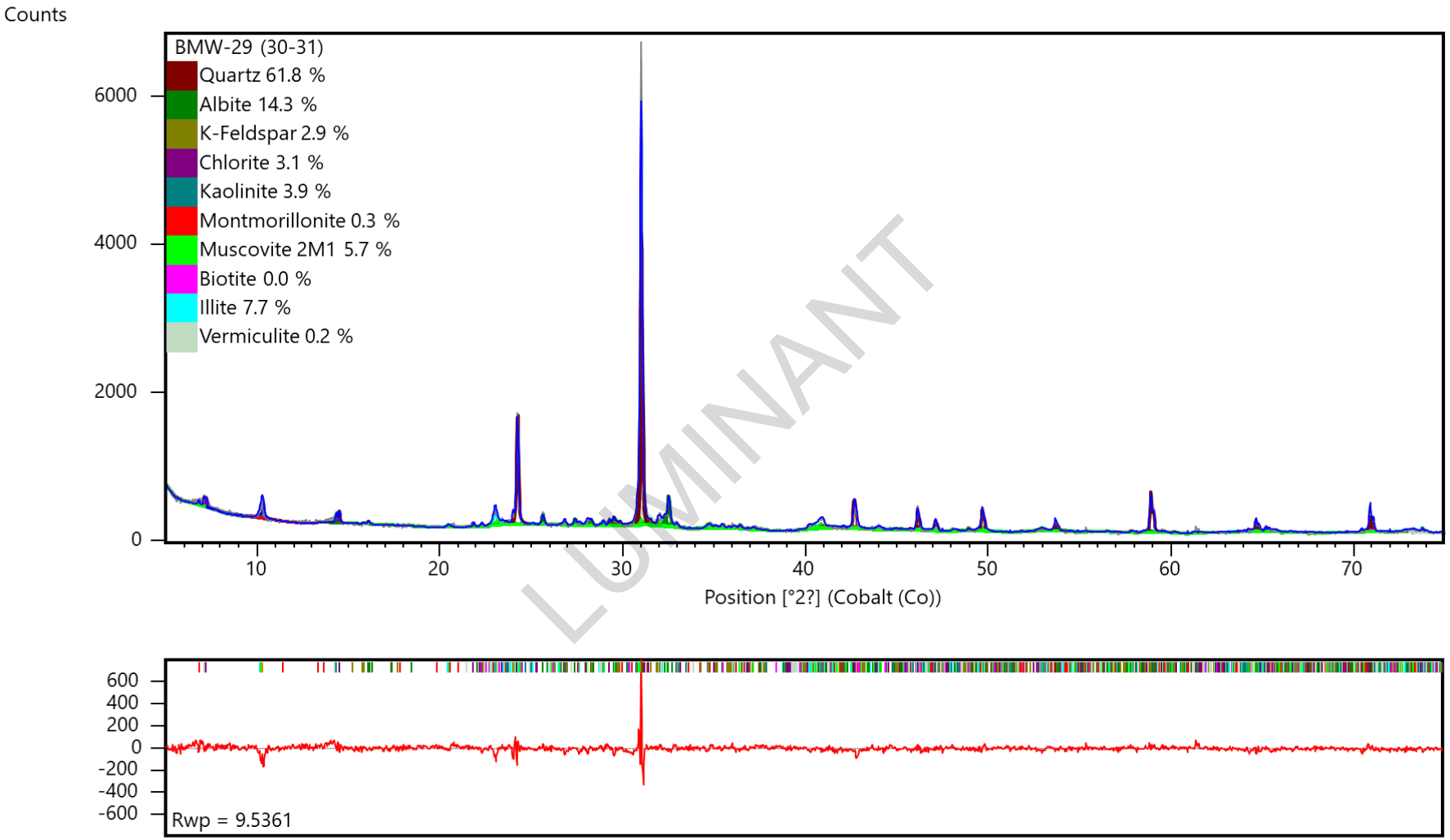
Zero values indicate that the mineral was included in the refinement, but the calculated concentration is below a measurable value.

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

** Tentative identification of clays only, further clay XRD analysis will be required for positive identification.*

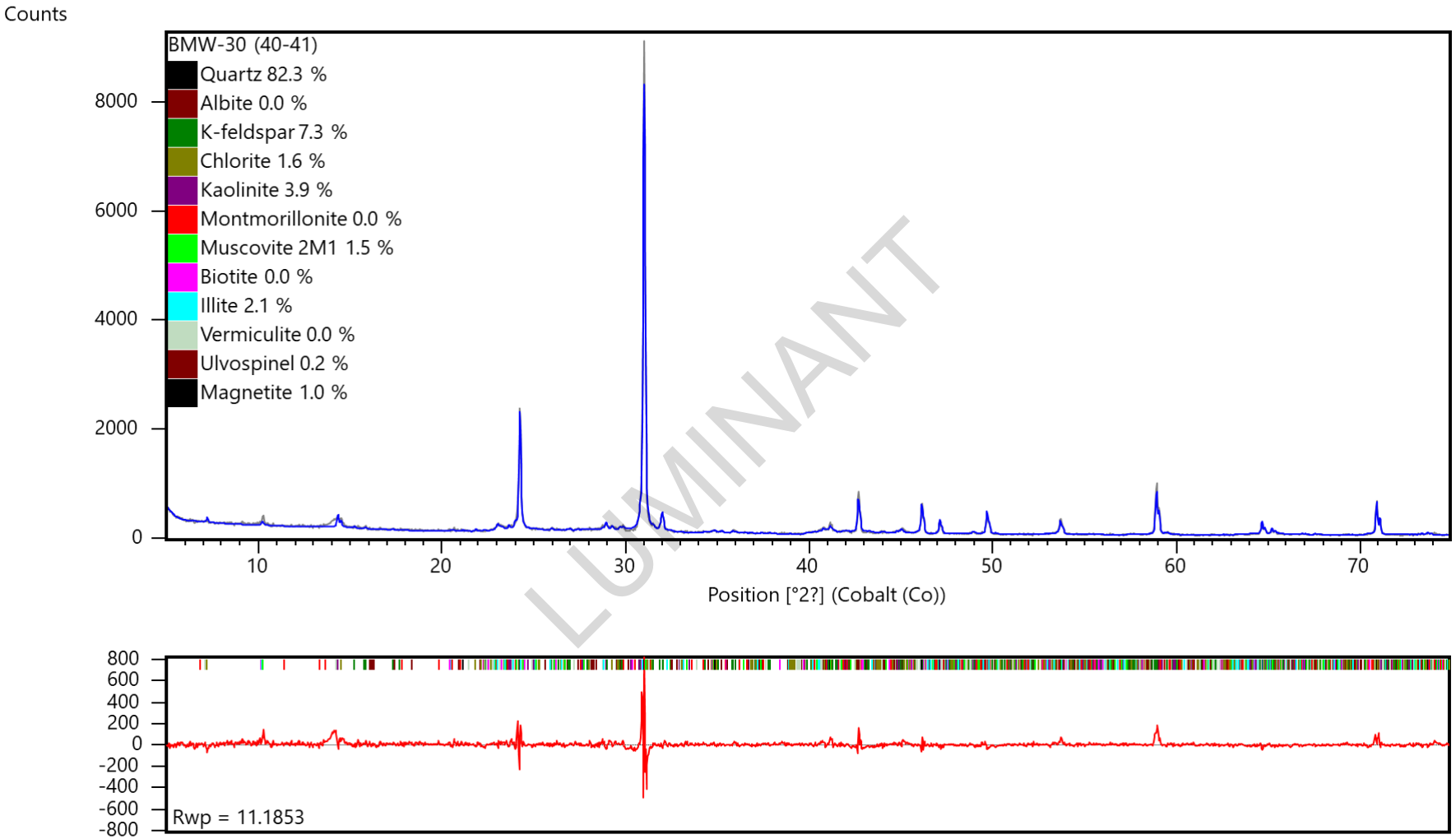
Mineral/Compound	Formula
Quartz	SiO_2
Albite	$NaAlSi_3O_8$
K-Feldspar	$KAlSi_3O_8$
Chlorite	$(Mg_3,Fe_2)Al(AlSi_3)O_{10}(OH)_8$
Kaolinite	$Al_2Si_2O_5(OH)_4$
Montmorillonite	$Na_{0.2}Ca_{0.1}Al_{1.5}Mg_{0.5}Si_4O_{10}(OH)_2 \cdot 4(H_2O)$
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$
Biotite	$KMg_{2.5}Fe_{0.5}AlSi_3O_{10}(OH)_{1.75}F_{0.25}$
Illite	$(K,H_3O)(Al,Mg,Fe)_2(Si,Al)_4O_{10}[(OH)_2,(H_2O)]$
Vermiculite	$(Mg,Fe,Al)_2(Al,Si)_4O_{10}(OH)_2 \cdot 4(H_2O)$
Titanomagnetite	Fe_2TiO_4
Magnetite	Fe_2O_4

DOMINANT



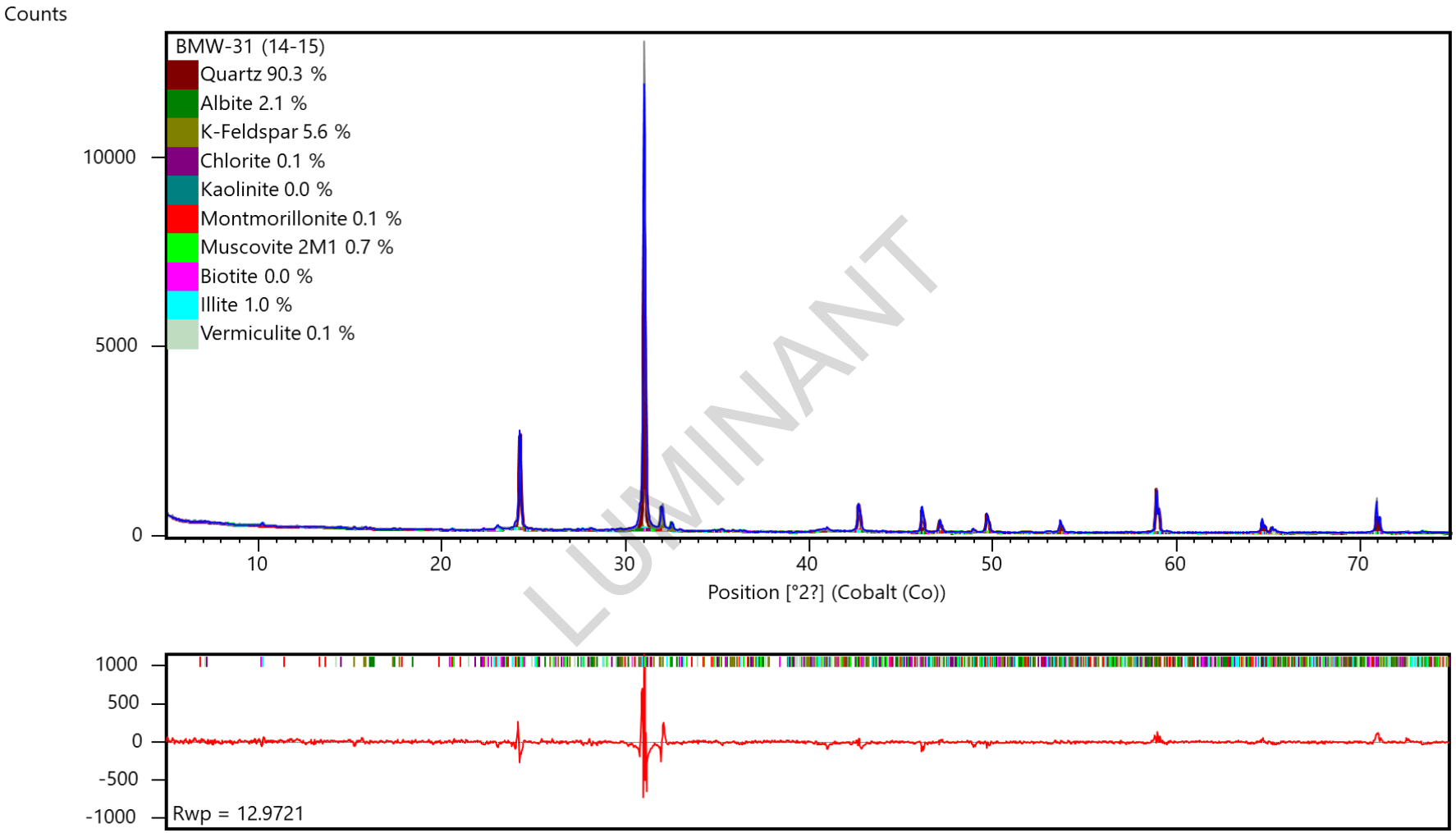
LUMINANT

X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement and the lower red curve is the difference plot.



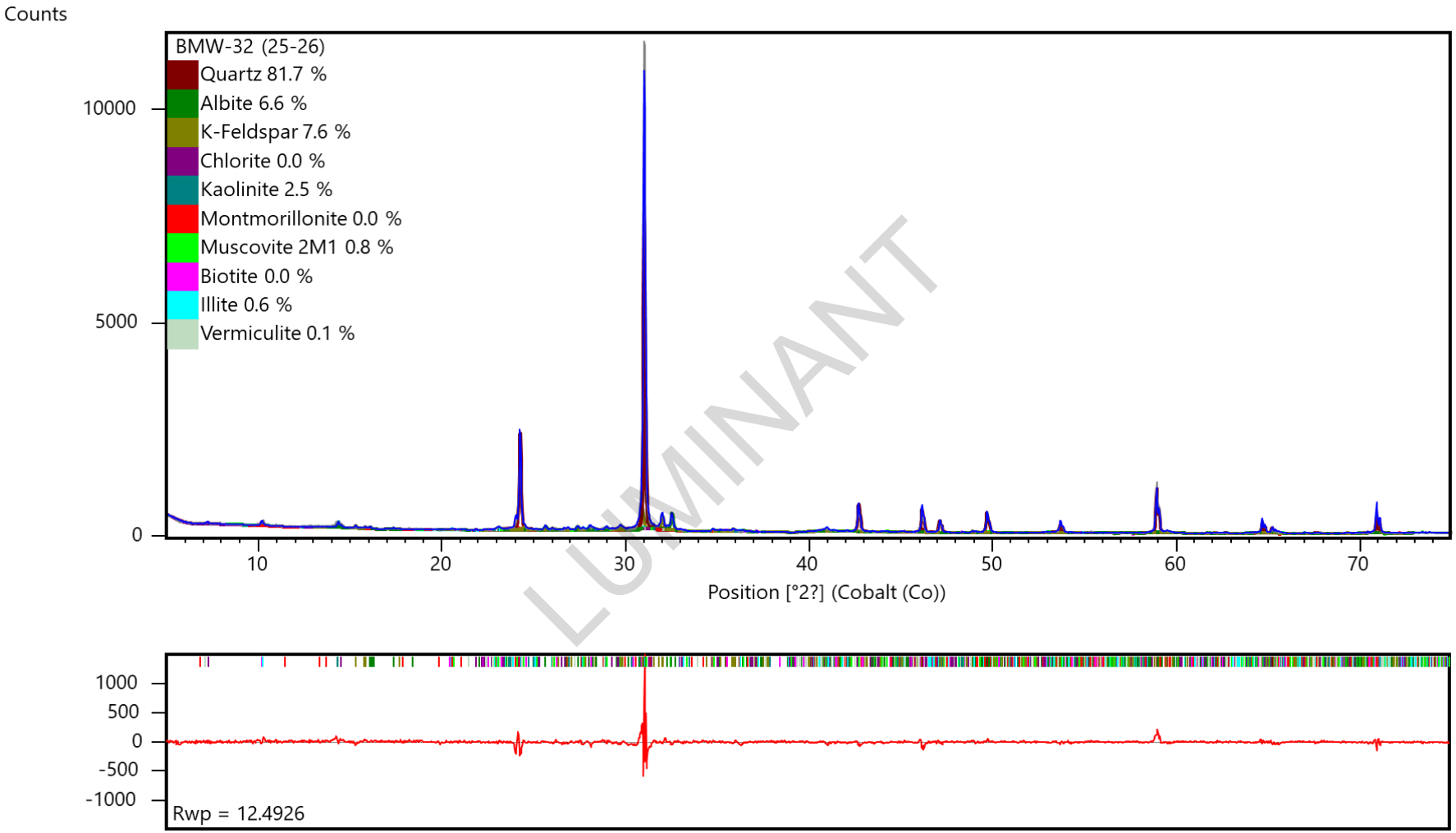
LUMINANT

X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement and the lower red curve is the difference plot.



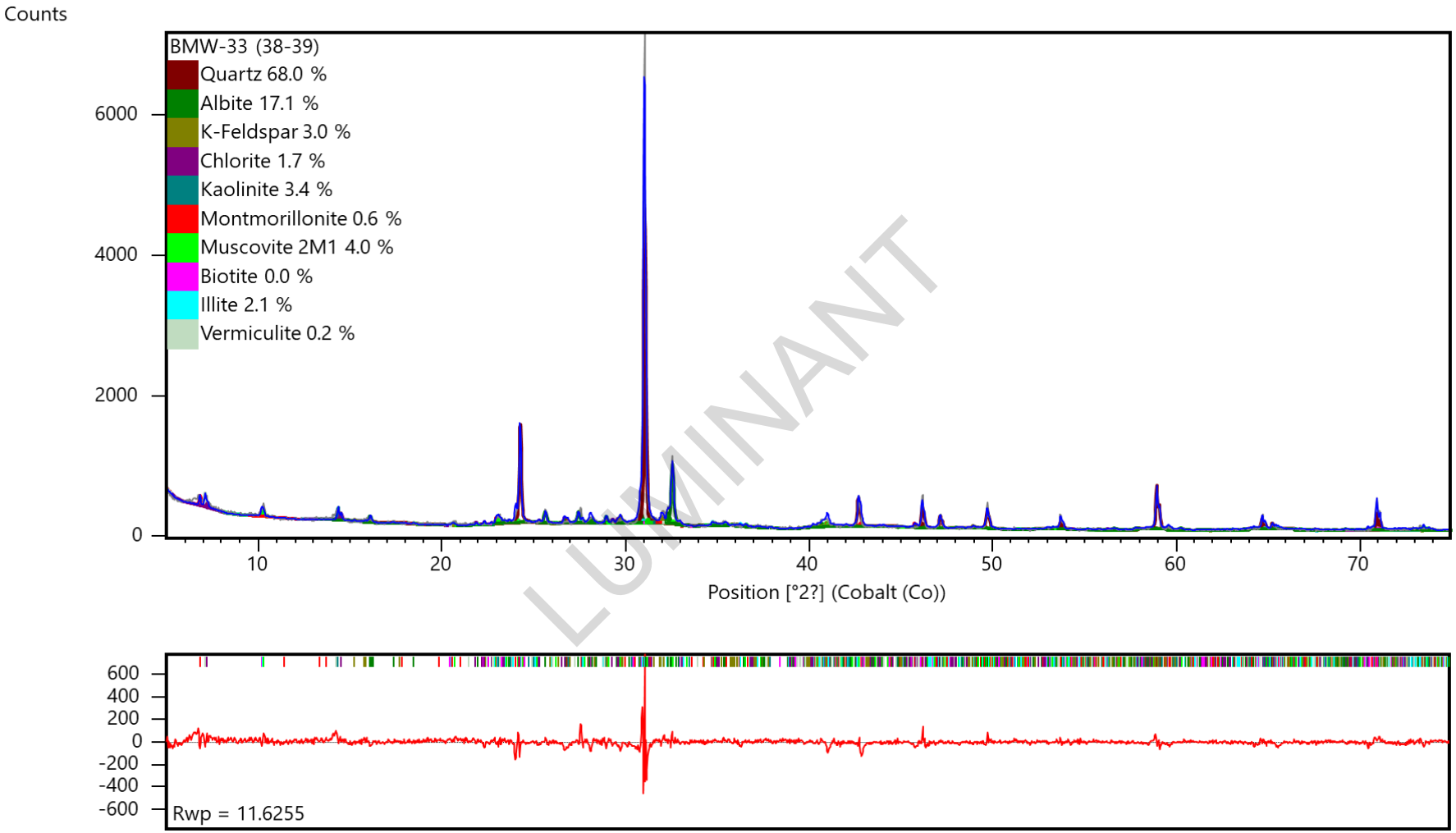
LUMINANT

X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement and the lower red curve is the difference plot.



LUMINANT

X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement and the lower red curve is the difference plot.



LUMINANT

X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement and the lower red curve is the difference plot.

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

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

Laboratory Job ID: 140-15492-1
Client Project/Site: Martin Lake A1 Area LF SEP + Totals

For:
Golder Associates Inc.
2201 Double Creek Dr
Suite 4004
Round Rock, Texas 78664

Attn: Will Vienne

Terry Walker Wasmund

Authorized for release by:
7/18/2019 6:22:20 PM

Terry Walker Wasmund, Project Manager II
(865)291-3000
terry.wasmund@testamericainc.com

LUMINANT

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Detection Summary 6
Client Sample Results 14
Default Detection Limits 29
QC Sample Results 33
QC Association Summary 43
Lab Chronicle 49
Method Summary 62
Sample Summary 63
Chain of Custody 64

LUMINANT

Definitions/Glossary

Client: Golder Associates Inc. Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Qualifiers

Metals

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

Glossary

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

LUMINANT

Job ID: 140-15492-1

Laboratory: Eurofins TestAmerica, Knoxville

Narrative

Job Narrative
140-15492-1

Receipt
The samples were received on 6/5/2019 at 9:20 AM. The samples arrived in good condition, properly preserved, and on ice. The temperature of the cooler at receipt was 1.4º 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 order to provide information about both the presence of elements of interest in the extraction solutions, and the recovery of elements of

DOMINANT

Job ID: 140-15492-1 (Continued)

Laboratory: Eurofins TestAmerica, Knoxville (Continued)

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 step 1 digestates were reanalyzed for vanadium at a 1/10 dilution due to positive interelement interferences resulting from the high magnesium results. The reporting limits were adjusted accordingly.

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.

Samples BMW-29 (30-31) (140-15492-1), BMW-30 (40-41) (140-15492-2), BMW-31 (14-15) (140-15492-3), BMW-32 (25-26) (140-15492-4) and BMW-33 (38-39) (140-15492-5) were diluted due to the presence of Silicon or Titanium which interferes with Arsenic, Cobalt, Selenium and Thallium: Elevated reporting limits (RLs) are provided.

Samples BMW-29 (30-31) (140-15492-1), BMW-30 (40-41) (140-15492-2), BMW-31 (14-15) (140-15492-3), BMW-32 (25-26) (140-15492-4) and BMW-33 (38-39) (140-15492-5) were diluted for Aluminum and Barium due to the nature of the sample matrix. 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 - % Moisture
The samples were analyzed for percent moisture using SOP number KNOX-WC-0012 (based on Modified MCAWW 160.3 and SM2540B and on the percent moisture determinations described in methods 3540C and 3550B).

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

Comments
No additional comments.

LUMINANT

Detection Summary

Client: Golder Associates Inc.
Project/Site: Martin Lake A1 Area LF SEP + Totals

Job ID: 140-15492-1

Client Sample ID: BMW-29 (30-31)

Lab Sample ID: 140-15492-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Manganese	3.8	J	4.1	0.17	mg/Kg	4	☼	6010B SEP	Step 1
Aluminum	16	J *	41	6.5	mg/Kg	3	☼	6010B SEP	Step 2
Barium	1.1	J *	10	0.49	mg/Kg	3	☼	6010B SEP	Step 2
Cobalt	1.4	J	10	0.26	mg/Kg	3	☼	6010B SEP	Step 2
Iron	48	*	20	12	mg/Kg	3	☼	6010B SEP	Step 2
Manganese	35		3.1	1.1	mg/Kg	3	☼	6010B SEP	Step 2
Selenium	1.2	J B	2.0	0.69	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	170		14	2.9	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	1.4		0.68	0.18	mg/Kg	1	☼	6010B SEP	Step 3
Barium	4.3	B	3.4	0.16	mg/Kg	1	☼	6010B SEP	Step 3
Beryllium	0.11	J	0.34	0.020	mg/Kg	1	☼	6010B SEP	Step 3
Cobalt	1.5	J	3.4	0.061	mg/Kg	1	☼	6010B SEP	Step 3
Iron	4200		6.8	3.9	mg/Kg	1	☼	6010B SEP	Step 3
Manganese	95	B	1.0	0.037	mg/Kg	1	☼	6010B SEP	Step 3
Mo	0.14	J	2.7	0.11	mg/Kg	1	☼	6010B SEP	Step 3
Selenium	0.28	J B	0.68	0.23	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	2600		14	2.2	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	0.87	B	0.68	0.30	mg/Kg	1	☼	6010B SEP	Step 4
Barium	19		3.4	0.16	mg/Kg	1	☼	6010B SEP	Step 4
Beryllium	0.23	J	0.34	0.022	mg/Kg	1	☼	6010B SEP	Step 4
Cobalt	3.2	J	3.4	0.072	mg/Kg	1	☼	6010B SEP	Step 4
Iron	8300		6.8	3.9	mg/Kg	1	☼	6010B SEP	Step 4
Li	6.7		3.4	0.20	mg/Kg	1	☼	6010B SEP	Step 4
Manganese	180		1.0	0.18	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	500	*	200	32	mg/Kg	5	☼	6010B SEP	Step 5
Barium	17	J *	51	2.4	mg/Kg	5	☼	6010B SEP	Step 5
Cobalt	1.0	J *	51	0.82	mg/Kg	5	☼	6010B SEP	Step 5
Iron	530	*	100	60	mg/Kg	5	☼	6010B SEP	Step 5
Manganese	33	*	15	2.5	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	3500		14	2.2	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	1.1		0.68	0.20	mg/Kg	1	☼	6010B SEP	Step 6
Barium	30		3.4	0.16	mg/Kg	1	☼	6010B SEP	Step 6
Beryllium	0.11	J	0.34	0.016	mg/Kg	1	☼	6010B SEP	Step 6
Cobalt	1.2	J	3.4	0.063	mg/Kg	1	☼	6010B SEP	Step 6
Iron	4800		6.8	3.9	mg/Kg	1	☼	6010B SEP	Step 6
Li	4.0		3.4	0.20	mg/Kg	1	☼	6010B SEP	Step 6
Manganese	38		1.0	0.34	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	34000		140	22	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	0.59	J	0.68	0.18	mg/Kg	1	☼	6010B SEP	Step 7
Barium	340		34	1.6	mg/Kg	10	☼	6010B SEP	Step 7
Beryllium	0.69		0.34	0.010	mg/Kg	1	☼	6010B SEP	Step 7
Cobalt	0.90	J	6.8	0.41	mg/Kg	2	☼	6010B SEP	Step 7
Iron	6700		6.8	5.6	mg/Kg	1	☼	6010B SEP	Step 7
Li	14		3.4	0.20	mg/Kg	1	☼	6010B SEP	Step 7
Manganese	36		1.0	0.071	mg/Kg	1	☼	6010B SEP	Step 7
Mo	0.20	J	2.7	0.11	mg/Kg	1	☼	6010B SEP	Step 7
Thallium	0.74	J	4.8	0.49	mg/Kg	2	☼	6010B SEP	Step 7
Aluminum	41000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	4.0		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7

LUMINANT

This Detection Summary does not include radiochemical test results.

Client Sample ID: BMW-29 (30-31) (Continued)

Lab Sample ID: 140-15492-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	410		2.5	0.12	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Beryllium	1.1		0.25	0.0075	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Cobalt	9.2		2.5	0.023	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	25000		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	25		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Manganese	420		0.75	0.052	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Mo	0.33	J	2.0	0.082	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Selenium	1.5		0.50	0.17	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Thallium	0.74	J	1.8	0.18	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Boron	15	J	25	13	mg/Kg	1	☼	6010B	Total/NA
Chromium	19		1.9	0.28	mg/Kg	1	☼	6010B	Total/NA
Lead	9.7		1.9	0.35	mg/Kg	1	☼	6010B	Total/NA
Aluminum	72000		140	22	mg/Kg	10	☼	6010B	Total/NA
Arsenic	3.8		0.68	0.18	mg/Kg	1	☼	6010B	Total/NA
Barium	630		34	1.6	mg/Kg	10	☼	6010B	Total/NA
Beryllium	1.2		0.34	0.010	mg/Kg	1	☼	6010B	Total/NA
Cobalt	10	J	17	1.0	mg/Kg	5	☼	6010B	Total/NA
Iron	26000		6.8	5.6	mg/Kg	1	☼	6010B	Total/NA
Lithium	31		3.4	0.20	mg/Kg	1	☼	6010B	Total/NA
Manganese	490		1.0	0.071	mg/Kg	1	☼	6010B	Total/NA
Molybdenum	0.70	J	2.7	0.11	mg/Kg	1	☼	6010B	Total/NA
Thallium	1.4	J	12	1.2	mg/Kg	5	☼	6010B	Total/NA
Hg	0.078	J	0.14	0.054	mg/Kg	1	☼	7470A	Total/NA

Client Sample ID: BMW-30 (40-41)

Lab Sample ID: 140-15492-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cobalt	0.82	J	12	0.21	mg/Kg	4	☼	6010B SEP	Step 1
Manganese	1.5	J	3.6	0.15	mg/Kg	4	☼	6010B SEP	Step 1
Aluminum	7.3	J *	36	5.7	mg/Kg	3	☼	6010B SEP	Step 2
Barium	0.52	J *	8.9	0.43	mg/Kg	3	☼	6010B SEP	Step 2
Cobalt	0.28	J	8.9	0.22	mg/Kg	3	☼	6010B SEP	Step 2
Iron	24	*	18	10	mg/Kg	3	☼	6010B SEP	Step 2
Selenium	0.67	J B	1.8	0.61	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	35		12	2.5	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	1.3		0.59	0.15	mg/Kg	1	☼	6010B SEP	Step 3
Barium	2.0	J B	3.0	0.14	mg/Kg	1	☼	6010B SEP	Step 3
Cobalt	0.28	J	3.0	0.053	mg/Kg	1	☼	6010B SEP	Step 3
Iron	190		5.9	3.4	mg/Kg	1	☼	6010B SEP	Step 3
Manganese	0.29	J B	0.89	0.032	mg/Kg	1	☼	6010B SEP	Step 3
Selenium	0.38	J B	0.59	0.20	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	1100		12	1.9	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	0.78	B	0.59	0.26	mg/Kg	1	☼	6010B SEP	Step 4
Barium	7.4		3.0	0.14	mg/Kg	1	☼	6010B SEP	Step 4
Beryllium	0.062	J	0.30	0.019	mg/Kg	1	☼	6010B SEP	Step 4

This Detection Summary does not include radiochemical test results.

LUMINANT

Detection Summary

Client: Golder Associates Inc.
Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Client Sample ID: BMW-30 (40-41) (Continued)
Lab Sample ID: 140-15492-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cobalt	0.50	J	3.0	0.063	mg/Kg	1	☼	6010B SEP	Step 4
Iron	1000		5.9	3.4	mg/Kg	1	☼	6010B SEP	Step 4
Li	1.7	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 4
Manganese	8.7		0.89	0.15	mg/Kg	1	☼	6010B SEP	Step 4
Selenium	0.76	B *	0.59	0.56	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	66	J *	180	28	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	1300		12	1.9	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.75		0.59	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Barium	4.0		3.0	0.14	mg/Kg	1	☼	6010B SEP	Step 6
Beryllium	0.043	J	0.30	0.014	mg/Kg	1	☼	6010B SEP	Step 6
Cobalt	0.46	J	3.0	0.055	mg/Kg	1	☼	6010B SEP	Step 6
Iron	1800		5.9	3.4	mg/Kg	1	☼	6010B SEP	Step 6
Li	0.91	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Manganese	8.0		0.89	0.30	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	37000		120	19	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	1.3		1.2	0.31	mg/Kg	2	☼	6010B SEP	Step 7
Barium	380		30	1.4	mg/Kg	10	☼	6010B SEP	Step 7
Beryllium	0.36		0.30	0.0089	mg/Kg	1	☼	6010B SEP	Step 7
Cobalt	0.76	J	5.9	0.36	mg/Kg	2	☼	6010B SEP	Step 7
Iron	2800		5.9	4.9	mg/Kg	1	☼	6010B SEP	Step 7
Li	14		3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 7
Manganese	38		0.89	0.062	mg/Kg	1	☼	6010B SEP	Step 7
Thallium	0.87	J	4.2	0.43	mg/Kg	2	☼	6010B SEP	Step 7
Aluminum	39000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	4.1		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Barium	390		2.5	0.12	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Beryllium	0.46		0.25	0.0075	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Cobalt	3.1		2.5	0.023	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	5800		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	17		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Manganese	57		0.75	0.052	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Selenium	1.8		0.50	0.17	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Thallium	0.87	J	1.8	0.18	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Chromium	7.9		1.7	0.25	mg/Kg	1	☼	6010B	Total/NA
Lead	5.9		1.7	0.32	mg/Kg	1	☼	6010B	Total/NA
Aluminum	48000		120	19	mg/Kg	10	☼	6010B	Total/NA
Arsenic	4.8		0.59	0.15	mg/Kg	1	☼	6010B	Total/NA
Barium	490		30	1.4	mg/Kg	10	☼	6010B	Total/NA
Beryllium	0.46		0.30	0.0089	mg/Kg	1	☼	6010B	Total/NA
Cobalt	3.4	J	15	0.89	mg/Kg	5	☼	6010B	Total/NA
Iron	5800		5.9	4.9	mg/Kg	1	☼	6010B	Total/NA
Lithium	18		3.0	0.18	mg/Kg	1	☼	6010B	Total/NA
Manganese	60		0.89	0.062	mg/Kg	1	☼	6010B	Total/NA

LUMINANT

This Detection Summary does not include radiochemical test results.

Client Sample ID: BMW-30 (40-41) (Continued)
Lab Sample ID: 140-15492-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Molybdenum	0.17	J	2.4	0.097	mg/Kg	1	☼	6010B	Total/NA
Selenium	1.1		0.59	0.20	mg/Kg	1	☼	6010B	Total/NA
Hg	0.054	J	0.12	0.048	mg/Kg	1	☼	7470A	Total/NA

Client Sample ID: BMW-31 (14-15)
Lab Sample ID: 140-15492-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.58	J	12	0.57	mg/Kg	4	☼	6010B SEP	Step 1
Manganese	11		3.6	0.15	mg/Kg	4	☼	6010B SEP	Step 1
Barium	0.46	J *	8.9	0.43	mg/Kg	3	☼	6010B SEP	Step 2
Manganese	2.4	J	2.7	1.0	mg/Kg	3	☼	6010B SEP	Step 2
Selenium	0.77	J B	1.8	0.61	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	59		12	2.5	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.29	J	0.59	0.15	mg/Kg	1	☼	6010B SEP	Step 3
Barium	14	B	3.0	0.14	mg/Kg	1	☼	6010B SEP	Step 3
Beryllium	0.069	J	0.30	0.018	mg/Kg	1	☼	6010B SEP	Step 3
Cobalt	16		3.0	0.053	mg/Kg	1	☼	6010B SEP	Step 3
Iron	120		5.9	3.4	mg/Kg	1	☼	6010B SEP	Step 3
Manganese	260	B	0.89	0.032	mg/Kg	1	☼	6010B SEP	Step 3
Selenium	0.23	J B	0.59	0.20	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	1600		12	1.9	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	1.8	B	0.59	0.26	mg/Kg	1	☼	6010B SEP	Step 4
Barium	33		3.0	0.14	mg/Kg	1	☼	6010B SEP	Step 4
Beryllium	0.24	J	0.30	0.019	mg/Kg	1	☼	6010B SEP	Step 4
Cobalt	2.8	J	3.0	0.063	mg/Kg	1	☼	6010B SEP	Step 4
Iron	5600		5.9	3.4	mg/Kg	1	☼	6010B SEP	Step 4
Li	2.2	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 4
Manganese	63		0.89	0.15	mg/Kg	1	☼	6010B SEP	Step 4
Selenium	1.1	B *	0.59	0.56	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	67	J *	180	28	mg/Kg	5	☼	6010B SEP	Step 5
Barium	3.9	J *	45	2.1	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	1800		12	1.9	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.54	J	0.59	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Barium	4.4		3.0	0.14	mg/Kg	1	☼	6010B SEP	Step 6
Beryllium	0.059	J	0.30	0.014	mg/Kg	1	☼	6010B SEP	Step 6
Cobalt	0.46	J	3.0	0.055	mg/Kg	1	☼	6010B SEP	Step 6
Iron	1700		5.9	3.4	mg/Kg	1	☼	6010B SEP	Step 6
Li	1.3	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Manganese	10		0.89	0.30	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	26000		120	19	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	0.58	J	1.2	0.31	mg/Kg	2	☼	6010B SEP	Step 7
Barium	320		30	1.4	mg/Kg	10	☼	6010B SEP	Step 7
Beryllium	0.30		0.30	0.0089	mg/Kg	1	☼	6010B SEP	Step 7
Cobalt	0.82	J	5.9	0.36	mg/Kg	2	☼	6010B SEP	Step 7
Iron	3600		5.9	4.9	mg/Kg	1	☼	6010B SEP	Step 7
Li	15		3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 7
Manganese	24		0.89	0.062	mg/Kg	1	☼	6010B SEP	Step 7
Mo	0.16	J	2.4	0.097	mg/Kg	1	☼	6010B SEP	Step 7
Thallium	0.52	J	4.2	0.43	mg/Kg	2	☼	6010B SEP	Step 7
Aluminum	30000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7

LUMINANT

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Golder Associates Inc.
Project/Site: Martin Lake A1 Area LF SEP + Totals

Job ID: 140-15492-1

Client Sample ID: BMW-31 (14-15) (Continued)

Lab Sample ID: 140-15492-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	3.2		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Barium	370		2.5	0.12	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Beryllium	0.67		0.25	0.0075	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Cobalt	20		2.5	0.023	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	11000		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	19		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Manganese	370		0.75	0.052	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Mo	0.16	J	2.0	0.082	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Selenium	2.1		0.50	0.17	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Thallium	0.52	J	1.8	0.18	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Chromium	7.3		1.8	0.26	mg/Kg	1	☼	6010B	Total/NA
Lead	6.8		1.8	0.33	mg/Kg	1	☼	6010B	Total/NA
Aluminum	30000		120	19	mg/Kg	10	☼	6010B	Total/NA
Arsenic	3.0		0.59	0.15	mg/Kg	1	☼	6010B	Total/NA
Barium	430		30	1.4	mg/Kg	10	☼	6010B	Total/NA
Beryllium	0.66		0.30	0.0089	mg/Kg	1	☼	6010B	Total/NA
Cobalt	18		5.9	0.36	mg/Kg	2	☼	6010B	Total/NA
Iron	10000		5.9	4.9	mg/Kg	1	☼	6010B	Total/NA
Lithium	18		3.0	0.18	mg/Kg	1	☼	6010B	Total/NA
Manganese	280		0.89	0.062	mg/Kg	1	☼	6010B	Total/NA
Molybdenum	0.29	J	2.4	0.097	mg/Kg	1	☼	6010B	Total/NA
Thallium	0.67	J	4.2	0.43	mg/Kg	2	☼	6010B	Total/NA

Client Sample ID: BMW-32 (25-26)

Lab Sample ID: 140-15492-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Manganese	1.0	J	3.6	0.15	mg/Kg	4	☼	6010B SEP	Step 1
Aluminum	17	J *	36	5.7	mg/Kg	3	☼	6010B SEP	Step 2
Iron	36	*	18	10	mg/Kg	3	☼	6010B SEP	Step 2
Selenium	0.78	J B	1.8	0.61	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	81		12	2.5	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.60		0.59	0.15	mg/Kg	1	☼	6010B SEP	Step 3
Barium	1.3	J B	3.0	0.14	mg/Kg	1	☼	6010B SEP	Step 3
Cobalt	0.060	J	3.0	0.053	mg/Kg	1	☼	6010B SEP	Step 3
Iron	500		5.9	3.4	mg/Kg	1	☼	6010B SEP	Step 3
Manganese	0.60	J B	0.89	0.032	mg/Kg	1	☼	6010B SEP	Step 3
Selenium	0.21	J B	0.59	0.20	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	1200		12	1.9	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	0.78	B	0.59	0.26	mg/Kg	1	☼	6010B SEP	Step 4
Barium	17		3.0	0.14	mg/Kg	1	☼	6010B SEP	Step 4
Beryllium	0.025	J	0.30	0.019	mg/Kg	1	☼	6010B SEP	Step 4
Cobalt	0.60	J	3.0	0.063	mg/Kg	1	☼	6010B SEP	Step 4
Iron	2000		5.9	3.4	mg/Kg	1	☼	6010B SEP	Step 4
Li	2.5	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 4

This Detection Summary does not include radiochemical test results.

LUMINANT

Client Sample ID: BMW-32 (25-26) (Continued)
Lab Sample ID: 140-15492-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Manganese	13		0.89	0.15	mg/Kg	1	☼	6010B SEP	Step 4
Selenium	0.62	B *	0.59	0.56	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	58	J *	180	28	mg/Kg	5	☼	6010B SEP	Step 5
Barium	3.3	J *	45	2.1	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	1100		12	1.9	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.42	J	0.59	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Barium	6.4		3.0	0.14	mg/Kg	1	☼	6010B SEP	Step 6
Beryllium	0.033	J	0.30	0.014	mg/Kg	1	☼	6010B SEP	Step 6
Cobalt	0.28	J	3.0	0.055	mg/Kg	1	☼	6010B SEP	Step 6
Iron	890		5.9	3.4	mg/Kg	1	☼	6010B SEP	Step 6
Li	1.0	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Manganese	10		0.89	0.30	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	32000		120	19	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	1.2		0.59	0.15	mg/Kg	1	☼	6010B SEP	Step 7
Barium	430		30	1.4	mg/Kg	10	☼	6010B SEP	Step 7
Beryllium	0.50		0.30	0.0089	mg/Kg	1	☼	6010B SEP	Step 7
Cobalt	0.76	J	5.9	0.36	mg/Kg	2	☼	6010B SEP	Step 7
Iron	2800		5.9	4.9	mg/Kg	1	☼	6010B SEP	Step 7
Li	8.2		3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 7
Manganese	42		0.89	0.062	mg/Kg	1	☼	6010B SEP	Step 7
Aluminum	35000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	3.0		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Barium	460		2.5	0.12	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Beryllium	0.56		0.25	0.0075	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Cobalt	1.7	J	2.5	0.023	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	6200		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	12		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Manganese	67		0.75	0.052	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Selenium	1.6		0.50	0.17	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Chromium	7.6		1.7	0.25	mg/Kg	1	☼	6010B	Total/NA
Lead	3.9		1.7	0.31	mg/Kg	1	☼	6010B	Total/NA
Aluminum	45000		120	19	mg/Kg	10	☼	6010B	Total/NA
Arsenic	3.2		0.59	0.15	mg/Kg	1	☼	6010B	Total/NA
Barium	570		30	1.4	mg/Kg	10	☼	6010B	Total/NA
Beryllium	0.53		0.30	0.0089	mg/Kg	1	☼	6010B	Total/NA
Cobalt	1.6	J	5.9	0.36	mg/Kg	2	☼	6010B	Total/NA
Iron	5600		5.9	4.9	mg/Kg	1	☼	6010B	Total/NA
Lithium	11		3.0	0.18	mg/Kg	1	☼	6010B	Total/NA
Manganese	70		0.89	0.062	mg/Kg	1	☼	6010B	Total/NA
Molybdenum	0.33	J	2.4	0.097	mg/Kg	1	☼	6010B	Total/NA
Selenium	0.54	J	0.59	0.20	mg/Kg	1	☼	6010B	Total/NA
Thallium	0.44	J	4.2	0.43	mg/Kg	2	☼	6010B	Total/NA
Hg	0.053	J	0.12	0.047	mg/Kg	1	☼	7470A	Total/NA

LUMINANT

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Golder Associates Inc.
Project/Site: Martin Lake A1 Area LF SEP + Totals

Job ID: 140-15492-1

Client Sample ID: BMW-33 (38-39)

Lab Sample ID: 140-15492-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	1.5	J	13	0.62	mg/Kg	4	☼	6010B SEP	Step 1
Cobalt	0.29	J	13	0.23	mg/Kg	4	☼	6010B SEP	Step 1
Manganese	17		3.9	0.16	mg/Kg	4	☼	6010B SEP	Step 1
Aluminum	10	J *	39	6.2	mg/Kg	3	☼	6010B SEP	Step 2
Barium	0.90	J *	9.7	0.46	mg/Kg	3	☼	6010B SEP	Step 2
Cobalt	0.74	J	9.7	0.24	mg/Kg	3	☼	6010B SEP	Step 2
Iron	14	J *	19	11	mg/Kg	3	☼	6010B SEP	Step 2
Manganese	25		2.9	1.1	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	94		13	2.7	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.47	J	0.65	0.17	mg/Kg	1	☼	6010B SEP	Step 3
Barium	7.5	B	3.2	0.15	mg/Kg	1	☼	6010B SEP	Step 3
Beryllium	0.028	J	0.32	0.019	mg/Kg	1	☼	6010B SEP	Step 3
Cobalt	1.9	J	3.2	0.058	mg/Kg	1	☼	6010B SEP	Step 3
Iron	510		6.5	3.7	mg/Kg	1	☼	6010B SEP	Step 3
Manganese	85	B	0.97	0.035	mg/Kg	1	☼	6010B SEP	Step 3
Selenium	0.25	J B	0.65	0.22	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	1800		13	2.1	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	1.2	B	0.65	0.28	mg/Kg	1	☼	6010B SEP	Step 4
Barium	20		3.2	0.15	mg/Kg	1	☼	6010B SEP	Step 4
Beryllium	0.20	J	0.32	0.021	mg/Kg	1	☼	6010B SEP	Step 4
Cobalt	1.5	J	3.2	0.068	mg/Kg	1	☼	6010B SEP	Step 4
Iron	4900		6.5	3.7	mg/Kg	1	☼	6010B SEP	Step 4
Li	2.1	J	3.2	0.19	mg/Kg	1	☼	6010B SEP	Step 4
Manganese	55		0.97	0.17	mg/Kg	1	☼	6010B SEP	Step 4
Selenium	0.71	B *	0.65	0.61	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	64	J *	190	30	mg/Kg	5	☼	6010B SEP	Step 5
Barium	4.1	J *	48	2.3	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	3400		13	2.1	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.85		0.65	0.19	mg/Kg	1	☼	6010B SEP	Step 6
Barium	13		3.2	0.15	mg/Kg	1	☼	6010B SEP	Step 6
Beryllium	0.11	J	0.32	0.015	mg/Kg	1	☼	6010B SEP	Step 6
Cobalt	1.1	J	3.2	0.059	mg/Kg	1	☼	6010B SEP	Step 6
Iron	3900		6.5	3.7	mg/Kg	1	☼	6010B SEP	Step 6
Li	2.1	J	3.2	0.19	mg/Kg	1	☼	6010B SEP	Step 6
Manganese	22		0.97	0.32	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	48000		130	21	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	0.64	J	0.65	0.17	mg/Kg	1	☼	6010B SEP	Step 7
Barium	550		32	1.5	mg/Kg	10	☼	6010B SEP	Step 7
Beryllium	0.69		0.32	0.0097	mg/Kg	1	☼	6010B SEP	Step 7
Cobalt	0.57	J	6.5	0.39	mg/Kg	2	☼	6010B SEP	Step 7
Iron	6100		6.5	5.3	mg/Kg	1	☼	6010B SEP	Step 7
Li	9.1		3.2	0.19	mg/Kg	1	☼	6010B SEP	Step 7
Manganese	30		0.97	0.067	mg/Kg	1	☼	6010B SEP	Step 7
Aluminum	54000		10	1.6	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Arsenic	3.2		0.50	0.13	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Barium	590		2.5	0.12	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Beryllium	1.0		0.25	0.0075	mg/Kg	1		6010B SEP	Sum of Steps 1-7

LUMINANT

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Knoxville

Client Sample ID: BMW-33 (38-39) (Continued)
Lab Sample ID: 140-15492-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cobalt	6.1		2.5	0.023	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	15000		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	13		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Manganese	230		0.75	0.052	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Selenium	0.95		0.50	0.17	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Chromium	14		1.8	0.27	mg/Kg	1	☼	6010B	Total/NA
Lead	5.9		1.8	0.34	mg/Kg	1	☼	6010B	Total/NA
Aluminum	73000		130	21	mg/Kg	10	☼	6010B	Total/NA
Arsenic	3.2		0.65	0.17	mg/Kg	1	☼	6010B	Total/NA
Barium	830		32	1.5	mg/Kg	10	☼	6010B	Total/NA
Beryllium	1.0		0.32	0.0097	mg/Kg	1	☼	6010B	Total/NA
Cobalt	4.6	J	16	0.97	mg/Kg	5	☼	6010B	Total/NA
Iron	13000		6.5	5.3	mg/Kg	1	☼	6010B	Total/NA
Lithium	14		3.2	0.19	mg/Kg	1	☼	6010B	Total/NA
Manganese	130		0.97	0.067	mg/Kg	1	☼	6010B	Total/NA
Molybdenum	0.22	J	2.6	0.11	mg/Kg	1	☼	6010B	Total/NA

LUMINANT

This Detection Summary does not include radiochemical test results.

Client Sample ID: BMW-29 (30-31)
Lab Sample ID: 140-15492-1
Date Collected: 05/31/19 16:45
Matrix: Solid
Date Received: 06/05/19 09:20
Percent Solids: 73.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		54	8.7	mg/Kg	☼	06/29/19 08:00	07/11/19 13:09	4
Antimony	ND		16	1.5	mg/Kg	☼	06/29/19 08:00	07/11/19 13:09	4
Arsenic	ND		2.7	0.71	mg/Kg	☼	06/29/19 08:00	07/11/19 13:09	4
Barium	ND		14	0.65	mg/Kg	☼	06/29/19 08:00	07/11/19 13:09	4
Beryllium	ND		1.4	0.42	mg/Kg	☼	06/29/19 08:00	07/11/19 13:09	4
Cobalt	ND		14	0.24	mg/Kg	☼	06/29/19 08:00	07/11/19 13:09	4
Iron	ND		27	16	mg/Kg	☼	06/29/19 08:00	07/11/19 13:09	4
Li	ND		14	0.82	mg/Kg	☼	06/29/19 08:00	07/11/19 13:09	4
Manganese	**3.8**	**J**	4.1	0.17	mg/Kg	☼	06/29/19 08:00	07/11/19 13:09	4
Mo	ND		11	0.45	mg/Kg	☼	06/29/19 08:00	07/11/19 13:09	4
Selenium	ND		2.7	0.93	mg/Kg	☼	06/29/19 08:00	07/11/19 13:09	4
Thallium	ND		9.5	1.1	mg/Kg	☼	06/29/19 08:00	07/11/19 13:09	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**16**	**J ***	41	6.5	mg/Kg	☼	06/30/19 08:00	07/11/19 14:53	3
Antimony	ND		12	1.1	mg/Kg	☼	06/30/19 08:00	07/11/19 14:53	3
Arsenic	ND		2.0	0.53	mg/Kg	☼	06/30/19 08:00	07/11/19 14:53	3
Barium	**1.1**	**J ***	10	0.49	mg/Kg	☼	06/30/19 08:00	07/11/19 14:53	3
Beryllium	ND	*	1.0	0.065	mg/Kg	☼	06/30/19 08:00	07/11/19 14:53	3
Cobalt	**1.4**	**J**	10	0.26	mg/Kg	☼	06/30/19 08:00	07/11/19 14:53	3
Iron	**48**	****	20	12	mg/Kg	☼	06/30/19 08:00	07/11/19 14:53	3
Li	ND		10	0.61	mg/Kg	☼	06/30/19 08:00	07/11/19 14:53	3
Manganese	**35**		3.1	1.1	mg/Kg	☼	06/30/19 08:00	07/11/19 14:53	3
Mo	ND		8.2	0.33	mg/Kg	☼	06/30/19 08:00	07/11/19 14:53	3
Selenium	**1.2**	**J B**	2.0	0.69	mg/Kg	☼	06/30/19 08:00	07/11/19 14:53	3
Thallium	ND		7.1	0.86	mg/Kg	☼	06/30/19 08:00	07/11/19 14:53	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**170**		14	2.9	mg/Kg	☼	07/02/19 08:00	07/11/19 16:42	1
Antimony	ND		4.1	0.38	mg/Kg	☼	07/02/19 08:00	07/11/19 16:42	1
Arsenic	**1.4**		0.68	0.18	mg/Kg	☼	07/02/19 08:00	07/11/19 16:42	1
Barium	**4.3**	**B**	3.4	0.16	mg/Kg	☼	07/02/19 08:00	07/11/19 16:42	1
Beryllium	**0.11**	**J**	0.34	0.020	mg/Kg	☼	07/02/19 08:00	07/11/19 16:42	1
Cobalt	**1.5**	**J**	3.4	0.061	mg/Kg	☼	07/02/19 08:00	07/11/19 16:42	1
Iron	**4200**		6.8	3.9	mg/Kg	☼	07/02/19 08:00	07/11/19 16:42	1
Li	ND		3.4	0.20	mg/Kg	☼	07/02/19 08:00	07/11/19 16:42	1
Manganese	**95**	**B**	1.0	0.037	mg/Kg	☼	07/02/19 08:00	07/11/19 16:42	1
Mo	**0.14**	**J**	2.7	0.11	mg/Kg	☼	07/02/19 08:00	07/11/19 16:42	1
Selenium	**0.28**	**J B**	0.68	0.23	mg/Kg	☼	07/02/19 08:00	07/11/19 16:42	1
Thallium	ND		2.4	0.29	mg/Kg	☼	07/02/19 08:00	07/11/19 16:42	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**2600**		14	2.2	mg/Kg	☼	07/03/19 08:00	07/11/19 18:09	1
Antimony	ND		4.1	0.61	mg/Kg	☼	07/03/19 08:00	07/11/19 18:09	1
Arsenic	**0.87**	**B**	0.68	0.30	mg/Kg	☼	07/03/19 08:00	07/11/19 18:09	1
Barium	**19**		3.4	0.16	mg/Kg	☼	07/03/19 08:00	07/11/19 18:09	1
Beryllium	**0.23**	**J**	0.34	0.022	mg/Kg	☼	07/03/19 08:00	07/11/19 18:09	1

LUMINANT

Client Sample ID: BMW-29 (30-31)
Date Collected: 05/31/19 16:45
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-1
Matrix: Solid
Percent Solids: 73.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cobalt	3.2	J	3.4	0.072	mg/Kg	☼	07/03/19 08:00	07/11/19 18:09	1
Iron	8300		6.8	3.9	mg/Kg	☼	07/03/19 08:00	07/11/19 18:09	1
Li	6.7		3.4	0.20	mg/Kg	☼	07/03/19 08:00	07/11/19 18:09	1
Manganese	180		1.0	0.18	mg/Kg	☼	07/03/19 08:00	07/11/19 18:09	1
Mo	ND		2.7	0.11	mg/Kg	☼	07/03/19 08:00	07/11/19 18:09	1
Selenium	ND	*	0.68	0.64	mg/Kg	☼	07/03/19 08:00	07/11/19 18:09	1
Thallium	ND		2.4	0.39	mg/Kg	☼	07/03/19 08:00	07/11/19 18:09	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	500	*	200	32	mg/Kg	☼	07/10/19 08:00	07/12/19 12:16	5
Antimony	ND		61	5.7	mg/Kg	☼	07/10/19 08:00	07/12/19 12:16	5
Arsenic	ND		10	2.6	mg/Kg	☼	07/10/19 08:00	07/12/19 12:16	5
Barium	17	J *	51	2.4	mg/Kg	☼	07/10/19 08:00	07/12/19 12:16	5
Beryllium	ND	*	5.1	0.43	mg/Kg	☼	07/10/19 08:00	07/12/19 12:16	5
Cobalt	1.0	J *	51	0.82	mg/Kg	☼	07/10/19 08:00	07/12/19 12:16	5
Iron	530	*	100	60	mg/Kg	☼	07/10/19 08:00	07/12/19 12:16	5
Li	ND		51	3.0	mg/Kg	☼	07/10/19 08:00	07/12/19 12:16	5
Manganese	33	*	15	2.5	mg/Kg	☼	07/10/19 08:00	07/12/19 12:16	5
Mo	ND		41	1.7	mg/Kg	☼	07/10/19 08:00	07/12/19 12:16	5
Selenium	ND		10	3.5	mg/Kg	☼	07/10/19 08:00	07/12/19 12:16	5
Thallium	ND	*	36	4.8	mg/Kg	☼	07/10/19 08:00	07/12/19 12:16	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	3500		14	2.2	mg/Kg	☼	07/10/19 08:00	07/12/19 14:00	1
Antimony	ND		4.1	0.38	mg/Kg	☼	07/10/19 08:00	07/12/19 14:00	1
Arsenic	1.1		0.68	0.20	mg/Kg	☼	07/10/19 08:00	07/12/19 14:00	1
Barium	30		3.4	0.16	mg/Kg	☼	07/10/19 08:00	07/12/19 14:00	1
Beryllium	0.11	J	0.34	0.016	mg/Kg	☼	07/10/19 08:00	07/12/19 14:00	1
Cobalt	1.2	J	3.4	0.063	mg/Kg	☼	07/10/19 08:00	07/12/19 14:00	1
Iron	4800		6.8	3.9	mg/Kg	☼	07/10/19 08:00	07/12/19 14:00	1
Li	4.0		3.4	0.20	mg/Kg	☼	07/10/19 08:00	07/12/19 14:00	1
Manganese	38		1.0	0.34	mg/Kg	☼	07/10/19 08:00	07/12/19 14:00	1
Mo	ND		2.7	0.13	mg/Kg	☼	07/10/19 08:00	07/12/19 14:00	1
Selenium	ND		0.68	0.23	mg/Kg	☼	07/10/19 08:00	07/12/19 14:00	1
Thallium	ND		2.4	0.29	mg/Kg	☼	07/10/19 08:00	07/12/19 14:00	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	34000		140	22	mg/Kg	☼	07/12/19 09:08	07/15/19 13:29	10
Antimony	ND		4.1	0.19	mg/Kg	☼	07/12/19 09:08	07/15/19 12:16	1
Arsenic	0.59	J	0.68	0.18	mg/Kg	☼	07/12/19 09:08	07/15/19 12:16	1
Barium	340		34	1.6	mg/Kg	☼	07/12/19 09:08	07/15/19 13:29	10
Beryllium	0.69		0.34	0.010	mg/Kg	☼	07/12/19 09:08	07/15/19 12:16	1
Cobalt	0.90	J	6.8	0.41	mg/Kg	☼	07/12/19 09:08	07/15/19 17:32	2
Iron	6700		6.8	5.6	mg/Kg	☼	07/12/19 09:08	07/15/19 12:16	1
Li	14		3.4	0.20	mg/Kg	☼	07/12/19 09:08	07/15/19 12:16	1
Manganese	36		1.0	0.071	mg/Kg	☼	07/12/19 09:08	07/15/19 12:16	1
Mo	0.20	J	2.7	0.11	mg/Kg	☼	07/12/19 09:08	07/15/19 12:16	1

LUMINANT

Client Sample ID: BMW-29 (30-31)
Date Collected: 05/31/19 16:45
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-1
Matrix: Solid
Percent Solids: 73.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		0.68	0.23	mg/Kg	☼	07/12/19 09:08	07/15/19 12:16	1
Thallium	**0.74**	**J**	4.8	0.49	mg/Kg	☼	07/12/19 09:08	07/15/19 17:32	2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**41000**		10	1.6	mg/Kg			07/16/19 17:31	1
Antimony	ND		3.0	0.14	mg/Kg			07/16/19 17:31	1
Arsenic	**4.0**		0.50	0.13	mg/Kg			07/16/19 17:31	1
Barium	**410**		2.5	0.12	mg/Kg			07/16/19 17:31	1
Beryllium	**1.1**		0.25	0.0075	mg/Kg			07/16/19 17:31	1
Cobalt	**9.2**		2.5	0.023	mg/Kg			07/16/19 17:31	1
Iron	**25000**		5.0	4.1	mg/Kg			07/16/19 17:31	1
Li	**25**		2.5	0.15	mg/Kg			07/16/19 17:31	1
Manganese	**420**		0.75	0.052	mg/Kg			07/16/19 17:31	1
Mo	**0.33**	**J**	2.0	0.082	mg/Kg			07/16/19 17:31	1
Selenium	**1.5**		0.50	0.17	mg/Kg			07/16/19 17:31	1
Thallium	**0.74**	**J**	1.8	0.18	mg/Kg			07/16/19 17:31	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**15**	**J**	25	13	mg/Kg	☼	06/26/19 08:00	07/10/19 12:23	1
Chromium	**19**		1.9	0.28	mg/Kg	☼	06/26/19 08:00	07/10/19 12:23	1
Lead	**9.7**		1.9	0.35	mg/Kg	☼	06/26/19 08:00	07/10/19 12:23	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**72000**		140	22	mg/Kg	☼	06/11/19 08:00	07/15/19 16:20	10
Antimony	ND		4.1	0.19	mg/Kg	☼	06/11/19 08:00	07/15/19 14:46	1
Arsenic	**3.8**		0.68	0.18	mg/Kg	☼	06/11/19 08:00	07/15/19 14:46	1
Barium	**630**		34	1.6	mg/Kg	☼	06/11/19 08:00	07/15/19 16:20	10
Beryllium	**1.2**		0.34	0.010	mg/Kg	☼	06/11/19 08:00	07/15/19 14:46	1
Cobalt	**10**	**J**	17	1.0	mg/Kg	☼	06/11/19 08:00	07/15/19 18:48	5
Iron	**26000**		6.8	5.6	mg/Kg	☼	06/11/19 08:00	07/15/19 14:46	1
Lithium	**31**		3.4	0.20	mg/Kg	☼	06/11/19 08:00	07/15/19 14:46	1
Manganese	**490**		1.0	0.071	mg/Kg	☼	06/11/19 08:00	07/15/19 14:46	1
Molybdenum	**0.70**	**J**	2.7	0.11	mg/Kg	☼	06/11/19 08:00	07/15/19 14:46	1
Selenium	ND		0.68	0.23	mg/Kg	☼	06/11/19 08:00	07/15/19 14:46	1
Thallium	**1.4**	**J**	12	1.2	mg/Kg	☼	06/11/19 08:00	07/15/19 18:48	5

Method: 7470A - SEP Mercury (CVAA) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	**0.078**	**J**	0.14	0.054	mg/Kg	☼	06/11/19 08:00	06/16/19 14:19	1

LUMINANT

Client Sample ID: BMW-30 (40-41)
Date Collected: 05/30/19 15:55
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-2
Matrix: Solid
Percent Solids: 84.1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		48	7.6	mg/Kg	☼	06/29/19 08:00	07/11/19 13:14	4
Antimony	ND		14	1.3	mg/Kg	☼	06/29/19 08:00	07/11/19 13:14	4
Arsenic	ND		2.4	0.62	mg/Kg	☼	06/29/19 08:00	07/11/19 13:14	4
Barium	ND		12	0.57	mg/Kg	☼	06/29/19 08:00	07/11/19 13:14	4
Beryllium	ND		1.2	0.37	mg/Kg	☼	06/29/19 08:00	07/11/19 13:14	4
Cobalt	**0.82**	**J**	12	0.21	mg/Kg	☼	06/29/19 08:00	07/11/19 13:14	4
Iron	ND		24	14	mg/Kg	☼	06/29/19 08:00	07/11/19 13:14	4
Li	ND		12	0.71	mg/Kg	☼	06/29/19 08:00	07/11/19 13:14	4
Manganese	**1.5**	**J**	3.6	0.15	mg/Kg	☼	06/29/19 08:00	07/11/19 13:14	4
Mo	ND		9.5	0.39	mg/Kg	☼	06/29/19 08:00	07/11/19 13:14	4
Selenium	ND		2.4	0.81	mg/Kg	☼	06/29/19 08:00	07/11/19 13:14	4
Thallium	ND		8.3	1.0	mg/Kg	☼	06/29/19 08:00	07/11/19 13:14	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**7.3**	**J ***	36	5.7	mg/Kg	☼	06/30/19 08:00	07/11/19 14:58	3
Antimony	ND		11	1.0	mg/Kg	☼	06/30/19 08:00	07/11/19 14:58	3
Arsenic	ND		1.8	0.46	mg/Kg	☼	06/30/19 08:00	07/11/19 14:58	3
Barium	**0.52**	**J ***	8.9	0.43	mg/Kg	☼	06/30/19 08:00	07/11/19 14:58	3
Beryllium	ND	*	0.89	0.057	mg/Kg	☼	06/30/19 08:00	07/11/19 14:58	3
Cobalt	**0.28**	**J**	8.9	0.22	mg/Kg	☼	06/30/19 08:00	07/11/19 14:58	3
Iron	**24**	****	18	10	mg/Kg	☼	06/30/19 08:00	07/11/19 14:58	3
Li	ND		8.9	0.53	mg/Kg	☼	06/30/19 08:00	07/11/19 14:58	3
Manganese	ND		2.7	1.0	mg/Kg	☼	06/30/19 08:00	07/11/19 14:58	3
Mo	ND		7.1	0.29	mg/Kg	☼	06/30/19 08:00	07/11/19 14:58	3
Selenium	**0.67**	**J B**	1.8	0.61	mg/Kg	☼	06/30/19 08:00	07/11/19 14:58	3
Thallium	ND		6.2	0.75	mg/Kg	☼	06/30/19 08:00	07/11/19 14:58	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**35**		12	2.5	mg/Kg	☼	07/02/19 08:00	07/11/19 16:47	1
Antimony	ND		3.6	0.33	mg/Kg	☼	07/02/19 08:00	07/11/19 16:47	1
Arsenic	**1.3**		0.59	0.15	mg/Kg	☼	07/02/19 08:00	07/11/19 16:47	1
Barium	**2.0**	**J B**	3.0	0.14	mg/Kg	☼	07/02/19 08:00	07/11/19 16:47	1
Beryllium	ND		0.30	0.018	mg/Kg	☼	07/02/19 08:00	07/11/19 16:47	1
Cobalt	**0.28**	**J**	3.0	0.053	mg/Kg	☼	07/02/19 08:00	07/11/19 16:47	1
Iron	**190**		5.9	3.4	mg/Kg	☼	07/02/19 08:00	07/11/19 16:47	1
Li	ND		3.0	0.18	mg/Kg	☼	07/02/19 08:00	07/11/19 16:47	1
Manganese	**0.29**	**J B**	0.89	0.032	mg/Kg	☼	07/02/19 08:00	07/11/19 16:47	1
Mo	ND		2.4	0.097	mg/Kg	☼	07/02/19 08:00	07/11/19 16:47	1
Selenium	**0.38**	**J B**	0.59	0.20	mg/Kg	☼	07/02/19 08:00	07/11/19 16:47	1
Thallium	ND		2.1	0.25	mg/Kg	☼	07/02/19 08:00	07/11/19 16:47	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1100**		12	1.9	mg/Kg	☼	07/03/19 08:00	07/11/19 18:15	1
Antimony	ND		3.6	0.53	mg/Kg	☼	07/03/19 08:00	07/11/19 18:15	1
Arsenic	**0.78**	**B**	0.59	0.26	mg/Kg	☼	07/03/19 08:00	07/11/19 18:15	1
Barium	**7.4**		3.0	0.14	mg/Kg	☼	07/03/19 08:00	07/11/19 18:15	1
Beryllium	**0.062**	**J**	0.30	0.019	mg/Kg	☼	07/03/19 08:00	07/11/19 18:15	1

LUMINANT

Client Sample ID: BMW-30 (40-41)
Lab Sample ID: 140-15492-2
Date Collected: 05/30/19 15:55
Matrix: Solid
Date Received: 06/05/19 09:20
Percent Solids: 84.1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cobalt	**0.50**	**J**	3.0	0.063	mg/Kg	☼	07/03/19 08:00	07/11/19 18:15	1
Iron	**1000**		5.9	3.4	mg/Kg	☼	07/03/19 08:00	07/11/19 18:15	1
Li	**1.7**	**J**	3.0	0.18	mg/Kg	☼	07/03/19 08:00	07/11/19 18:15	1
Manganese	**8.7**		0.89	0.15	mg/Kg	☼	07/03/19 08:00	07/11/19 18:15	1
Mo	ND		2.4	0.097	mg/Kg	☼	07/03/19 08:00	07/11/19 18:15	1
Selenium	**0.76**	**B ***	0.59	0.56	mg/Kg	☼	07/03/19 08:00	07/11/19 18:15	1
Thallium	ND		2.1	0.34	mg/Kg	☼	07/03/19 08:00	07/11/19 18:15	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**66**	**J ***	180	28	mg/Kg	☼	07/10/19 08:00	07/12/19 12:21	5
Antimony	ND		53	5.0	mg/Kg	☼	07/10/19 08:00	07/12/19 12:21	5
Arsenic	ND		8.9	2.3	mg/Kg	☼	07/10/19 08:00	07/12/19 12:21	5
Barium	ND	*	45	2.1	mg/Kg	☼	07/10/19 08:00	07/12/19 12:21	5
Beryllium	ND	*	4.5	0.37	mg/Kg	☼	07/10/19 08:00	07/12/19 12:21	5
Cobalt	ND	*	45	0.71	mg/Kg	☼	07/10/19 08:00	07/12/19 12:21	5
Iron	ND	*	89	52	mg/Kg	☼	07/10/19 08:00	07/12/19 12:21	5
Li	ND		45	2.6	mg/Kg	☼	07/10/19 08:00	07/12/19 12:21	5
Manganese	ND	*	13	2.2	mg/Kg	☼	07/10/19 08:00	07/12/19 12:21	5
Mo	ND		36	1.5	mg/Kg	☼	07/10/19 08:00	07/12/19 12:21	5
Selenium	ND		8.9	3.1	mg/Kg	☼	07/10/19 08:00	07/12/19 12:21	5
Thallium	ND	*	31	4.2	mg/Kg	☼	07/10/19 08:00	07/12/19 12:21	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1300**		12	1.9	mg/Kg	☼	07/10/19 08:00	07/12/19 14:05	1
Antimony	ND		3.6	0.33	mg/Kg	☼	07/10/19 08:00	07/12/19 14:05	1
Arsenic	**0.75**		0.59	0.18	mg/Kg	☼	07/10/19 08:00	07/12/19 14:05	1
Barium	**4.0**		3.0	0.14	mg/Kg	☼	07/10/19 08:00	07/12/19 14:05	1
Beryllium	**0.043**	**J**	0.30	0.014	mg/Kg	☼	07/10/19 08:00	07/12/19 14:05	1
Cobalt	**0.46**	**J**	3.0	0.055	mg/Kg	☼	07/10/19 08:00	07/12/19 14:05	1
Iron	**1800**		5.9	3.4	mg/Kg	☼	07/10/19 08:00	07/12/19 14:05	1
Li	**0.91**	**J**	3.0	0.18	mg/Kg	☼	07/10/19 08:00	07/12/19 14:05	1
Manganese	**8.0**		0.89	0.30	mg/Kg	☼	07/10/19 08:00	07/12/19 14:05	1
Mo	ND		2.4	0.12	mg/Kg	☼	07/10/19 08:00	07/12/19 14:05	1
Selenium	ND		0.59	0.20	mg/Kg	☼	07/10/19 08:00	07/12/19 14:05	1
Thallium	ND		2.1	0.25	mg/Kg	☼	07/10/19 08:00	07/12/19 14:05	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**37000**		120	19	mg/Kg	☼	07/12/19 09:08	07/15/19 13:34	10
Antimony	ND		3.6	0.17	mg/Kg	☼	07/12/19 09:08	07/15/19 12:21	1
Arsenic	**1.3**		1.2	0.31	mg/Kg	☼	07/12/19 09:08	07/15/19 17:37	2
Barium	**380**		30	1.4	mg/Kg	☼	07/12/19 09:08	07/15/19 13:34	10
Beryllium	**0.36**		0.30	0.0089	mg/Kg	☼	07/12/19 09:08	07/15/19 12:21	1
Cobalt	**0.76**	**J**	5.9	0.36	mg/Kg	☼	07/12/19 09:08	07/15/19 17:37	2
Iron	**2800**		5.9	4.9	mg/Kg	☼	07/12/19 09:08	07/15/19 12:21	1
Li	**14**		3.0	0.18	mg/Kg	☼	07/12/19 09:08	07/15/19 12:21	1
Manganese	**38**		0.89	0.062	mg/Kg	☼	07/12/19 09:08	07/15/19 12:21	1
Mo	ND		2.4	0.097	mg/Kg	☼	07/12/19 09:08	07/15/19 12:21	1

LUMINANT

Client Sample ID: BMW-30 (40-41)
Date Collected: 05/30/19 15:55
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-2
Matrix: Solid
Percent Solids: 84.1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		1.2	0.40	mg/Kg	☼	07/12/19 09:08	07/15/19 17:37	2
Thallium	**0.87**	**J**	4.2	0.43	mg/Kg	☼	07/12/19 09:08	07/15/19 17:37	2

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			07/16/19 17:31	1
Antimony	ND		3.0	0.14	mg/Kg			07/16/19 17:31	1
Arsenic	**4.1**		0.50	0.13	mg/Kg			07/16/19 17:31	1
Barium	**390**		2.5	0.12	mg/Kg			07/16/19 17:31	1
Beryllium	**0.46**		0.25	0.0075	mg/Kg			07/16/19 17:31	1
Cobalt	**3.1**		2.5	0.023	mg/Kg			07/16/19 17:31	1
Iron	**5800**		5.0	4.1	mg/Kg			07/16/19 17:31	1
Li	**17**		2.5	0.15	mg/Kg			07/16/19 17:31	1
Manganese	**57**		0.75	0.052	mg/Kg			07/16/19 17:31	1
Mo	ND		2.0	0.082	mg/Kg			07/16/19 17:31	1
Selenium	**1.8**		0.50	0.17	mg/Kg			07/16/19 17:31	1
Thallium	**0.87**	**J**	1.8	0.18	mg/Kg			07/16/19 17:31	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		23	11	mg/Kg	☼	06/26/19 08:00	07/10/19 12:28	1
Chromium	**7.9**		1.7	0.25	mg/Kg	☼	06/26/19 08:00	07/10/19 12:28	1
Lead	**5.9**		1.7	0.32	mg/Kg	☼	06/26/19 08:00	07/10/19 12:28	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**48000**		120	19	mg/Kg	☼	06/11/19 08:00	07/15/19 16:25	10
Antimony	ND		3.6	0.17	mg/Kg	☼	06/11/19 08:00	07/15/19 15:07	1
Arsenic	**4.8**		0.59	0.15	mg/Kg	☼	06/11/19 08:00	07/15/19 15:07	1
Barium	**490**		30	1.4	mg/Kg	☼	06/11/19 08:00	07/15/19 16:25	10
Beryllium	**0.46**		0.30	0.0089	mg/Kg	☼	06/11/19 08:00	07/15/19 15:07	1
Cobalt	**3.4**	**J**	15	0.89	mg/Kg	☼	06/11/19 08:00	07/15/19 18:53	5
Iron	**5800**		5.9	4.9	mg/Kg	☼	06/11/19 08:00	07/15/19 15:07	1
Lithium	**18**		3.0	0.18	mg/Kg	☼	06/11/19 08:00	07/15/19 15:07	1
Manganese	**60**		0.89	0.062	mg/Kg	☼	06/11/19 08:00	07/15/19 15:07	1
Molybdenum	**0.17**	**J**	2.4	0.097	mg/Kg	☼	06/11/19 08:00	07/15/19 15:07	1
Selenium	**1.1**		0.59	0.20	mg/Kg	☼	06/11/19 08:00	07/15/19 15:07	1
Thallium	ND		10	1.1	mg/Kg	☼	06/11/19 08:00	07/15/19 18:53	5

Method: 7470A - SEP Mercury (CVAA) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	**0.054**	**J**	0.12	0.048	mg/Kg	☼	06/11/19 08:00	06/16/19 14:21	1

LUMINANT

Client Sample ID: BMW-31 (14-15)
Date Collected: 05/31/19 11:15
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-3
Matrix: Solid
Percent Solids: 84.2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		47	7.6	mg/Kg	☼	06/29/19 08:00	07/11/19 13:35	4
Antimony	ND		14	1.3	mg/Kg	☼	06/29/19 08:00	07/11/19 13:35	4
Arsenic	ND		2.4	0.62	mg/Kg	☼	06/29/19 08:00	07/11/19 13:35	4
Barium	**0.58**	**J**	12	0.57	mg/Kg	☼	06/29/19 08:00	07/11/19 13:35	4
Beryllium	ND		1.2	0.37	mg/Kg	☼	06/29/19 08:00	07/11/19 13:35	4
Cobalt	ND		12	0.21	mg/Kg	☼	06/29/19 08:00	07/11/19 13:35	4
Iron	ND		24	14	mg/Kg	☼	06/29/19 08:00	07/11/19 13:35	4
Li	ND		12	0.71	mg/Kg	☼	06/29/19 08:00	07/11/19 13:35	4
Manganese	**11**		3.6	0.15	mg/Kg	☼	06/29/19 08:00	07/11/19 13:35	4
Mo	ND		9.5	0.39	mg/Kg	☼	06/29/19 08:00	07/11/19 13:35	4
Selenium	ND		2.4	0.81	mg/Kg	☼	06/29/19 08:00	07/11/19 13:35	4
Thallium	ND		8.3	1.0	mg/Kg	☼	06/29/19 08:00	07/11/19 13:35	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND	*	36	5.7	mg/Kg	☼	06/30/19 08:00	07/11/19 15:03	3
Antimony	ND		11	1.0	mg/Kg	☼	06/30/19 08:00	07/11/19 15:03	3
Arsenic	ND		1.8	0.46	mg/Kg	☼	06/30/19 08:00	07/11/19 15:03	3
Barium	**0.46**	**J ***	8.9	0.43	mg/Kg	☼	06/30/19 08:00	07/11/19 15:03	3
Beryllium	ND	*	0.89	0.057	mg/Kg	☼	06/30/19 08:00	07/11/19 15:03	3
Cobalt	ND		8.9	0.22	mg/Kg	☼	06/30/19 08:00	07/11/19 15:03	3
Iron	ND	*	18	10	mg/Kg	☼	06/30/19 08:00	07/11/19 15:03	3
Li	ND		8.9	0.53	mg/Kg	☼	06/30/19 08:00	07/11/19 15:03	3
Manganese	**2.4**	**J**	2.7	1.0	mg/Kg	☼	06/30/19 08:00	07/11/19 15:03	3
Mo	ND		7.1	0.29	mg/Kg	☼	06/30/19 08:00	07/11/19 15:03	3
Selenium	**0.77**	**J B**	1.8	0.61	mg/Kg	☼	06/30/19 08:00	07/11/19 15:03	3
Thallium	ND		6.2	0.75	mg/Kg	☼	06/30/19 08:00	07/11/19 15:03	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**59**		12	2.5	mg/Kg	☼	07/02/19 08:00	07/11/19 16:52	1
Antimony	ND		3.6	0.33	mg/Kg	☼	07/02/19 08:00	07/11/19 16:52	1
Arsenic	**0.29**	**J**	0.59	0.15	mg/Kg	☼	07/02/19 08:00	07/11/19 16:52	1
Barium	**14**	**B**	3.0	0.14	mg/Kg	☼	07/02/19 08:00	07/11/19 16:52	1
Beryllium	**0.069**	**J**	0.30	0.018	mg/Kg	☼	07/02/19 08:00	07/11/19 16:52	1
Cobalt	**16**		3.0	0.053	mg/Kg	☼	07/02/19 08:00	07/11/19 16:52	1
Iron	**120**		5.9	3.4	mg/Kg	☼	07/02/19 08:00	07/11/19 16:52	1
Li	ND		3.0	0.18	mg/Kg	☼	07/02/19 08:00	07/11/19 16:52	1
Manganese	**260**	**B**	0.89	0.032	mg/Kg	☼	07/02/19 08:00	07/11/19 16:52	1
Mo	ND		2.4	0.097	mg/Kg	☼	07/02/19 08:00	07/11/19 16:52	1
Selenium	**0.23**	**J B**	0.59	0.20	mg/Kg	☼	07/02/19 08:00	07/11/19 16:52	1
Thallium	ND		2.1	0.25	mg/Kg	☼	07/02/19 08:00	07/11/19 16:52	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1600**		12	1.9	mg/Kg	☼	07/03/19 08:00	07/11/19 18:20	1
Antimony	ND		3.6	0.53	mg/Kg	☼	07/03/19 08:00	07/11/19 18:20	1
Arsenic	**1.8**	**B**	0.59	0.26	mg/Kg	☼	07/03/19 08:00	07/11/19 18:20	1
Barium	**33**		3.0	0.14	mg/Kg	☼	07/03/19 08:00	07/11/19 18:20	1
Beryllium	**0.24**	**J**	0.30	0.019	mg/Kg	☼	07/03/19 08:00	07/11/19 18:20	1

LUMINANT

Client Sample ID: BMW-31 (14-15)
Date Collected: 05/31/19 11:15
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-3
Matrix: Solid
Percent Solids: 84.2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cobalt	**2.8**	**J**	3.0	0.063	mg/Kg	☼	07/03/19 08:00	07/11/19 18:20	1
Iron	**5600**		5.9	3.4	mg/Kg	☼	07/03/19 08:00	07/11/19 18:20	1
Li	**2.2**	**J**	3.0	0.18	mg/Kg	☼	07/03/19 08:00	07/11/19 18:20	1
Manganese	**63**		0.89	0.15	mg/Kg	☼	07/03/19 08:00	07/11/19 18:20	1
Mo	ND		2.4	0.097	mg/Kg	☼	07/03/19 08:00	07/11/19 18:20	1
Selenium	**1.1**	**B ***	0.59	0.56	mg/Kg	☼	07/03/19 08:00	07/11/19 18:20	1
Thallium	ND		2.1	0.34	mg/Kg	☼	07/03/19 08:00	07/11/19 18:20	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**67**	**J ***	180	28	mg/Kg	☼	07/10/19 08:00	07/12/19 12:42	5
Antimony	ND		53	5.0	mg/Kg	☼	07/10/19 08:00	07/12/19 12:42	5
Arsenic	ND		8.9	2.3	mg/Kg	☼	07/10/19 08:00	07/12/19 12:42	5
Barium	**3.9**	**J ***	45	2.1	mg/Kg	☼	07/10/19 08:00	07/12/19 12:42	5
Beryllium	ND	*	4.5	0.37	mg/Kg	☼	07/10/19 08:00	07/12/19 12:42	5
Cobalt	ND	*	45	0.71	mg/Kg	☼	07/10/19 08:00	07/12/19 12:42	5
Iron	ND	*	89	52	mg/Kg	☼	07/10/19 08:00	07/12/19 12:42	5
Li	ND		45	2.6	mg/Kg	☼	07/10/19 08:00	07/12/19 12:42	5
Manganese	ND	*	13	2.2	mg/Kg	☼	07/10/19 08:00	07/12/19 12:42	5
Mo	ND		36	1.5	mg/Kg	☼	07/10/19 08:00	07/12/19 12:42	5
Selenium	ND		8.9	3.1	mg/Kg	☼	07/10/19 08:00	07/12/19 12:42	5
Thallium	ND	*	31	4.2	mg/Kg	☼	07/10/19 08:00	07/12/19 12:42	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1800**		12	1.9	mg/Kg	☼	07/10/19 08:00	07/12/19 14:10	1
Antimony	ND		3.6	0.33	mg/Kg	☼	07/10/19 08:00	07/12/19 14:10	1
Arsenic	**0.54**	**J**	0.59	0.18	mg/Kg	☼	07/10/19 08:00	07/12/19 14:10	1
Barium	**4.4**		3.0	0.14	mg/Kg	☼	07/10/19 08:00	07/12/19 14:10	1
Beryllium	**0.059**	**J**	0.30	0.014	mg/Kg	☼	07/10/19 08:00	07/12/19 14:10	1
Cobalt	**0.46**	**J**	3.0	0.055	mg/Kg	☼	07/10/19 08:00	07/12/19 14:10	1
Iron	**1700**		5.9	3.4	mg/Kg	☼	07/10/19 08:00	07/12/19 14:10	1
Li	**1.3**	**J**	3.0	0.18	mg/Kg	☼	07/10/19 08:00	07/12/19 14:10	1
Manganese	**10**		0.89	0.30	mg/Kg	☼	07/10/19 08:00	07/12/19 14:10	1
Mo	ND		2.4	0.12	mg/Kg	☼	07/10/19 08:00	07/12/19 14:10	1
Selenium	ND		0.59	0.20	mg/Kg	☼	07/10/19 08:00	07/12/19 14:10	1
Thallium	ND		2.1	0.25	mg/Kg	☼	07/10/19 08:00	07/12/19 14:10	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**26000**		120	19	mg/Kg	☼	07/12/19 09:08	07/15/19 13:39	10
Antimony	ND		3.6	0.17	mg/Kg	☼	07/12/19 09:08	07/15/19 12:26	1
Arsenic	**0.58**	**J**	1.2	0.31	mg/Kg	☼	07/12/19 09:08	07/15/19 17:42	2
Barium	**320**		30	1.4	mg/Kg	☼	07/12/19 09:08	07/15/19 13:39	10
Beryllium	**0.30**		0.30	0.0089	mg/Kg	☼	07/12/19 09:08	07/15/19 12:26	1
Cobalt	**0.82**	**J**	5.9	0.36	mg/Kg	☼	07/12/19 09:08	07/15/19 17:42	2
Iron	**3600**		5.9	4.9	mg/Kg	☼	07/12/19 09:08	07/15/19 12:26	1
Li	**15**		3.0	0.18	mg/Kg	☼	07/12/19 09:08	07/15/19 12:26	1
Manganese	**24**		0.89	0.062	mg/Kg	☼	07/12/19 09:08	07/15/19 12:26	1
Mo	**0.16**	**J**	2.4	0.097	mg/Kg	☼	07/12/19 09:08	07/15/19 12:26	1

LUMINANT

Client Sample ID: BMW-31 (14-15)
Date Collected: 05/31/19 11:15
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-3
Matrix: Solid
Percent Solids: 84.2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		1.2	0.40	mg/Kg	☼	07/12/19 09:08	07/15/19 17:42	2
Thallium	**0.52**	**J**	4.2	0.43	mg/Kg	☼	07/12/19 09:08	07/15/19 17:42	2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**30000**		10	1.6	mg/Kg			07/16/19 17:31	1
Antimony	ND		3.0	0.14	mg/Kg			07/16/19 17:31	1
Arsenic	**3.2**		0.50	0.13	mg/Kg			07/16/19 17:31	1
Barium	**370**		2.5	0.12	mg/Kg			07/16/19 17:31	1
Beryllium	**0.67**		0.25	0.0075	mg/Kg			07/16/19 17:31	1
Cobalt	**20**		2.5	0.023	mg/Kg			07/16/19 17:31	1
Iron	**11000**		5.0	4.1	mg/Kg			07/16/19 17:31	1
Li	**19**		2.5	0.15	mg/Kg			07/16/19 17:31	1
Manganese	**370**		0.75	0.052	mg/Kg			07/16/19 17:31	1
Mo	**0.16**	**J**	2.0	0.082	mg/Kg			07/16/19 17:31	1
Selenium	**2.1**		0.50	0.17	mg/Kg			07/16/19 17:31	1
Thallium	**0.52**	**J**	1.8	0.18	mg/Kg			07/16/19 17:31	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		24	12	mg/Kg	☼	06/26/19 08:00	07/10/19 12:43	1
Chromium	**7.3**		1.8	0.26	mg/Kg	☼	06/26/19 08:00	07/10/19 12:43	1
Lead	**6.8**		1.8	0.33	mg/Kg	☼	06/26/19 08:00	07/10/19 12:43	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**30000**		120	19	mg/Kg	☼	06/11/19 08:00	07/15/19 16:30	10
Antimony	ND		3.6	0.17	mg/Kg	☼	06/11/19 08:00	07/15/19 15:12	1
Arsenic	**3.0**		0.59	0.15	mg/Kg	☼	06/11/19 08:00	07/15/19 15:12	1
Barium	**430**		30	1.4	mg/Kg	☼	06/11/19 08:00	07/15/19 16:30	10
Beryllium	**0.66**		0.30	0.0089	mg/Kg	☼	06/11/19 08:00	07/15/19 15:12	1
Cobalt	**18**		5.9	0.36	mg/Kg	☼	06/11/19 08:00	07/15/19 19:14	2
Iron	**10000**		5.9	4.9	mg/Kg	☼	06/11/19 08:00	07/15/19 15:12	1
Lithium	**18**		3.0	0.18	mg/Kg	☼	06/11/19 08:00	07/15/19 15:12	1
Manganese	**280**		0.89	0.062	mg/Kg	☼	06/11/19 08:00	07/15/19 15:12	1
Molybdenum	**0.29**	**J**	2.4	0.097	mg/Kg	☼	06/11/19 08:00	07/15/19 15:12	1
Selenium	ND		0.59	0.20	mg/Kg	☼	06/11/19 08:00	07/15/19 15:12	1
Thallium	**0.67**	**J**	4.2	0.43	mg/Kg	☼	06/11/19 08:00	07/15/19 19:14	2

Method: 7470A - SEP Mercury (CVAA) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.12	0.047	mg/Kg	☼	06/11/19 08:00	06/16/19 14:24	1

LUMINANT

Client Sample ID: BMW-32 (25-26)
Date Collected: 05/29/19 15:45
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-4
Matrix: Solid
Percent Solids: 84.2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		47	7.6	mg/Kg	☼	06/29/19 08:00	07/11/19 13:40	4
Antimony	ND		14	1.3	mg/Kg	☼	06/29/19 08:00	07/11/19 13:40	4
Arsenic	ND		2.4	0.62	mg/Kg	☼	06/29/19 08:00	07/11/19 13:40	4
Barium	ND		12	0.57	mg/Kg	☼	06/29/19 08:00	07/11/19 13:40	4
Beryllium	ND		1.2	0.37	mg/Kg	☼	06/29/19 08:00	07/11/19 13:40	4
Cobalt	ND		12	0.21	mg/Kg	☼	06/29/19 08:00	07/11/19 13:40	4
Iron	ND		24	14	mg/Kg	☼	06/29/19 08:00	07/11/19 13:40	4
Li	ND		12	0.71	mg/Kg	☼	06/29/19 08:00	07/11/19 13:40	4
Manganese	**1.0**	**J**	3.6	0.15	mg/Kg	☼	06/29/19 08:00	07/11/19 13:40	4
Mo	ND		9.5	0.39	mg/Kg	☼	06/29/19 08:00	07/11/19 13:40	4
Selenium	ND		2.4	0.81	mg/Kg	☼	06/29/19 08:00	07/11/19 13:40	4
Thallium	ND		8.3	1.0	mg/Kg	☼	06/29/19 08:00	07/11/19 13:40	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**17**	**J ***	36	5.7	mg/Kg	☼	06/30/19 08:00	07/11/19 15:09	3
Antimony	ND		11	1.0	mg/Kg	☼	06/30/19 08:00	07/11/19 15:09	3
Arsenic	ND		1.8	0.46	mg/Kg	☼	06/30/19 08:00	07/11/19 15:09	3
Barium	ND	*	8.9	0.43	mg/Kg	☼	06/30/19 08:00	07/11/19 15:09	3
Beryllium	ND	*	0.89	0.057	mg/Kg	☼	06/30/19 08:00	07/11/19 15:09	3
Cobalt	ND		8.9	0.22	mg/Kg	☼	06/30/19 08:00	07/11/19 15:09	3
Iron	**36**	****	18	10	mg/Kg	☼	06/30/19 08:00	07/11/19 15:09	3
Li	ND		8.9	0.53	mg/Kg	☼	06/30/19 08:00	07/11/19 15:09	3
Manganese	ND		2.7	1.0	mg/Kg	☼	06/30/19 08:00	07/11/19 15:09	3
Mo	ND		7.1	0.29	mg/Kg	☼	06/30/19 08:00	07/11/19 15:09	3
Selenium	**0.78**	**J B**	1.8	0.61	mg/Kg	☼	06/30/19 08:00	07/11/19 15:09	3
Thallium	ND		6.2	0.75	mg/Kg	☼	06/30/19 08:00	07/11/19 15:09	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**81**		12	2.5	mg/Kg	☼	07/02/19 08:00	07/11/19 16:58	1
Antimony	ND		3.6	0.33	mg/Kg	☼	07/02/19 08:00	07/11/19 16:58	1
Arsenic	**0.60**		0.59	0.15	mg/Kg	☼	07/02/19 08:00	07/11/19 16:58	1
Barium	**1.3**	**J B**	3.0	0.14	mg/Kg	☼	07/02/19 08:00	07/11/19 16:58	1
Beryllium	ND		0.30	0.018	mg/Kg	☼	07/02/19 08:00	07/11/19 16:58	1
Cobalt	**0.060**	**J**	3.0	0.053	mg/Kg	☼	07/02/19 08:00	07/11/19 16:58	1
Iron	**500**		5.9	3.4	mg/Kg	☼	07/02/19 08:00	07/11/19 16:58	1
Li	ND		3.0	0.18	mg/Kg	☼	07/02/19 08:00	07/11/19 16:58	1
Manganese	**0.60**	**J B**	0.89	0.032	mg/Kg	☼	07/02/19 08:00	07/11/19 16:58	1
Mo	ND		2.4	0.097	mg/Kg	☼	07/02/19 08:00	07/11/19 16:58	1
Selenium	**0.21**	**J B**	0.59	0.20	mg/Kg	☼	07/02/19 08:00	07/11/19 16:58	1
Thallium	ND		2.1	0.25	mg/Kg	☼	07/02/19 08:00	07/11/19 16:58	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1200**		12	1.9	mg/Kg	☼	07/03/19 08:00	07/11/19 18:25	1
Antimony	ND		3.6	0.53	mg/Kg	☼	07/03/19 08:00	07/11/19 18:25	1
Arsenic	**0.78**	**B**	0.59	0.26	mg/Kg	☼	07/03/19 08:00	07/11/19 18:25	1
Barium	**17**		3.0	0.14	mg/Kg	☼	07/03/19 08:00	07/11/19 18:25	1
Beryllium	**0.025**	**J**	0.30	0.019	mg/Kg	☼	07/03/19 08:00	07/11/19 18:25	1

LUMINANT

Client Sample ID: BMW-32 (25-26)
Date Collected: 05/29/19 15:45
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-4
Matrix: Solid
Percent Solids: 84.2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cobalt	0.60	J	3.0	0.063	mg/Kg	☼	07/03/19 08:00	07/11/19 18:25	1
Iron	2000		5.9	3.4	mg/Kg	☼	07/03/19 08:00	07/11/19 18:25	1
Li	2.5	J	3.0	0.18	mg/Kg	☼	07/03/19 08:00	07/11/19 18:25	1
Manganese	13		0.89	0.15	mg/Kg	☼	07/03/19 08:00	07/11/19 18:25	1
Mo	ND		2.4	0.097	mg/Kg	☼	07/03/19 08:00	07/11/19 18:25	1
Selenium	0.62	B *	0.59	0.56	mg/Kg	☼	07/03/19 08:00	07/11/19 18:25	1
Thallium	ND		2.1	0.34	mg/Kg	☼	07/03/19 08:00	07/11/19 18:25	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	58	J *	180	28	mg/Kg	☼	07/10/19 08:00	07/12/19 12:47	5
Antimony	ND		53	5.0	mg/Kg	☼	07/10/19 08:00	07/12/19 12:47	5
Arsenic	ND		8.9	2.3	mg/Kg	☼	07/10/19 08:00	07/12/19 12:47	5
Barium	3.3	J *	45	2.1	mg/Kg	☼	07/10/19 08:00	07/12/19 12:47	5
Beryllium	ND	*	4.5	0.37	mg/Kg	☼	07/10/19 08:00	07/12/19 12:47	5
Cobalt	ND	*	45	0.71	mg/Kg	☼	07/10/19 08:00	07/12/19 12:47	5
Iron	ND	*	89	52	mg/Kg	☼	07/10/19 08:00	07/12/19 12:47	5
Li	ND		45	2.6	mg/Kg	☼	07/10/19 08:00	07/12/19 12:47	5
Manganese	ND	*	13	2.2	mg/Kg	☼	07/10/19 08:00	07/12/19 12:47	5
Mo	ND		36	1.5	mg/Kg	☼	07/10/19 08:00	07/12/19 12:47	5
Selenium	ND		8.9	3.1	mg/Kg	☼	07/10/19 08:00	07/12/19 12:47	5
Thallium	ND	*	31	4.2	mg/Kg	☼	07/10/19 08:00	07/12/19 12:47	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	1100		12	1.9	mg/Kg	☼	07/10/19 08:00	07/12/19 14:15	1
Antimony	ND		3.6	0.33	mg/Kg	☼	07/10/19 08:00	07/12/19 14:15	1
Arsenic	0.42	J	0.59	0.18	mg/Kg	☼	07/10/19 08:00	07/12/19 14:15	1
Barium	6.4		3.0	0.14	mg/Kg	☼	07/10/19 08:00	07/12/19 14:15	1
Beryllium	0.033	J	0.30	0.014	mg/Kg	☼	07/10/19 08:00	07/12/19 14:15	1
Cobalt	0.28	J	3.0	0.055	mg/Kg	☼	07/10/19 08:00	07/12/19 14:15	1
Iron	890		5.9	3.4	mg/Kg	☼	07/10/19 08:00	07/12/19 14:15	1
Li	1.0	J	3.0	0.18	mg/Kg	☼	07/10/19 08:00	07/12/19 14:15	1
Manganese	10		0.89	0.30	mg/Kg	☼	07/10/19 08:00	07/12/19 14:15	1
Mo	ND		2.4	0.12	mg/Kg	☼	07/10/19 08:00	07/12/19 14:15	1
Selenium	ND		0.59	0.20	mg/Kg	☼	07/10/19 08:00	07/12/19 14:15	1
Thallium	ND		2.1	0.25	mg/Kg	☼	07/10/19 08:00	07/12/19 14:15	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	32000		120	19	mg/Kg	☼	07/12/19 09:08	07/15/19 13:44	10
Antimony	ND		3.6	0.17	mg/Kg	☼	07/12/19 09:08	07/15/19 12:32	1
Arsenic	1.2		0.59	0.15	mg/Kg	☼	07/12/19 09:08	07/15/19 12:32	1
Barium	430		30	1.4	mg/Kg	☼	07/12/19 09:08	07/15/19 13:44	10
Beryllium	0.50		0.30	0.0089	mg/Kg	☼	07/12/19 09:08	07/15/19 12:32	1
Cobalt	0.76	J	5.9	0.36	mg/Kg	☼	07/12/19 09:08	07/15/19 17:47	2
Iron	2800		5.9	4.9	mg/Kg	☼	07/12/19 09:08	07/15/19 12:32	1
Li	8.2		3.0	0.18	mg/Kg	☼	07/12/19 09:08	07/15/19 12:32	1
Manganese	42		0.89	0.062	mg/Kg	☼	07/12/19 09:08	07/15/19 12:32	1
Mo	ND		2.4	0.097	mg/Kg	☼	07/12/19 09:08	07/15/19 12:32	1

LUMINANT

Client Sample ID: BMW-32 (25-26)
Date Collected: 05/29/19 15:45
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-4
Matrix: Solid
Percent Solids: 84.2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		0.59	0.20	mg/Kg	☼	07/12/19 09:08	07/15/19 12:32	1
Thallium	ND		4.2	0.43	mg/Kg	☼	07/12/19 09:08	07/15/19 17:47	2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**35000**		10	1.6	mg/Kg			07/16/19 17:31	1
Antimony	ND		3.0	0.14	mg/Kg			07/16/19 17:31	1
Arsenic	**3.0**		0.50	0.13	mg/Kg			07/16/19 17:31	1
Barium	**460**		2.5	0.12	mg/Kg			07/16/19 17:31	1
Beryllium	**0.56**		0.25	0.0075	mg/Kg			07/16/19 17:31	1
Cobalt	**1.7**	**J**	2.5	0.023	mg/Kg			07/16/19 17:31	1
Iron	**6200**		5.0	4.1	mg/Kg			07/16/19 17:31	1
Li	**12**		2.5	0.15	mg/Kg			07/16/19 17:31	1
Manganese	**67**		0.75	0.052	mg/Kg			07/16/19 17:31	1
Mo	ND		2.0	0.082	mg/Kg			07/16/19 17:31	1
Selenium	**1.6**		0.50	0.17	mg/Kg			07/16/19 17:31	1
Thallium	ND		1.8	0.18	mg/Kg			07/16/19 17:31	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		22	11	mg/Kg	☼	06/26/19 08:00	07/10/19 12:49	1
Chromium	**7.6**		1.7	0.25	mg/Kg	☼	06/26/19 08:00	07/10/19 12:49	1
Lead	**3.9**		1.7	0.31	mg/Kg	☼	06/26/19 08:00	07/10/19 12:49	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**45000**		120	19	mg/Kg	☼	06/11/19 08:00	07/15/19 16:35	10
Antimony	ND		3.6	0.17	mg/Kg	☼	06/11/19 08:00	07/15/19 15:18	1
Arsenic	**3.2**		0.59	0.15	mg/Kg	☼	06/11/19 08:00	07/15/19 15:18	1
Barium	**570**		30	1.4	mg/Kg	☼	06/11/19 08:00	07/15/19 16:35	10
Beryllium	**0.53**		0.30	0.0089	mg/Kg	☼	06/11/19 08:00	07/15/19 15:18	1
Cobalt	**1.6**	**J**	5.9	0.36	mg/Kg	☼	06/11/19 08:00	07/15/19 19:19	2
Iron	**5600**		5.9	4.9	mg/Kg	☼	06/11/19 08:00	07/15/19 15:18	1
Lithium	**11**		3.0	0.18	mg/Kg	☼	06/11/19 08:00	07/15/19 15:18	1
Manganese	**70**		0.89	0.062	mg/Kg	☼	06/11/19 08:00	07/15/19 15:18	1
Molybdenum	**0.33**	**J**	2.4	0.097	mg/Kg	☼	06/11/19 08:00	07/15/19 15:18	1
Selenium	**0.54**	**J**	0.59	0.20	mg/Kg	☼	06/11/19 08:00	07/15/19 15:18	1
Thallium	**0.44**	**J**	4.2	0.43	mg/Kg	☼	06/11/19 08:00	07/15/19 19:19	2

Method: 7470A - SEP Mercury (CVAA) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	**0.053**	**J**	0.12	0.047	mg/Kg	☼	06/11/19 08:00	06/16/19 14:27	1

LUMINANT

Client Sample ID: BMW-33 (38-39)
Lab Sample ID: 140-15492-5
Date Collected: 05/30/19 11:35
Matrix: Solid
Date Received: 06/05/19 09:20
Percent Solids: 77.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		52	8.3	mg/Kg	☼	06/29/19 08:00	07/11/19 13:45	4
Antimony	ND		15	1.4	mg/Kg	☼	06/29/19 08:00	07/11/19 13:45	4
Arsenic	ND		2.6	0.67	mg/Kg	☼	06/29/19 08:00	07/11/19 13:45	4
Barium	**1.5**	**J**	13	0.62	mg/Kg	☼	06/29/19 08:00	07/11/19 13:45	4
Beryllium	ND		1.3	0.40	mg/Kg	☼	06/29/19 08:00	07/11/19 13:45	4
Cobalt	**0.29**	**J**	13	0.23	mg/Kg	☼	06/29/19 08:00	07/11/19 13:45	4
Iron	ND		26	15	mg/Kg	☼	06/29/19 08:00	07/11/19 13:45	4
Li	ND		13	0.77	mg/Kg	☼	06/29/19 08:00	07/11/19 13:45	4
Manganese	**17**		3.9	0.16	mg/Kg	☼	06/29/19 08:00	07/11/19 13:45	4
Mo	ND		10	0.42	mg/Kg	☼	06/29/19 08:00	07/11/19 13:45	4
Selenium	ND		2.6	0.88	mg/Kg	☼	06/29/19 08:00	07/11/19 13:45	4
Thallium	ND		9.0	1.1	mg/Kg	☼	06/29/19 08:00	07/11/19 13:45	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**10**	**J ***	39	6.2	mg/Kg	☼	06/30/19 08:00	07/11/19 15:14	3
Antimony	ND		12	1.1	mg/Kg	☼	06/30/19 08:00	07/11/19 15:14	3
Arsenic	ND		1.9	0.50	mg/Kg	☼	06/30/19 08:00	07/11/19 15:14	3
Barium	**0.90**	**J ***	9.7	0.46	mg/Kg	☼	06/30/19 08:00	07/11/19 15:14	3
Beryllium	ND	*	0.97	0.062	mg/Kg	☼	06/30/19 08:00	07/11/19 15:14	3
Cobalt	**0.74**	**J**	9.7	0.24	mg/Kg	☼	06/30/19 08:00	07/11/19 15:14	3
Iron	**14**	**J ***	19	11	mg/Kg	☼	06/30/19 08:00	07/11/19 15:14	3
Li	ND		9.7	0.58	mg/Kg	☼	06/30/19 08:00	07/11/19 15:14	3
Manganese	**25**		2.9	1.1	mg/Kg	☼	06/30/19 08:00	07/11/19 15:14	3
Mo	ND		7.7	0.32	mg/Kg	☼	06/30/19 08:00	07/11/19 15:14	3
Selenium	ND		1.9	0.66	mg/Kg	☼	06/30/19 08:00	07/11/19 15:14	3
Thallium	ND		6.8	0.81	mg/Kg	☼	06/30/19 08:00	07/11/19 15:14	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**94**		13	2.7	mg/Kg	☼	07/02/19 08:00	07/11/19 17:03	1
Antimony	ND		3.9	0.36	mg/Kg	☼	07/02/19 08:00	07/11/19 17:03	1
Arsenic	**0.47**	**J**	0.65	0.17	mg/Kg	☼	07/02/19 08:00	07/11/19 17:03	1
Barium	**7.5**	**B**	3.2	0.15	mg/Kg	☼	07/02/19 08:00	07/11/19 17:03	1
Beryllium	**0.028**	**J**	0.32	0.019	mg/Kg	☼	07/02/19 08:00	07/11/19 17:03	1
Cobalt	**1.9**	**J**	3.2	0.058	mg/Kg	☼	07/02/19 08:00	07/11/19 17:03	1
Iron	**510**		6.5	3.7	mg/Kg	☼	07/02/19 08:00	07/11/19 17:03	1
Li	ND		3.2	0.19	mg/Kg	☼	07/02/19 08:00	07/11/19 17:03	1
Manganese	**85**	**B**	0.97	0.035	mg/Kg	☼	07/02/19 08:00	07/11/19 17:03	1
Mo	ND		2.6	0.11	mg/Kg	☼	07/02/19 08:00	07/11/19 17:03	1
Selenium	**0.25**	**J B**	0.65	0.22	mg/Kg	☼	07/02/19 08:00	07/11/19 17:03	1
Thallium	ND		2.3	0.27	mg/Kg	☼	07/02/19 08:00	07/11/19 17:03	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1800**		13	2.1	mg/Kg	☼	07/03/19 08:00	07/11/19 18:45	1
Antimony	ND		3.9	0.58	mg/Kg	☼	07/03/19 08:00	07/11/19 18:45	1
Arsenic	**1.2**	**B**	0.65	0.28	mg/Kg	☼	07/03/19 08:00	07/11/19 18:45	1
Barium	**20**		3.2	0.15	mg/Kg	☼	07/03/19 08:00	07/11/19 18:45	1
Beryllium	**0.20**	**J**	0.32	0.021	mg/Kg	☼	07/03/19 08:00	07/11/19 18:45	1

LUMINANT

Client Sample ID: BMW-33 (38-39)
Date Collected: 05/30/19 11:35
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-5
Matrix: Solid
Percent Solids: 77.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cobalt	**1.5**	**J**	3.2	0.068	mg/Kg	☼	07/03/19 08:00	07/11/19 18:45	1
Iron	**4900**		6.5	3.7	mg/Kg	☼	07/03/19 08:00	07/11/19 18:45	1
Li	**2.1**	**J**	3.2	0.19	mg/Kg	☼	07/03/19 08:00	07/11/19 18:45	1
Manganese	**55**		0.97	0.17	mg/Kg	☼	07/03/19 08:00	07/11/19 18:45	1
Mo	ND		2.6	0.11	mg/Kg	☼	07/03/19 08:00	07/11/19 18:45	1
Selenium	**0.71**	**B ***	0.65	0.61	mg/Kg	☼	07/03/19 08:00	07/11/19 18:45	1
Thallium	ND		2.3	0.37	mg/Kg	☼	07/03/19 08:00	07/11/19 18:45	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**64**	**J ***	190	30	mg/Kg	☼	07/10/19 08:00	07/12/19 12:53	5
Antimony	ND		58	5.4	mg/Kg	☼	07/10/19 08:00	07/12/19 12:53	5
Arsenic	ND		9.7	2.5	mg/Kg	☼	07/10/19 08:00	07/12/19 12:53	5
Barium	**4.1**	**J ***	48	2.3	mg/Kg	☼	07/10/19 08:00	07/12/19 12:53	5
Beryllium	ND	*	4.8	0.41	mg/Kg	☼	07/10/19 08:00	07/12/19 12:53	5
Cobalt	ND	*	48	0.77	mg/Kg	☼	07/10/19 08:00	07/12/19 12:53	5
Iron	ND	*	97	57	mg/Kg	☼	07/10/19 08:00	07/12/19 12:53	5
Li	ND		48	2.8	mg/Kg	☼	07/10/19 08:00	07/12/19 12:53	5
Manganese	ND	*	15	2.4	mg/Kg	☼	07/10/19 08:00	07/12/19 12:53	5
Mo	ND		39	1.6	mg/Kg	☼	07/10/19 08:00	07/12/19 12:53	5
Selenium	ND		9.7	3.4	mg/Kg	☼	07/10/19 08:00	07/12/19 12:53	5
Thallium	ND	*	34	4.5	mg/Kg	☼	07/10/19 08:00	07/12/19 12:53	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**3400**		13	2.1	mg/Kg	☼	07/10/19 08:00	07/12/19 14:21	1
Antimony	ND		3.9	0.36	mg/Kg	☼	07/10/19 08:00	07/12/19 14:21	1
Arsenic	**0.85**		0.65	0.19	mg/Kg	☼	07/10/19 08:00	07/12/19 14:21	1
Barium	**13**		3.2	0.15	mg/Kg	☼	07/10/19 08:00	07/12/19 14:21	1
Beryllium	**0.11**	**J**	0.32	0.015	mg/Kg	☼	07/10/19 08:00	07/12/19 14:21	1
Cobalt	**1.1**	**J**	3.2	0.059	mg/Kg	☼	07/10/19 08:00	07/12/19 14:21	1
Iron	**3900**		6.5	3.7	mg/Kg	☼	07/10/19 08:00	07/12/19 14:21	1
Li	**2.1**	**J**	3.2	0.19	mg/Kg	☼	07/10/19 08:00	07/12/19 14:21	1
Manganese	**22**		0.97	0.32	mg/Kg	☼	07/10/19 08:00	07/12/19 14:21	1
Mo	ND		2.6	0.13	mg/Kg	☼	07/10/19 08:00	07/12/19 14:21	1
Selenium	ND		0.65	0.22	mg/Kg	☼	07/10/19 08:00	07/12/19 14:21	1
Thallium	ND		2.3	0.27	mg/Kg	☼	07/10/19 08:00	07/12/19 14:21	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**48000**		130	21	mg/Kg	☼	07/12/19 09:08	07/15/19 14:04	10
Antimony	ND		3.9	0.18	mg/Kg	☼	07/12/19 09:08	07/15/19 12:37	1
Arsenic	**0.64**	**J**	0.65	0.17	mg/Kg	☼	07/12/19 09:08	07/15/19 12:37	1
Barium	**550**		32	1.5	mg/Kg	☼	07/12/19 09:08	07/15/19 14:04	10
Beryllium	**0.69**		0.32	0.0097	mg/Kg	☼	07/12/19 09:08	07/15/19 12:37	1
Cobalt	**0.57**	**J**	6.5	0.39	mg/Kg	☼	07/12/19 09:08	07/15/19 17:52	2
Iron	**6100**		6.5	5.3	mg/Kg	☼	07/12/19 09:08	07/15/19 12:37	1
Li	**9.1**		3.2	0.19	mg/Kg	☼	07/12/19 09:08	07/15/19 12:37	1
Manganese	**30**		0.97	0.067	mg/Kg	☼	07/12/19 09:08	07/15/19 12:37	1
Mo	ND		2.6	0.11	mg/Kg	☼	07/12/19 09:08	07/15/19 12:37	1

LUMINANT

Client Sample ID: BMW-33 (38-39)
Date Collected: 05/30/19 11:35
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-5
Matrix: Solid
Percent Solids: 77.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		0.65	0.22	mg/Kg	☼	07/12/19 09:08	07/15/19 12:37	1
Thallium	ND		4.5	0.46	mg/Kg	☼	07/12/19 09:08	07/15/19 17:52	2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**54000**		10	1.6	mg/Kg			07/16/19 17:31	1
Antimony	ND		3.0	0.14	mg/Kg			07/16/19 17:31	1
Arsenic	**3.2**		0.50	0.13	mg/Kg			07/16/19 17:31	1
Barium	**590**		2.5	0.12	mg/Kg			07/16/19 17:31	1
Beryllium	**1.0**		0.25	0.0075	mg/Kg			07/16/19 17:31	1
Cobalt	**6.1**		2.5	0.023	mg/Kg			07/16/19 17:31	1
Iron	**15000**		5.0	4.1	mg/Kg			07/16/19 17:31	1
Li	**13**		2.5	0.15	mg/Kg			07/16/19 17:31	1
Manganese	**230**		0.75	0.052	mg/Kg			07/16/19 17:31	1
Mo	ND		2.0	0.082	mg/Kg			07/16/19 17:31	1
Selenium	**0.95**		0.50	0.17	mg/Kg			07/16/19 17:31	1
Thallium	ND		1.8	0.18	mg/Kg			07/16/19 17:31	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		24	12	mg/Kg	☼	06/26/19 08:00	07/10/19 12:54	1
Chromium	**14**		1.8	0.27	mg/Kg	☼	06/26/19 08:00	07/10/19 12:54	1
Lead	**5.9**		1.8	0.34	mg/Kg	☼	06/26/19 08:00	07/10/19 12:54	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**73000**		130	21	mg/Kg	☼	06/11/19 08:00	07/15/19 16:40	10
Antimony	ND		3.9	0.18	mg/Kg	☼	06/11/19 08:00	07/15/19 15:23	1
Arsenic	**3.2**		0.65	0.17	mg/Kg	☼	06/11/19 08:00	07/15/19 15:23	1
Barium	**830**		32	1.5	mg/Kg	☼	06/11/19 08:00	07/15/19 16:40	10
Beryllium	**1.0**		0.32	0.0097	mg/Kg	☼	06/11/19 08:00	07/15/19 15:23	1
Cobalt	**4.6**	**J**	16	0.97	mg/Kg	☼	06/11/19 08:00	07/15/19 19:24	5
Iron	**13000**		6.5	5.3	mg/Kg	☼	06/11/19 08:00	07/15/19 15:23	1
Lithium	**14**		3.2	0.19	mg/Kg	☼	06/11/19 08:00	07/15/19 15:23	1
Manganese	**130**		0.97	0.067	mg/Kg	☼	06/11/19 08:00	07/15/19 15:23	1
Molybdenum	**0.22**	**J**	2.6	0.11	mg/Kg	☼	06/11/19 08:00	07/15/19 15:23	1
Selenium	ND		0.65	0.22	mg/Kg	☼	06/11/19 08:00	07/15/19 15:23	1
Thallium	ND		11	1.2	mg/Kg	☼	06/11/19 08:00	07/15/19 19:24	5

Method: 7470A - SEP Mercury (CVAA) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.13	0.052	mg/Kg	☼	06/11/19 08:00	06/16/19 14:29	1

LUMINANT

Default Detection Limits

Client: Golder Associates Inc.
Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

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
Barium	2.5	0.12	mg/Kg
Beryllium	0.25	0.077	mg/Kg
Cobalt	2.5	0.045	mg/Kg
Iron	5.0	2.9	mg/Kg
Li	2.5	0.15	mg/Kg
Manganese	0.75	0.031	mg/Kg
Mo	2.0	0.082	mg/Kg
Selenium	0.50	0.17	mg/Kg
Thallium	1.8	0.21	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
Barium	2.5	0.12	mg/Kg
Beryllium	0.25	0.016	mg/Kg
Cobalt	2.5	0.063	mg/Kg
Iron	5.0	2.9	mg/Kg
Li	2.5	0.15	mg/Kg
Manganese	0.75	0.28	mg/Kg
Mo	2.0	0.082	mg/Kg
Selenium	0.50	0.17	mg/Kg
Thallium	1.8	0.21	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
Barium	2.5	0.12	mg/Kg
Beryllium	0.25	0.015	mg/Kg
Cobalt	2.5	0.045	mg/Kg
Iron	5.0	2.9	mg/Kg
Li	2.5	0.15	mg/Kg
Manganese	0.75	0.027	mg/Kg
Mo	2.0	0.082	mg/Kg
Selenium	0.50	0.17	mg/Kg
Thallium	1.8	0.21	mg/Kg

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

Prep: 3010A

SEP: Metal Hydroxide

LUMINANT

Client: Golder Associates Inc.
Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

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
Barium	2.5	0.12	mg/Kg
Beryllium	0.25	0.016	mg/Kg
Cobalt	2.5	0.053	mg/Kg
Iron	5.0	2.9	mg/Kg
Li	2.5	0.15	mg/Kg
Manganese	0.75	0.13	mg/Kg
Mo	2.0	0.082	mg/Kg
Selenium	0.50	0.47	mg/Kg
Thallium	1.8	0.29	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
Barium	7.5	0.36	mg/Kg
Beryllium	0.75	0.063	mg/Kg
Cobalt	7.5	0.12	mg/Kg
Iron	15	8.8	mg/Kg
Li	7.5	0.44	mg/Kg
Manganese	2.3	0.37	mg/Kg
Mo	6.0	0.25	mg/Kg
Selenium	1.5	0.52	mg/Kg
Thallium	5.3	0.70	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
Barium	2.5	0.12	mg/Kg
Beryllium	0.25	0.012	mg/Kg
Cobalt	2.5	0.046	mg/Kg
Iron	5.0	2.9	mg/Kg
Li	2.5	0.15	mg/Kg
Manganese	0.75	0.25	mg/Kg
Mo	2.0	0.099	mg/Kg
Selenium	0.50	0.17	mg/Kg
Thallium	1.8	0.21	mg/Kg

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

Prep: Residual

Analyte	RL	MDL	Units
Aluminum	10	1.6	mg/Kg

LUMINANT

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

Prep: Residual

Analyte	RL	MDL	Units
Antimony	3.0	0.14	mg/Kg
Arsenic	0.50	0.13	mg/Kg
Barium	2.5	0.12	mg/Kg
Beryllium	0.25	0.0075	mg/Kg
Cobalt	2.5	0.15	mg/Kg
Iron	5.0	4.1	mg/Kg
Li	2.5	0.15	mg/Kg
Manganese	0.75	0.052	mg/Kg
Mo	2.0	0.082	mg/Kg
Selenium	0.50	0.17	mg/Kg
Thallium	1.8	0.18	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
Barium	2.5	0.12	mg/Kg
Beryllium	0.25	0.0075	mg/Kg
Cobalt	2.5	0.023	mg/Kg
Iron	5.0	4.1	mg/Kg
Li	2.5	0.15	mg/Kg
Manganese	0.75	0.052	mg/Kg
Mo	2.0	0.082	mg/Kg
Selenium	0.50	0.17	mg/Kg
Thallium	1.8	0.18	mg/Kg

Method: 6010B - Metals (ICP)

Prep: 3050B

Analyte	RL	MDL	Units
Boron	20	10	mg/Kg
Chromium	1.5	0.22	mg/Kg
Lead	1.5	0.28	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
Barium	2.5	0.12	mg/Kg
Beryllium	0.25	0.0075	mg/Kg
Cobalt	2.5	0.15	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
Selenium	0.50	0.17	mg/Kg
Thallium	1.8	0.18	mg/Kg

Method: 7470A - SEP Mercury (CVAA) - Total

LUMINANT

Default Detection Limits

Client: Golder Associates Inc.
Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Method: 7470A - SEP Mercury (CVAA) - Total

Prep: Total

Analyte	RL	MDL	Units
Hg	0.10	0.040	mg/Kg

LUMINANT

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 140-31128/14-A
Matrix: Solid
Analysis Batch: 31553

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 31128

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		20	10	mg/Kg		06/26/19 08:00	07/10/19 11:42	1
Chromium	ND		1.5	0.22	mg/Kg		06/26/19 08:00	07/10/19 11:42	1
Lead	ND		1.5	0.28	mg/Kg		06/26/19 08:00	07/10/19 11:42	1

Lab Sample ID: LCS 140-31128/15-A
Matrix: Solid
Analysis Batch: 31553

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 31128

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	100	101		mg/Kg		101	80 - 120
Chromium	20.0	20.3		mg/Kg		101	90 - 110
Lead	10.0	10.1		mg/Kg		101	90 - 110

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

Lab Sample ID: MB 140-30683/13-A
Matrix: Solid
Analysis Batch: 31713

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 30683

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		06/11/19 08:00	07/15/19 11:13	1
Antimony	ND		3.0	0.14	mg/Kg		06/11/19 08:00	07/15/19 11:13	1
Arsenic	ND		0.50	0.13	mg/Kg		06/11/19 08:00	07/15/19 11:13	1
Barium	ND		2.5	0.12	mg/Kg		06/11/19 08:00	07/15/19 11:13	1
Beryllium	ND		0.25	0.0075	mg/Kg		06/11/19 08:00	07/15/19 11:13	1
Cobalt	ND		2.5	0.15	mg/Kg		06/11/19 08:00	07/15/19 11:13	1
Iron	ND		5.0	4.1	mg/Kg		06/11/19 08:00	07/15/19 11:13	1
Lithium	ND		2.5	0.15	mg/Kg		06/11/19 08:00	07/15/19 11:13	1
Manganese	ND		0.75	0.052	mg/Kg		06/11/19 08:00	07/15/19 11:13	1
Molybdenum	ND		2.0	0.082	mg/Kg		06/11/19 08:00	07/15/19 11:13	1
Selenium	ND		0.50	0.17	mg/Kg		06/11/19 08:00	07/15/19 11:13	1
Thallium	ND		1.8	0.18	mg/Kg		06/11/19 08:00	07/15/19 11:13	1

Lab Sample ID: LCS 140-30683/14-A
Matrix: Solid
Analysis Batch: 31713

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 30683

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	97.6		mg/Kg		98	75 - 125
Antimony	25.0	25.9		mg/Kg		103	75 - 125
Arsenic	5.00	5.29		mg/Kg		106	75 - 125
Barium	5.00	4.99		mg/Kg		100	75 - 125
Beryllium	2.50	2.51		mg/Kg		100	75 - 125
Cobalt	5.00	5.20		mg/Kg		104	75 - 125
Iron	50.0	51.1		mg/Kg		102	75 - 125
Lithium	5.00	5.12		mg/Kg		102	75 - 125
Manganese	5.00	5.21		mg/Kg		104	75 - 125
Molybdenum	25.0	26.6		mg/Kg		106	75 - 125
Selenium	7.50	7.55		mg/Kg		101	75 - 125

LUMINANT

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

Lab Sample ID: LCS 140-30683/14-A
Matrix: Solid
Analysis Batch: 31713

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 30683

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Thallium	20.0	21.2		mg/Kg		106	75 - 125

Lab Sample ID: LCSD 140-30683/15-A
Matrix: Solid
Analysis Batch: 31713

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 30683

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	97.0		mg/Kg		97	75 - 125	1	30
Antimony	25.0	25.9		mg/Kg		104	75 - 125	0	30
Arsenic	5.00	5.24		mg/Kg		105	75 - 125	1	30
Barium	5.00	4.95		mg/Kg		99	75 - 125	1	30
Beryllium	2.50	2.48		mg/Kg		99	75 - 125	1	30
Cobalt	5.00	5.16		mg/Kg		103	75 - 125	1	30
Iron	50.0	50.4		mg/Kg		101	75 - 125	1	30
Lithium	5.00	5.04		mg/Kg		101	75 - 125	2	30
Manganese	5.00	5.16		mg/Kg		103	75 - 125	1	30
Molybdenum	25.0	26.5		mg/Kg		106	75 - 125	0	30
Selenium	7.50	7.47		mg/Kg		100	75 - 125	1	30
Thallium	20.0	21.2		mg/Kg		106	75 - 125	0	30

Method: 6010B SEP - SEP Metals (ICP)

Lab Sample ID: MB 140-31148/13-B ^4
Matrix: Solid
Analysis Batch: 31604

Client Sample ID: Method Blank
Prep Type: Step 1
Prep Batch: 31252

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		40	6.4	mg/Kg		06/29/19 08:00	07/11/19 12:33	4
Antimony	ND		12	1.1	mg/Kg		06/29/19 08:00	07/11/19 12:33	4
Arsenic	ND		2.0	0.52	mg/Kg		06/29/19 08:00	07/11/19 12:33	4
Barium	ND		10	0.48	mg/Kg		06/29/19 08:00	07/11/19 12:33	4
Beryllium	ND		1.0	0.31	mg/Kg		06/29/19 08:00	07/11/19 12:33	4
Cobalt	ND		10	0.18	mg/Kg		06/29/19 08:00	07/11/19 12:33	4
Iron	ND		20	12	mg/Kg		06/29/19 08:00	07/11/19 12:33	4
Li	ND		10	0.60	mg/Kg		06/29/19 08:00	07/11/19 12:33	4
Manganese	ND		3.0	0.12	mg/Kg		06/29/19 08:00	07/11/19 12:33	4
Mo	ND		8.0	0.33	mg/Kg		06/29/19 08:00	07/11/19 12:33	4
Selenium	ND		2.0	0.68	mg/Kg		06/29/19 08:00	07/11/19 12:33	4
Thallium	ND		7.0	0.84	mg/Kg		06/29/19 08:00	07/11/19 12:33	4

Lab Sample ID: LCS 140-31148/14-B ^5
Matrix: Solid
Analysis Batch: 31604

Client Sample ID: Lab Control Sample
Prep Type: Step 1
Prep Batch: 31252

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	97.0		mg/Kg		97	75 - 125
Antimony	25.0	24.5		mg/Kg		98	75 - 125
Arsenic	5.00	4.89		mg/Kg		98	75 - 125
Barium	5.00	4.35	J	mg/Kg		87	75 - 125
Beryllium	2.50	2.58		mg/Kg		103	75 - 125

LUMINANT

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

Lab Sample ID: LCS 140-31148/14-B ^5
Matrix: Solid
Analysis Batch: 31604

Client Sample ID: Lab Control Sample
Prep Type: Step 1
Prep Batch: 31252

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cobalt	5.00	4.93	J	mg/Kg		99	75 - 125
Iron	50.0	49.6		mg/Kg		99	75 - 125
Li	5.00	4.72	J	mg/Kg		94	75 - 125
Manganese	5.00	5.09		mg/Kg		102	75 - 125
Mo	25.0	25.0		mg/Kg		100	75 - 125
Selenium	7.50	7.82		mg/Kg		104	75 - 125
Thallium	20.0	19.7		mg/Kg		98	75 - 125

Lab Sample ID: LCSD 140-31148/15-B ^5
Matrix: Solid
Analysis Batch: 31604

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 1
Prep Batch: 31252

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	99.5		mg/Kg		100	75 - 125	3	30
Antimony	25.0	24.7		mg/Kg		99	75 - 125	1	30
Arsenic	5.00	4.78		mg/Kg		96	75 - 125	2	30
Barium	5.00	4.30	J	mg/Kg		86	75 - 125	1	30
Beryllium	2.50	2.59		mg/Kg		104	75 - 125	0	30
Cobalt	5.00	4.89	J	mg/Kg		98	75 - 125	1	30
Iron	50.0	49.5		mg/Kg		99	75 - 125	0	30
Li	5.00	4.84	J	mg/Kg		97	75 - 125	3	30
Manganese	5.00	5.06		mg/Kg		101	75 - 125	1	30
Mo	25.0	25.1		mg/Kg		100	75 - 125	0	30
Selenium	7.50	8.06		mg/Kg		108	75 - 125	3	30
Thallium	20.0	20.1		mg/Kg		101	75 - 125	2	30

Lab Sample ID: MB 140-31253/13-B ^3
Matrix: Solid
Analysis Batch: 31604

Client Sample ID: Method Blank
Prep Type: Step 2
Prep Batch: 31256

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		30	4.8	mg/Kg		06/30/19 08:00	07/11/19 14:06	3
Antimony	ND		9.0	0.84	mg/Kg		06/30/19 08:00	07/11/19 14:06	3
Arsenic	ND		1.5	0.39	mg/Kg		06/30/19 08:00	07/11/19 14:06	3
Barium	ND		7.5	0.36	mg/Kg		06/30/19 08:00	07/11/19 14:06	3
Beryllium	ND		0.75	0.048	mg/Kg		06/30/19 08:00	07/11/19 14:06	3
Cobalt	ND		7.5	0.19	mg/Kg		06/30/19 08:00	07/11/19 14:06	3
Iron	ND		15	8.7	mg/Kg		06/30/19 08:00	07/11/19 14:06	3
Li	ND		7.5	0.45	mg/Kg		06/30/19 08:00	07/11/19 14:06	3
Manganese	ND		2.3	0.84	mg/Kg		06/30/19 08:00	07/11/19 14:06	3
Mo	ND		6.0	0.25	mg/Kg		06/30/19 08:00	07/11/19 14:06	3
Selenium	0.587	J	1.5	0.51	mg/Kg		06/30/19 08:00	07/11/19 14:06	3
Thallium	ND		5.3	0.63	mg/Kg		06/30/19 08:00	07/11/19 14:06	3

LUMINANT

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

Lab Sample ID: LCS 140-31253/14-B ^5
Matrix: Solid
Analysis Batch: 31604

Client Sample ID: Lab Control Sample
Prep Type: Step 2
Prep Batch: 31256

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	ND	*	mg/Kg		1	75 - 125
Antimony	25.0	21.1		mg/Kg		84	75 - 125
Arsenic	5.00	3.95		mg/Kg		79	75 - 125
Barium	5.00	2.28	J *	mg/Kg		46	75 - 125
Beryllium	2.50	1.35	*	mg/Kg		54	75 - 125
Cobalt	5.00	4.62	J	mg/Kg		92	75 - 125
Iron	50.0	ND	*	mg/Kg		2	75 - 125
Li	5.00	4.14	J	mg/Kg		83	75 - 125
Manganese	5.00	4.79		mg/Kg		96	75 - 125
Mo	25.0	20.7		mg/Kg		83	75 - 125
Selenium	7.50	7.34		mg/Kg		98	75 - 125
Thallium	20.0	18.4		mg/Kg		92	75 - 125

Lab Sample ID: LCSD 140-31253/15-B ^5
Matrix: Solid
Analysis Batch: 31604

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 2
Prep Batch: 31256

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	ND	*	mg/Kg		-0.3	75 - 125	289	30
Antimony	25.0	21.4		mg/Kg		86	75 - 125	1	30
Arsenic	5.00	4.00		mg/Kg		80	75 - 125	1	30
Barium	5.00	2.28	J *	mg/Kg		46	75 - 125	0	30
Beryllium	2.50	1.32	*	mg/Kg		53	75 - 125	2	30
Cobalt	5.00	4.62	J	mg/Kg		92	75 - 125	0	30
Iron	50.0	ND	*	mg/Kg		3	75 - 125	28	30
Li	5.00	4.15	J	mg/Kg		83	75 - 125	0	30
Manganese	5.00	4.76		mg/Kg		95	75 - 125	1	30
Mo	25.0	20.9		mg/Kg		84	75 - 125	1	30
Selenium	7.50	6.68		mg/Kg		89	75 - 125	10	30
Thallium	20.0	18.6		mg/Kg		93	75 - 125	1	30

Lab Sample ID: MB 140-31257/13-B
Matrix: Solid
Analysis Batch: 31604

Client Sample ID: Method Blank
Prep Type: Step 3
Prep Batch: 31338

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	2.1	mg/Kg		07/02/19 08:00	07/11/19 15:50	1
Antimony	ND		3.0	0.28	mg/Kg		07/02/19 08:00	07/11/19 15:50	1
Arsenic	ND		0.50	0.13	mg/Kg		07/02/19 08:00	07/11/19 15:50	1
Barium	0.151	J	2.5	0.12	mg/Kg		07/02/19 08:00	07/11/19 15:50	1
Beryllium	ND		0.25	0.015	mg/Kg		07/02/19 08:00	07/11/19 15:50	1
Cobalt	ND		2.5	0.045	mg/Kg		07/02/19 08:00	07/11/19 15:50	1
Iron	ND		5.0	2.9	mg/Kg		07/02/19 08:00	07/11/19 15:50	1
Li	ND		2.5	0.15	mg/Kg		07/02/19 08:00	07/11/19 15:50	1
Manganese	0.0515	J	0.75	0.027	mg/Kg		07/02/19 08:00	07/11/19 15:50	1
Mo	ND		2.0	0.082	mg/Kg		07/02/19 08:00	07/11/19 15:50	1
Selenium	0.197	J	0.50	0.17	mg/Kg		07/02/19 08:00	07/11/19 15:50	1
Thallium	ND		1.8	0.21	mg/Kg		07/02/19 08:00	07/11/19 15:50	1

LUMINANT

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

Lab Sample ID: LCS 140-31257/14-B
Matrix: Solid
Analysis Batch: 31604

Client Sample ID: Lab Control Sample
Prep Type: Step 3
Prep Batch: 31338

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	95.8		mg/Kg		96	75 - 125
Antimony	25.0	24.3		mg/Kg		97	75 - 125
Arsenic	5.00	4.90		mg/Kg		98	75 - 125
Barium	5.00	4.34		mg/Kg		87	75 - 125
Beryllium	2.50	2.56		mg/Kg		102	75 - 125
Cobalt	5.00	4.90		mg/Kg		98	75 - 125
Iron	50.0	54.0		mg/Kg		108	75 - 125
Li	5.00	4.87		mg/Kg		97	75 - 125
Manganese	5.00	5.03		mg/Kg		101	75 - 125
Mo	25.0	24.8		mg/Kg		99	75 - 125
Selenium	7.50	7.37		mg/Kg		98	75 - 125
Thallium	20.0	20.2		mg/Kg		101	75 - 125

Lab Sample ID: LCSD 140-31257/15-B
Matrix: Solid
Analysis Batch: 31604

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 3
Prep Batch: 31338

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	98.1		mg/Kg		98	75 - 125	2	30
Antimony	25.0	24.6		mg/Kg		98	75 - 125	1	30
Arsenic	5.00	5.06		mg/Kg		101	75 - 125	3	30
Barium	5.00	4.49		mg/Kg		90	75 - 125	3	30
Beryllium	2.50	2.61		mg/Kg		104	75 - 125	2	30
Cobalt	5.00	4.97		mg/Kg		99	75 - 125	1	30
Iron	50.0	51.0		mg/Kg		102	75 - 125	6	30
Li	5.00	4.95		mg/Kg		99	75 - 125	2	30
Manganese	5.00	5.06		mg/Kg		101	75 - 125	1	30
Mo	25.0	24.9		mg/Kg		100	75 - 125	0	30
Selenium	7.50	7.63		mg/Kg		102	75 - 125	3	30
Thallium	20.0	20.5		mg/Kg		103	75 - 125	2	30

Lab Sample ID: MB 140-31341/13-B
Matrix: Solid
Analysis Batch: 31604

Client Sample ID: Method Blank
Prep Type: Step 4
Prep Batch: 31360

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		07/03/19 08:00	07/11/19 17:24	1
Antimony	ND		3.0	0.45	mg/Kg		07/03/19 08:00	07/11/19 17:24	1
Arsenic	0.260	J	0.50	0.22	mg/Kg		07/03/19 08:00	07/11/19 17:24	1
Barium	ND		2.5	0.12	mg/Kg		07/03/19 08:00	07/11/19 17:24	1
Beryllium	ND		0.25	0.016	mg/Kg		07/03/19 08:00	07/11/19 17:24	1
Cobalt	ND		2.5	0.053	mg/Kg		07/03/19 08:00	07/11/19 17:24	1
Iron	ND		5.0	2.9	mg/Kg		07/03/19 08:00	07/11/19 17:24	1
Li	ND		2.5	0.15	mg/Kg		07/03/19 08:00	07/11/19 17:24	1
Manganese	ND		0.75	0.13	mg/Kg		07/03/19 08:00	07/11/19 17:24	1
Mo	ND		2.0	0.082	mg/Kg		07/03/19 08:00	07/11/19 17:24	1
Selenium	0.561		0.50	0.47	mg/Kg		07/03/19 08:00	07/11/19 17:24	1
Thallium	ND		1.8	0.29	mg/Kg		07/03/19 08:00	07/11/19 17:24	1

LUMINANT

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

Lab Sample ID: LCS 140-31341/14-B
Matrix: Solid
Analysis Batch: 31604

Client Sample ID: Lab Control Sample
Prep Type: Step 4
Prep Batch: 31360

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	98.4		mg/Kg		98	75 - 125
Antimony	25.0	25.6		mg/Kg		102	75 - 125
Arsenic	5.00	5.48		mg/Kg		110	75 - 125
Barium	5.00	4.90		mg/Kg		98	75 - 125
Beryllium	2.50	2.66		mg/Kg		106	75 - 125
Cobalt	5.00	4.92		mg/Kg		98	75 - 125
Iron	50.0	50.0		mg/Kg		100	75 - 125
Li	5.00	4.92		mg/Kg		98	75 - 125
Manganese	5.00	4.98		mg/Kg		100	75 - 125
Mo	25.0	25.7		mg/Kg		103	75 - 125
Selenium	7.50	0.762	*	mg/Kg		10	75 - 125
Thallium	20.0	17.2		mg/Kg		86	75 - 125

Lab Sample ID: LCSD 140-31341/15-B
Matrix: Solid
Analysis Batch: 31604

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 4
Prep Batch: 31360

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	101		mg/Kg		101	75 - 125	3	30
Antimony	25.0	25.9		mg/Kg		103	75 - 125	1	30
Arsenic	5.00	5.55		mg/Kg		111	75 - 125	1	30
Barium	5.00	5.04		mg/Kg		101	75 - 125	3	30
Beryllium	2.50	2.74		mg/Kg		109	75 - 125	3	30
Cobalt	5.00	5.07		mg/Kg		101	75 - 125	3	30
Iron	50.0	51.5		mg/Kg		103	75 - 125	3	30
Li	5.00	5.09		mg/Kg		102	75 - 125	3	30
Manganese	5.00	5.13		mg/Kg		103	75 - 125	3	30
Mo	25.0	25.9		mg/Kg		104	75 - 125	1	30
Selenium	7.50	0.631	*	mg/Kg		8	75 - 125	19	30
Thallium	20.0	17.9		mg/Kg		89	75 - 125	4	30

Lab Sample ID: MB 140-31436/13-B ^5
Matrix: Solid
Analysis Batch: 31651

Client Sample ID: Method Blank
Prep Type: Step 5
Prep Batch: 31500

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		150	24	mg/Kg		07/10/19 08:00	07/12/19 11:39	5
Antimony	ND		45	4.2	mg/Kg		07/10/19 08:00	07/12/19 11:39	5
Arsenic	ND		7.5	1.9	mg/Kg		07/10/19 08:00	07/12/19 11:39	5
Barium	ND		38	1.8	mg/Kg		07/10/19 08:00	07/12/19 11:39	5
Beryllium	ND		3.8	0.32	mg/Kg		07/10/19 08:00	07/12/19 11:39	5
Cobalt	ND		38	0.60	mg/Kg		07/10/19 08:00	07/12/19 11:39	5
Iron	ND		75	44	mg/Kg		07/10/19 08:00	07/12/19 11:39	5
Li	ND		38	2.2	mg/Kg		07/10/19 08:00	07/12/19 11:39	5
Manganese	ND		11	1.9	mg/Kg		07/10/19 08:00	07/12/19 11:39	5
Mo	ND		30	1.3	mg/Kg		07/10/19 08:00	07/12/19 11:39	5
Selenium	ND		7.5	2.6	mg/Kg		07/10/19 08:00	07/12/19 11:39	5
Thallium	ND		26	3.5	mg/Kg		07/10/19 08:00	07/12/19 11:39	5

LUMINANT

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

Lab Sample ID: LCS 140-31436/14-B ^5
Matrix: Solid
Analysis Batch: 31651

Client Sample ID: Lab Control Sample
Prep Type: Step 5
Prep Batch: 31500

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	300	ND	*	mg/Kg		6	75 - 125
Antimony	75.0	81.2		mg/Kg		108	75 - 125
Arsenic	15.0	12.3		mg/Kg		82	75 - 125
Barium	15.0	7.80	J *	mg/Kg		52	75 - 125
Beryllium	7.50	4.23	*	mg/Kg		56	75 - 125
Cobalt	15.0	4.86	J *	mg/Kg		32	75 - 125
Iron	150	ND	*	mg/Kg		2	75 - 125
Li	15.0	16.4	J	mg/Kg		109	75 - 125
Manganese	15.0	4.82	J *	mg/Kg		32	75 - 125
Mo	75.0	64.7		mg/Kg		86	75 - 125
Selenium	22.5	24.8		mg/Kg		110	75 - 125
Thallium	60.0	ND	*	mg/Kg		2	75 - 125

Lab Sample ID: LCSD 140-31436/15-B ^5
Matrix: Solid
Analysis Batch: 31651

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 5
Prep Batch: 31500

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	300	ND	*	mg/Kg		7	75 - 125	14	30
Antimony	75.0	82.5		mg/Kg		110	75 - 125	2	30
Arsenic	15.0	12.5		mg/Kg		83	75 - 125	2	30
Barium	15.0	7.73	J *	mg/Kg		52	75 - 125	1	30
Beryllium	7.50	4.34	*	mg/Kg		58	75 - 125	2	30
Cobalt	15.0	5.05	J *	mg/Kg		34	75 - 125	4	30
Iron	150	ND	*	mg/Kg		3	75 - 125	55	30
Li	15.0	16.1	J	mg/Kg		107	75 - 125	2	30
Manganese	15.0	4.97	J *	mg/Kg		33	75 - 125	3	30
Mo	75.0	64.0		mg/Kg		85	75 - 125	1	30
Selenium	22.5	26.2		mg/Kg		116	75 - 125	6	30
Thallium	60.0	ND	*	mg/Kg		0.9	75 - 125	60	30

Lab Sample ID: MB 140-31502/13-A
Matrix: Solid
Analysis Batch: 31651

Client Sample ID: Method Blank
Prep Type: Step 6
Prep Batch: 31502

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		07/10/19 08:00	07/12/19 13:14	1
Antimony	ND		3.0	0.28	mg/Kg		07/10/19 08:00	07/12/19 13:14	1
Arsenic	ND		0.50	0.15	mg/Kg		07/10/19 08:00	07/12/19 13:14	1
Barium	ND		2.5	0.12	mg/Kg		07/10/19 08:00	07/12/19 13:14	1
Beryllium	ND		0.25	0.012	mg/Kg		07/10/19 08:00	07/12/19 13:14	1
Cobalt	ND		2.5	0.046	mg/Kg		07/10/19 08:00	07/12/19 13:14	1
Iron	ND		5.0	2.9	mg/Kg		07/10/19 08:00	07/12/19 13:14	1
Li	ND		2.5	0.15	mg/Kg		07/10/19 08:00	07/12/19 13:14	1
Manganese	ND		0.75	0.25	mg/Kg		07/10/19 08:00	07/12/19 13:14	1
Mo	ND		2.0	0.099	mg/Kg		07/10/19 08:00	07/12/19 13:14	1
Selenium	ND		0.50	0.17	mg/Kg		07/10/19 08:00	07/12/19 13:14	1
Thallium	ND		1.8	0.21	mg/Kg		07/10/19 08:00	07/12/19 13:14	1

LUMINANT

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

Lab Sample ID: LCS 140-31502/14-A
Matrix: Solid
Analysis Batch: 31651

Client Sample ID: Lab Control Sample
Prep Type: Step 6
Prep Batch: 31502

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	95.4		mg/Kg		95	75 - 125
Antimony	25.0	24.8		mg/Kg		99	75 - 125
Arsenic	5.00	4.94		mg/Kg		99	75 - 125
Barium	5.00	4.58		mg/Kg		92	75 - 125
Beryllium	2.50	2.57		mg/Kg		103	75 - 125
Cobalt	5.00	4.78		mg/Kg		96	75 - 125
Iron	50.0	47.4		mg/Kg		95	75 - 125
Li	5.00	4.71		mg/Kg		94	75 - 125
Manganese	5.00	4.83		mg/Kg		97	75 - 125
Mo	25.0	24.7		mg/Kg		99	75 - 125
Selenium	7.50	7.32		mg/Kg		98	75 - 125
Thallium	20.0	19.8		mg/Kg		99	75 - 125

Lab Sample ID: LCSD 140-31502/15-A
Matrix: Solid
Analysis Batch: 31651

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 6
Prep Batch: 31502

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	98.8		mg/Kg		99	75 - 125	4	30
Antimony	25.0	25.5		mg/Kg		102	75 - 125	3	30
Arsenic	5.00	5.16		mg/Kg		103	75 - 125	4	30
Barium	5.00	4.77		mg/Kg		95	75 - 125	4	30
Beryllium	2.50	2.67		mg/Kg		107	75 - 125	4	30
Cobalt	5.00	4.97		mg/Kg		99	75 - 125	4	30
Iron	50.0	49.5		mg/Kg		99	75 - 125	4	30
Li	5.00	4.90		mg/Kg		98	75 - 125	4	30
Manganese	5.00	5.02		mg/Kg		100	75 - 125	4	30
Mo	25.0	25.2		mg/Kg		101	75 - 125	2	30
Selenium	7.50	7.50		mg/Kg		100	75 - 125	2	30
Thallium	20.0	20.6		mg/Kg		103	75 - 125	4	30

Lab Sample ID: MB 140-31615/13-A
Matrix: Solid
Analysis Batch: 31713

Client Sample ID: Method Blank
Prep Type: Step 7
Prep Batch: 31615

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		10	1.6	mg/Kg		07/12/19 09:08	07/15/19 10:58	1
Antimony	ND		3.0	0.14	mg/Kg		07/12/19 09:08	07/15/19 10:58	1
Arsenic	ND		0.50	0.13	mg/Kg		07/12/19 09:08	07/15/19 10:58	1
Barium	ND		2.5	0.12	mg/Kg		07/12/19 09:08	07/15/19 10:58	1
Beryllium	ND		0.25	0.0075	mg/Kg		07/12/19 09:08	07/15/19 10:58	1
Cobalt	ND		2.5	0.15	mg/Kg		07/12/19 09:08	07/15/19 10:58	1
Iron	ND		5.0	4.1	mg/Kg		07/12/19 09:08	07/15/19 10:58	1
Li	ND		2.5	0.15	mg/Kg		07/12/19 09:08	07/15/19 10:58	1
Manganese	ND		0.75	0.052	mg/Kg		07/12/19 09:08	07/15/19 10:58	1
Mo	ND		2.0	0.082	mg/Kg		07/12/19 09:08	07/15/19 10:58	1
Selenium	ND		0.50	0.17	mg/Kg		07/12/19 09:08	07/15/19 10:58	1
Thallium	ND		1.8	0.18	mg/Kg		07/12/19 09:08	07/15/19 10:58	1

LUMINANT

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

Lab Sample ID: LCS 140-31615/14-A
Matrix: Solid
Analysis Batch: 31713

Client Sample ID: Lab Control Sample
Prep Type: Step 7
Prep Batch: 31615

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	100	96.8		mg/Kg		97	75 - 125
Antimony	25.0	25.7		mg/Kg		103	75 - 125
Arsenic	5.00	5.23		mg/Kg		105	75 - 125
Barium	5.00	4.99		mg/Kg		100	75 - 125
Beryllium	2.50	2.52		mg/Kg		101	75 - 125
Cobalt	5.00	5.20		mg/Kg		104	75 - 125
Iron	50.0	51.7		mg/Kg		103	75 - 125
Li	5.00	5.15		mg/Kg		103	75 - 125
Manganese	5.00	5.21		mg/Kg		104	75 - 125
Mo	25.0	26.5		mg/Kg		106	75 - 125
Selenium	7.50	7.52		mg/Kg		100	75 - 125
Thallium	20.0	21.2		mg/Kg		106	75 - 125

Lab Sample ID: LCSD 140-31615/15-A
Matrix: Solid
Analysis Batch: 31713

Client Sample ID: Lab Control Sample Dup
Prep Type: Step 7
Prep Batch: 31615

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	100	98.0		mg/Kg		98	75 - 125	1	30
Antimony	25.0	25.8		mg/Kg		103	75 - 125	0	30
Arsenic	5.00	5.30		mg/Kg		106	75 - 125	1	30
Barium	5.00	4.99		mg/Kg		100	75 - 125	0	30
Beryllium	2.50	2.50		mg/Kg		100	75 - 125	1	30
Cobalt	5.00	5.21		mg/Kg		104	75 - 125	0	30
Iron	50.0	51.5		mg/Kg		103	75 - 125	0	30
Li	5.00	5.18		mg/Kg		104	75 - 125	1	30
Manganese	5.00	5.21		mg/Kg		104	75 - 125	0	30
Mo	25.0	26.7		mg/Kg		107	75 - 125	1	30
Selenium	7.50	7.55		mg/Kg		101	75 - 125	0	30
Thallium	20.0	21.3		mg/Kg		107	75 - 125	1	30

LUMINANT

Method: 7470A - SEP Mercury (CVAA) - Total

Lab Sample ID: MB 140-30683/13-B
Matrix: Solid
Analysis Batch: 30868

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 30683

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.10	0.040	mg/Kg		06/11/19 08:00	06/16/19 13:56	1

Lab Sample ID: LCS 140-30683/14-B
Matrix: Solid
Analysis Batch: 30868

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 30683

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Hg	2.50	2.70		mg/Kg		108	75 - 125

Client: Golder Associates Inc.
Project/Site: Martin Lake A1 Area LF SEP + Totals

Job ID: 140-15492-1

Method: 7470A - SEP Mercury (CVAA) - Total (Continued)

Lab Sample ID: LCSD 140-30683/15-B
Matrix: Solid
Analysis Batch: 30868

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 30683

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Hg			2.50	2.71		mg/Kg		108	75 - 125	0	30

LUMINANT

Metals

Prep Batch: 30683

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Total/NA	Solid	Total	
140-15492-2	BMW-30 (40-41)	Total/NA	Solid	Total	
140-15492-3	BMW-31 (14-15)	Total/NA	Solid	Total	
140-15492-4	BMW-32 (25-26)	Total/NA	Solid	Total	
140-15492-5	BMW-33 (38-39)	Total/NA	Solid	Total	
MB 140-30683/13-A	Method Blank	Total/NA	Solid	Total	
MB 140-30683/13-B	Method Blank	Total/NA	Solid	Total	
LCS 140-30683/14-A	Lab Control Sample	Total/NA	Solid	Total	
LCS 140-30683/14-B	Lab Control Sample	Total/NA	Solid	Total	
LCSD 140-30683/15-A	Lab Control Sample Dup	Total/NA	Solid	Total	
LCSD 140-30683/15-B	Lab Control Sample Dup	Total/NA	Solid	Total	

Prep Batch: 30859

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Total/NA	Solid	7470A	30683
140-15492-2	BMW-30 (40-41)	Total/NA	Solid	7470A	30683
140-15492-3	BMW-31 (14-15)	Total/NA	Solid	7470A	30683
140-15492-4	BMW-32 (25-26)	Total/NA	Solid	7470A	30683
140-15492-5	BMW-33 (38-39)	Total/NA	Solid	7470A	30683
MB 140-30683/13-B	Method Blank	Total/NA	Solid	7470A	30683
LCS 140-30683/14-B	Lab Control Sample	Total/NA	Solid	7470A	30683
LCSD 140-30683/15-B	Lab Control Sample Dup	Total/NA	Solid	7470A	30683

Analysis Batch: 30868

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Total/NA	Solid	7470A	30859
140-15492-2	BMW-30 (40-41)	Total/NA	Solid	7470A	30859
140-15492-3	BMW-31 (14-15)	Total/NA	Solid	7470A	30859
140-15492-4	BMW-32 (25-26)	Total/NA	Solid	7470A	30859
140-15492-5	BMW-33 (38-39)	Total/NA	Solid	7470A	30859
MB 140-30683/13-B	Method Blank	Total/NA	Solid	7470A	30859
LCS 140-30683/14-B	Lab Control Sample	Total/NA	Solid	7470A	30859
LCSD 140-30683/15-B	Lab Control Sample Dup	Total/NA	Solid	7470A	30859

Prep Batch: 31128

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Total/NA	Solid	3050B	
140-15492-2	BMW-30 (40-41)	Total/NA	Solid	3050B	
140-15492-3	BMW-31 (14-15)	Total/NA	Solid	3050B	
140-15492-4	BMW-32 (25-26)	Total/NA	Solid	3050B	
140-15492-5	BMW-33 (38-39)	Total/NA	Solid	3050B	
MB 140-31128/14-A	Method Blank	Total/NA	Solid	3050B	
LCS 140-31128/15-A	Lab Control Sample	Total/NA	Solid	3050B	

SEP Batch: 31148

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 1	Solid	Exchangeable	
140-15492-2	BMW-30 (40-41)	Step 1	Solid	Exchangeable	
140-15492-3	BMW-31 (14-15)	Step 1	Solid	Exchangeable	
140-15492-4	BMW-32 (25-26)	Step 1	Solid	Exchangeable	
140-15492-5	BMW-33 (38-39)	Step 1	Solid	Exchangeable	

LUMINANT

Metals (Continued)

SEP Batch: 31148 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 140-31148/13-B ^4	Method Blank	Step 1	Solid	Exchangeable	
LCS 140-31148/14-B ^5	Lab Control Sample	Step 1	Solid	Exchangeable	
LCSD 140-31148/15-B ^5	Lab Control Sample Dup	Step 1	Solid	Exchangeable	

Prep Batch: 31252

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 1	Solid	3010A	31148
140-15492-2	BMW-30 (40-41)	Step 1	Solid	3010A	31148
140-15492-3	BMW-31 (14-15)	Step 1	Solid	3010A	31148
140-15492-4	BMW-32 (25-26)	Step 1	Solid	3010A	31148
140-15492-5	BMW-33 (38-39)	Step 1	Solid	3010A	31148
MB 140-31148/13-B ^4	Method Blank	Step 1	Solid	3010A	31148
LCS 140-31148/14-B ^5	Lab Control Sample	Step 1	Solid	3010A	31148
LCSD 140-31148/15-B ^5	Lab Control Sample Dup	Step 1	Solid	3010A	31148

SEP Batch: 31253

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 2	Solid	Carbonate	
140-15492-2	BMW-30 (40-41)	Step 2	Solid	Carbonate	
140-15492-3	BMW-31 (14-15)	Step 2	Solid	Carbonate	
140-15492-4	BMW-32 (25-26)	Step 2	Solid	Carbonate	
140-15492-5	BMW-33 (38-39)	Step 2	Solid	Carbonate	
MB 140-31253/13-B ^3	Method Blank	Step 2	Solid	Carbonate	
LCS 140-31253/14-B ^5	Lab Control Sample	Step 2	Solid	Carbonate	
LCSD 140-31253/15-B ^5	Lab Control Sample Dup	Step 2	Solid	Carbonate	

Prep Batch: 31256

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 2	Solid	3010A	31253
140-15492-2	BMW-30 (40-41)	Step 2	Solid	3010A	31253
140-15492-3	BMW-31 (14-15)	Step 2	Solid	3010A	31253
140-15492-4	BMW-32 (25-26)	Step 2	Solid	3010A	31253
140-15492-5	BMW-33 (38-39)	Step 2	Solid	3010A	31253
MB 140-31253/13-B ^3	Method Blank	Step 2	Solid	3010A	31253
LCS 140-31253/14-B ^5	Lab Control Sample	Step 2	Solid	3010A	31253
LCSD 140-31253/15-B ^5	Lab Control Sample Dup	Step 2	Solid	3010A	31253

SEP Batch: 31257

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 3	Solid	Non-Crystalline	
140-15492-2	BMW-30 (40-41)	Step 3	Solid	Non-Crystalline	
140-15492-3	BMW-31 (14-15)	Step 3	Solid	Non-Crystalline	
140-15492-4	BMW-32 (25-26)	Step 3	Solid	Non-Crystalline	
140-15492-5	BMW-33 (38-39)	Step 3	Solid	Non-Crystalline	
MB 140-31257/13-B	Method Blank	Step 3	Solid	Non-Crystalline	
LCS 140-31257/14-B	Lab Control Sample	Step 3	Solid	Non-Crystalline	
LCSD 140-31257/15-B	Lab Control Sample Dup	Step 3	Solid	Non-Crystalline	

Prep Batch: 31338

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 3	Solid	3010A	31257

LUMINANT

Metals (Continued)

Prep Batch: 31338 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-2	BMW-30 (40-41)	Step 3	Solid	3010A	31257
140-15492-3	BMW-31 (14-15)	Step 3	Solid	3010A	31257
140-15492-4	BMW-32 (25-26)	Step 3	Solid	3010A	31257
140-15492-5	BMW-33 (38-39)	Step 3	Solid	3010A	31257
MB 140-31257/13-B	Method Blank	Step 3	Solid	3010A	31257
LCS 140-31257/14-B	Lab Control Sample	Step 3	Solid	3010A	31257
LCSD 140-31257/15-B	Lab Control Sample Dup	Step 3	Solid	3010A	31257

SEP Batch: 31341

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 4	Solid	Metal Hydroxide	
140-15492-2	BMW-30 (40-41)	Step 4	Solid	Metal Hydroxide	
140-15492-3	BMW-31 (14-15)	Step 4	Solid	Metal Hydroxide	
140-15492-4	BMW-32 (25-26)	Step 4	Solid	Metal Hydroxide	
140-15492-5	BMW-33 (38-39)	Step 4	Solid	Metal Hydroxide	
MB 140-31341/13-B	Method Blank	Step 4	Solid	Metal Hydroxide	
LCS 140-31341/14-B	Lab Control Sample	Step 4	Solid	Metal Hydroxide	
LCSD 140-31341/15-B	Lab Control Sample Dup	Step 4	Solid	Metal Hydroxide	

Prep Batch: 31360

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 4	Solid	3010A	31341
140-15492-2	BMW-30 (40-41)	Step 4	Solid	3010A	31341
140-15492-3	BMW-31 (14-15)	Step 4	Solid	3010A	31341
140-15492-4	BMW-32 (25-26)	Step 4	Solid	3010A	31341
140-15492-5	BMW-33 (38-39)	Step 4	Solid	3010A	31341
MB 140-31341/13-B	Method Blank	Step 4	Solid	3010A	31341
LCS 140-31341/14-B	Lab Control Sample	Step 4	Solid	3010A	31341
LCSD 140-31341/15-B	Lab Control Sample Dup	Step 4	Solid	3010A	31341

SEP Batch: 31436

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 5	Solid	Organic-Bound	
140-15492-2	BMW-30 (40-41)	Step 5	Solid	Organic-Bound	
140-15492-3	BMW-31 (14-15)	Step 5	Solid	Organic-Bound	
140-15492-4	BMW-32 (25-26)	Step 5	Solid	Organic-Bound	
140-15492-5	BMW-33 (38-39)	Step 5	Solid	Organic-Bound	
MB 140-31436/13-B ^5	Method Blank	Step 5	Solid	Organic-Bound	
LCS 140-31436/14-B ^5	Lab Control Sample	Step 5	Solid	Organic-Bound	
LCSD 140-31436/15-B ^5	Lab Control Sample Dup	Step 5	Solid	Organic-Bound	

Prep Batch: 31500

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 5	Solid	3010A	31436
140-15492-2	BMW-30 (40-41)	Step 5	Solid	3010A	31436
140-15492-3	BMW-31 (14-15)	Step 5	Solid	3010A	31436
140-15492-4	BMW-32 (25-26)	Step 5	Solid	3010A	31436
140-15492-5	BMW-33 (38-39)	Step 5	Solid	3010A	31436
MB 140-31436/13-B ^5	Method Blank	Step 5	Solid	3010A	31436
LCS 140-31436/14-B ^5	Lab Control Sample	Step 5	Solid	3010A	31436
LCSD 140-31436/15-B ^5	Lab Control Sample Dup	Step 5	Solid	3010A	31436

LUMINANT

Metals

SEP Batch: 31502

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 6	Solid	Acid/Sulfide	
140-15492-2	BMW-30 (40-41)	Step 6	Solid	Acid/Sulfide	
140-15492-3	BMW-31 (14-15)	Step 6	Solid	Acid/Sulfide	
140-15492-4	BMW-32 (25-26)	Step 6	Solid	Acid/Sulfide	
140-15492-5	BMW-33 (38-39)	Step 6	Solid	Acid/Sulfide	
MB 140-31502/13-A	Method Blank	Step 6	Solid	Acid/Sulfide	
LCS 140-31502/14-A	Lab Control Sample	Step 6	Solid	Acid/Sulfide	
LCSD 140-31502/15-A	Lab Control Sample Dup	Step 6	Solid	Acid/Sulfide	

Analysis Batch: 31553

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Total/NA	Solid	6010B	31128
140-15492-2	BMW-30 (40-41)	Total/NA	Solid	6010B	31128
140-15492-3	BMW-31 (14-15)	Total/NA	Solid	6010B	31128
140-15492-4	BMW-32 (25-26)	Total/NA	Solid	6010B	31128
140-15492-5	BMW-33 (38-39)	Total/NA	Solid	6010B	31128
MB 140-31128/14-A	Method Blank	Total/NA	Solid	6010B	31128
LCS 140-31128/15-A	Lab Control Sample	Total/NA	Solid	6010B	31128

Analysis Batch: 31604

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 1	Solid	6010B SEP	31252
140-15492-1	BMW-29 (30-31)	Step 2	Solid	6010B SEP	31256
140-15492-1	BMW-29 (30-31)	Step 3	Solid	6010B SEP	31338
140-15492-1	BMW-29 (30-31)	Step 4	Solid	6010B SEP	31360
140-15492-2	BMW-30 (40-41)	Step 1	Solid	6010B SEP	31252
140-15492-2	BMW-30 (40-41)	Step 2	Solid	6010B SEP	31256
140-15492-2	BMW-30 (40-41)	Step 3	Solid	6010B SEP	31338
140-15492-2	BMW-30 (40-41)	Step 4	Solid	6010B SEP	31360
140-15492-3	BMW-31 (14-15)	Step 1	Solid	6010B SEP	31252
140-15492-3	BMW-31 (14-15)	Step 2	Solid	6010B SEP	31256
140-15492-3	BMW-31 (14-15)	Step 3	Solid	6010B SEP	31338
140-15492-3	BMW-31 (14-15)	Step 4	Solid	6010B SEP	31360
140-15492-4	BMW-32 (25-26)	Step 1	Solid	6010B SEP	31252
140-15492-4	BMW-32 (25-26)	Step 2	Solid	6010B SEP	31256
140-15492-4	BMW-32 (25-26)	Step 3	Solid	6010B SEP	31338
140-15492-4	BMW-32 (25-26)	Step 4	Solid	6010B SEP	31360
140-15492-5	BMW-33 (38-39)	Step 1	Solid	6010B SEP	31252
140-15492-5	BMW-33 (38-39)	Step 2	Solid	6010B SEP	31256
140-15492-5	BMW-33 (38-39)	Step 3	Solid	6010B SEP	31338
140-15492-5	BMW-33 (38-39)	Step 4	Solid	6010B SEP	31360
MB 140-31148/13-B ^4	Method Blank	Step 1	Solid	6010B SEP	31252
MB 140-31253/13-B ^3	Method Blank	Step 2	Solid	6010B SEP	31256
MB 140-31257/13-B	Method Blank	Step 3	Solid	6010B SEP	31338
MB 140-31341/13-B	Method Blank	Step 4	Solid	6010B SEP	31360
LCS 140-31148/14-B ^5	Lab Control Sample	Step 1	Solid	6010B SEP	31252
LCS 140-31253/14-B ^5	Lab Control Sample	Step 2	Solid	6010B SEP	31256
LCS 140-31257/14-B	Lab Control Sample	Step 3	Solid	6010B SEP	31338
LCS 140-31341/14-B	Lab Control Sample	Step 4	Solid	6010B SEP	31360
LCSD 140-31148/15-B ^5	Lab Control Sample Dup	Step 1	Solid	6010B SEP	31252
LCSD 140-31253/15-B ^5	Lab Control Sample Dup	Step 2	Solid	6010B SEP	31256

LUMINANT

Metals (Continued)

Analysis Batch: 31604 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCSD 140-31257/15-B	Lab Control Sample Dup	Step 3	Solid	6010B SEP	31338
LCSD 140-31341/15-B	Lab Control Sample Dup	Step 4	Solid	6010B SEP	31360

Prep Batch: 31615

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 7	Solid	Residual	
140-15492-2	BMW-30 (40-41)	Step 7	Solid	Residual	
140-15492-3	BMW-31 (14-15)	Step 7	Solid	Residual	
140-15492-4	BMW-32 (25-26)	Step 7	Solid	Residual	
140-15492-5	BMW-33 (38-39)	Step 7	Solid	Residual	
MB 140-31615/13-A	Method Blank	Step 7	Solid	Residual	
LCS 140-31615/14-A	Lab Control Sample	Step 7	Solid	Residual	
LCSD 140-31615/15-A	Lab Control Sample Dup	Step 7	Solid	Residual	

Analysis Batch: 31651

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 5	Solid	6010B SEP	31500
140-15492-1	BMW-29 (30-31)	Step 6	Solid	6010B SEP	31502
140-15492-2	BMW-30 (40-41)	Step 5	Solid	6010B SEP	31500
140-15492-2	BMW-30 (40-41)	Step 6	Solid	6010B SEP	31502
140-15492-3	BMW-31 (14-15)	Step 5	Solid	6010B SEP	31500
140-15492-3	BMW-31 (14-15)	Step 6	Solid	6010B SEP	31502
140-15492-4	BMW-32 (25-26)	Step 5	Solid	6010B SEP	31500
140-15492-4	BMW-32 (25-26)	Step 6	Solid	6010B SEP	31502
140-15492-5	BMW-33 (38-39)	Step 5	Solid	6010B SEP	31500
140-15492-5	BMW-33 (38-39)	Step 6	Solid	6010B SEP	31502
MB 140-31436/13-B ^5	Method Blank	Step 5	Solid	6010B SEP	31500
MB 140-31502/13-A	Method Blank	Step 6	Solid	6010B SEP	31502
LCS 140-31436/14-B ^5	Lab Control Sample	Step 5	Solid	6010B SEP	31500
LCS 140-31502/14-A	Lab Control Sample	Step 6	Solid	6010B SEP	31502
LCSD 140-31436/15-B ^5	Lab Control Sample Dup	Step 5	Solid	6010B SEP	31500
LCSD 140-31502/15-A	Lab Control Sample Dup	Step 6	Solid	6010B SEP	31502

Analysis Batch: 31713

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Step 7	Solid	6010B SEP	31615
140-15492-1	BMW-29 (30-31)	Step 7	Solid	6010B SEP	31615
140-15492-1	BMW-29 (30-31)	Step 7	Solid	6010B SEP	31615
140-15492-1	BMW-29 (30-31)	Total/NA	Solid	6010B	30683
140-15492-1	BMW-29 (30-31)	Total/NA	Solid	6010B	30683
140-15492-1	BMW-29 (30-31)	Total/NA	Solid	6010B	30683
140-15492-2	BMW-30 (40-41)	Step 7	Solid	6010B SEP	31615
140-15492-2	BMW-30 (40-41)	Step 7	Solid	6010B SEP	31615
140-15492-2	BMW-30 (40-41)	Step 7	Solid	6010B SEP	31615
140-15492-2	BMW-30 (40-41)	Total/NA	Solid	6010B	30683
140-15492-2	BMW-30 (40-41)	Total/NA	Solid	6010B	30683
140-15492-2	BMW-30 (40-41)	Total/NA	Solid	6010B	30683
140-15492-3	BMW-31 (14-15)	Step 7	Solid	6010B SEP	31615
140-15492-3	BMW-31 (14-15)	Step 7	Solid	6010B SEP	31615
140-15492-3	BMW-31 (14-15)	Step 7	Solid	6010B SEP	31615
140-15492-3	BMW-31 (14-15)	Total/NA	Solid	6010B	30683

LUMINANT

Metals (Continued)

Analysis Batch: 31713 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-3	BMW-31 (14-15)	Total/NA	Solid	6010B	30683
140-15492-3	BMW-31 (14-15)	Total/NA	Solid	6010B	30683
140-15492-4	BMW-32 (25-26)	Step 7	Solid	6010B SEP	31615
140-15492-4	BMW-32 (25-26)	Step 7	Solid	6010B SEP	31615
140-15492-4	BMW-32 (25-26)	Step 7	Solid	6010B SEP	31615
140-15492-4	BMW-32 (25-26)	Total/NA	Solid	6010B	30683
140-15492-4	BMW-32 (25-26)	Total/NA	Solid	6010B	30683
140-15492-4	BMW-32 (25-26)	Total/NA	Solid	6010B	30683
140-15492-5	BMW-33 (38-39)	Step 7	Solid	6010B SEP	31615
140-15492-5	BMW-33 (38-39)	Step 7	Solid	6010B SEP	31615
140-15492-5	BMW-33 (38-39)	Step 7	Solid	6010B SEP	31615
140-15492-5	BMW-33 (38-39)	Total/NA	Solid	6010B	30683
140-15492-5	BMW-33 (38-39)	Total/NA	Solid	6010B	30683
140-15492-5	BMW-33 (38-39)	Total/NA	Solid	6010B	30683
MB 140-30683/13-A	Method Blank	Total/NA	Solid	6010B	30683
MB 140-31615/13-A	Method Blank	Step 7	Solid	6010B SEP	31615
LCS 140-30683/14-A	Lab Control Sample	Total/NA	Solid	6010B	30683
LCS 140-31615/14-A	Lab Control Sample	Step 7	Solid	6010B SEP	31615
LCSD 140-30683/15-A	Lab Control Sample Dup	Total/NA	Solid	6010B	30683
LCSD 140-31615/15-A	Lab Control Sample Dup	Step 7	Solid	6010B SEP	31615

Analysis Batch: 31744

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Sum of Steps 1-7	Solid	6010B SEP	
140-15492-2	BMW-30 (40-41)	Sum of Steps 1-7	Solid	6010B SEP	
140-15492-3	BMW-31 (14-15)	Sum of Steps 1-7	Solid	6010B SEP	
140-15492-4	BMW-32 (25-26)	Sum of Steps 1-7	Solid	6010B SEP	
140-15492-5	BMW-33 (38-39)	Sum of Steps 1-7	Solid	6010B SEP	

General Chemistry

Analysis Batch: 30602

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15492-1	BMW-29 (30-31)	Total/NA	Solid	Moisture	
140-15492-2	BMW-30 (40-41)	Total/NA	Solid	Moisture	
140-15492-3	BMW-31 (14-15)	Total/NA	Solid	Moisture	
140-15492-4	BMW-32 (25-26)	Total/NA	Solid	Moisture	
140-15492-5	BMW-33 (38-39)	Total/NA	Solid	Moisture	

LUMINANT

Client Sample ID: BMW-29 (30-31)
Date Collected: 05/31/19 16:45
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			31744	07/16/19 17:31	CLJ	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			30602	06/06/19 14:52	BKD	TAL KNX
	Instrument ID: W3									

Client Sample ID: BMW-29 (30-31)
Date Collected: 05/31/19 16:45
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-1
Matrix: Solid
Percent Solids: 73.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.539 g	50 mL	31128	06/26/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31553	07/10/19 12:23	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31713	07/15/19 14:46	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			31713	07/15/19 16:20	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		5			31713	07/15/19 18:48	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	31148	06/26/19 09:47	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	31252	06/29/19 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			31604	07/11/19 13:09	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.000 g	25 mL	31253	06/29/19 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	31256	06/30/19 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			31604	07/11/19 14:53	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	31257	06/30/19 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	31338	07/02/19 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			31604	07/11/19 16:42	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	31341	07/02/19 09:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	31360	07/03/19 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			31604	07/11/19 18:09	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	31436	07/08/19 07:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	31500	07/10/19 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			31651	07/12/19 12:16	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	31502	07/10/19 08:00	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			31651	07/12/19 14:00	KNC	TAL KNX
	Instrument ID: DUO									

LUMINANT

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Client Sample ID: BMW-29 (30-31)
Lab Sample ID: 140-15492-1
Date Collected: 05/31/19 16:45
Matrix: Solid
Date Received: 06/05/19 09:20
Percent Solids: 73.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			31713	07/15/19 12:16	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			31713	07/15/19 13:29	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			31713	07/15/19 17:32	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Prep	7470A			5.0 mL	50.0 mL	30859	06/16/19 08:00	DKW	TAL KNX
Total/NA	Analysis	7470A		1			30868	06/16/19 14:19	DKW	TAL KNX
	Instrument ID: HG									

Client Sample ID: BMW-30 (40-41)
Lab Sample ID: 140-15492-2
Date Collected: 05/30/19 15:55
Matrix: Solid
Date Received: 06/05/19 09:20

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			31744	07/16/19 17:31	CLJ	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			30602	06/06/19 14:52	BKD	TAL KNX
	Instrument ID: W3									

Client Sample ID: BMW-30 (40-41)
Lab Sample ID: 140-15492-2
Date Collected: 05/30/19 15:55
Matrix: Solid
Date Received: 06/05/19 09:20
Percent Solids: 84.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.528 g	50 mL	31128	06/26/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31553	07/10/19 12:28	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31713	07/15/19 15:07	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			31713	07/15/19 16:25	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		5			31713	07/15/19 18:53	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	31148	06/26/19 09:47	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	31252	06/29/19 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			31604	07/11/19 13:14	KNC	TAL KNX
	Instrument ID: DUO									

LUMINANT

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Client Sample ID: BMW-30 (40-41)
Lab Sample ID: 140-15492-2

Date Collected: 05/30/19 15:55
Matrix: Solid
Date Received: 06/05/19 09:20
Percent Solids: 84.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.000 g	25 mL	31253	06/29/19 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	31256	06/30/19 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			31604	07/11/19 14:58	KNC	TAL KNX
	Instrument ID:	DUO								
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	31257	06/30/19 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	31338	07/02/19 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			31604	07/11/19 16:47	KNC	TAL KNX
	Instrument ID:	DUO								
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	31341	07/02/19 09:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	31360	07/03/19 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			31604	07/11/19 18:15	KNC	TAL KNX
	Instrument ID:	DUO								
Step 5	SEP	Organic-Bound			5.000 g	75 mL	31436	07/08/19 07:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	31500	07/10/19 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			31651	07/12/19 12:21	KNC	TAL KNX
	Instrument ID:	DUO								
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	31502	07/10/19 08:00	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			31651	07/12/19 14:05	KNC	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			31713	07/15/19 12:21	KNC	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			31713	07/15/19 13:34	KNC	TAL KNX
	Instrument ID:	DUO								
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			31713	07/15/19 17:37	KNC	TAL KNX
	Instrument ID:	DUO								
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Prep	7470A			5.0 mL	50.0 mL	30859	06/16/19 08:00	DKW	TAL KNX
Total/NA	Analysis	7470A		1			30868	06/16/19 14:21	DKW	TAL KNX
	Instrument ID:	HG								

Client Sample ID: BMW-31 (14-15)
Lab Sample ID: 140-15492-3

Date Collected: 05/31/19 11:15
Matrix: Solid
Date Received: 06/05/19 09:20

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			31744	07/16/19 17:31	CLJ	TAL KNX
	Instrument ID:	NOEQUIP								
Total/NA	Analysis	Moisture		1			30602	06/06/19 14:52	BKD	TAL KNX
	Instrument ID:	W3								

LUMINANT

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Client Sample ID: BMW-31 (14-15)
Date Collected: 05/31/19 11:15
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-3
Matrix: Solid
Percent Solids: 84.2

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.502 g	50 mL	31128	06/26/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31553	07/10/19 12:43	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31713	07/15/19 15:12	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			31713	07/15/19 16:30	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		2			31713	07/15/19 19:14	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	31148	06/26/19 09:47	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	31252	06/29/19 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			31604	07/11/19 13:35	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.000 g	25 mL	31253	06/29/19 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	31256	06/30/19 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			31604	07/11/19 15:03	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	31257	06/30/19 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	31338	07/02/19 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			31604	07/11/19 16:52	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	31341	07/02/19 09:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	31360	07/03/19 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			31604	07/11/19 18:20	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	31436	07/08/19 07:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	31500	07/10/19 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			31651	07/12/19 12:42	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	31502	07/10/19 08:00	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			31651	07/12/19 14:10	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			31713	07/15/19 12:26	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			31713	07/15/19 13:39	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			31713	07/15/19 17:42	KNC	TAL KNX
	Instrument ID: DUO									

LUMINANT

Lab Chronicle

Client: Golder Associates Inc. Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Client Sample ID: BMW-31 (14-15) Lab Sample ID: 140-15492-3

Date Collected: 05/31/19 11:15 **Matrix: Solid**
Date Received: 06/05/19 09:20 **Percent Solids: 84.2**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Prep	7470A			5.0 mL	50.0 mL	30859	06/16/19 08:00	DKW	TAL KNX
Total/NA	Analysis	7470A		1			30868	06/16/19 14:24	DKW	TAL KNX
	Instrument ID: HG									

Client Sample ID: BMW-32 (25-26) Lab Sample ID: 140-15492-4

Date Collected: 05/29/19 15:45 **Matrix: Solid**
Date Received: 06/05/19 09:20

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			31744	07/16/19 17:31	CLJ	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			30602	06/06/19 14:52	BKD	TAL KNX
	Instrument ID: W3									

Client Sample ID: BMW-32 (25-26) Lab Sample ID: 140-15492-4

Date Collected: 05/29/19 15:45 **Matrix: Solid**
Date Received: 06/05/19 09:20 **Percent Solids: 84.2**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.529 g	50 mL	31128	06/26/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31553	07/10/19 12:49	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31713	07/15/19 15:18	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			31713	07/15/19 16:35	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		2			31713	07/15/19 19:19	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	31148	06/26/19 09:47	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	31252	06/29/19 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			31604	07/11/19 13:40	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.000 g	25 mL	31253	06/29/19 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	31256	06/30/19 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			31604	07/11/19 15:09	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	31257	06/30/19 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	31338	07/02/19 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			31604	07/11/19 16:58	KNC	TAL KNX
	Instrument ID: DUO									

LUMINANT

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Client Sample ID: BMW-32 (25-26)
Lab Sample ID: 140-15492-4
Date Collected: 05/29/19 15:45
Matrix: Solid
Date Received: 06/05/19 09:20
Percent Solids: 84.2

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	31341	07/02/19 09:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	31360	07/03/19 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			31604	07/11/19 18:25	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	31436	07/08/19 07:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	31500	07/10/19 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			31651	07/12/19 12:47	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	31502	07/10/19 08:00	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			31651	07/12/19 14:15	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			31713	07/15/19 12:32	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			31713	07/15/19 13:44	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			31713	07/15/19 17:47	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Prep	7470A			5.0 mL	50.0 mL	30859	06/16/19 08:00	DKW	TAL KNX
Total/NA	Analysis	7470A		1			30868	06/16/19 14:27	DKW	TAL KNX
	Instrument ID: HG									

Client Sample ID: BMW-33 (38-39)
Lab Sample ID: 140-15492-5
Date Collected: 05/30/19 11:35
Matrix: Solid
Date Received: 06/05/19 09:20

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			31744	07/16/19 17:31	CLJ	TAL KNX
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Moisture		1			30602	06/06/19 14:52	BKD	TAL KNX
	Instrument ID: W3									

Client Sample ID: BMW-33 (38-39)
Lab Sample ID: 140-15492-5
Date Collected: 05/30/19 11:35
Matrix: Solid
Date Received: 06/05/19 09:20
Percent Solids: 77.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.527 g	50 mL	31128	06/26/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31553	07/10/19 12:54	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31713	07/15/19 15:23	KNC	TAL KNX
	Instrument ID: DUO									

LUMINANT

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Client Sample ID: BMW-33 (38-39)
Date Collected: 05/30/19 11:35
Date Received: 06/05/19 09:20

Lab Sample ID: 140-15492-5
Matrix: Solid
Percent Solids: 77.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			31713	07/15/19 16:40	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		5			31713	07/15/19 19:24	KNC	TAL KNX
	Instrument ID: DUO									
Step 1	SEP	Exchangeable			5.000 g	25 mL	31148	06/26/19 09:47	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	31252	06/29/19 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			31604	07/11/19 13:45	KNC	TAL KNX
	Instrument ID: DUO									
Step 2	SEP	Carbonate			5.000 g	25 mL	31253	06/29/19 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	31256	06/30/19 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			31604	07/11/19 15:14	KNC	TAL KNX
	Instrument ID: DUO									
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	31257	06/30/19 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	31338	07/02/19 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			31604	07/11/19 17:03	KNC	TAL KNX
	Instrument ID: DUO									
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	31341	07/02/19 09:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	31360	07/03/19 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			31604	07/11/19 18:45	KNC	TAL KNX
	Instrument ID: DUO									
Step 5	SEP	Organic-Bound			5.000 g	75 mL	31436	07/08/19 07:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	31500	07/10/19 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			31651	07/12/19 12:53	KNC	TAL KNX
	Instrument ID: DUO									
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	31502	07/10/19 08:00	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			31651	07/12/19 14:21	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			31713	07/15/19 12:37	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			31713	07/15/19 14:04	KNC	TAL KNX
	Instrument ID: DUO									
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			31713	07/15/19 17:52	KNC	TAL KNX
	Instrument ID: DUO									
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Prep	7470A			5.0 mL	50.0 mL	30859	06/16/19 08:00	DKW	TAL KNX
Total/NA	Analysis	7470A		1			30868	06/16/19 14:29	DKW	TAL KNX
	Instrument ID: HG									

LUMINANT

Lab Chronicle

Client: Golder Associates Inc. Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Client Sample ID: Method Blank — Lab Sample ID: MB 140-30683/13-A
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31713	07/15/19 11:13	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-30683/13-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
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Prep	7470A			5.0 mL	50.0 mL	30859	06/16/19 08:00	DKW	TAL KNX
Total/NA	Analysis	7470A		1			30868	06/16/19 13:56	DKW	TAL KNX
	Instrument ID: HG									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-31128/14-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	31128	06/26/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31553	07/10/19 11:42	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-31148/13-B ^4
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.000 g	25 mL	31148	06/26/19 09:47	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	31252	06/29/19 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			31604	07/11/19 12:33	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-31253/13-B ^3
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.000 g	25 mL	31253	06/29/19 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	31256	06/30/19 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			31604	07/11/19 14:06	KNC	TAL KNX
	Instrument ID: DUO									

LUMINANT

Lab Chronicle

Client: Golder Associates Inc. Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Client Sample ID: Method Blank — Lab Sample ID: MB 140-31257/13-B
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	31257	06/30/19 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	31338	07/02/19 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			31604	07/11/19 15:50	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-31341/13-B
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	31341	07/02/19 09:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	31360	07/03/19 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			31604	07/11/19 17:24	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-31436/13-B ^5
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.000 g	75 mL	31436	07/08/19 07:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	31500	07/10/19 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			31651	07/12/19 11:39	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-31502/13-A
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	31502	07/10/19 08:00	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			31651	07/12/19 13:14	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-31615/13-A
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			31713	07/15/19 10:58	KNC	TAL KNX
	Instrument ID: DUO									

LUMINANT

Lab Chronicle

Client: Golder Associates Inc. Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-30683/14-A
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31713	07/15/19 11:19	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-30683/14-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
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Prep	7470A			5.0 mL	50.0 mL	30859	06/16/19 08:00	DKW	TAL KNX
Total/NA	Analysis	7470A		1			30868	06/16/19 13:59	DKW	TAL KNX
	Instrument ID: HG									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-31128/15-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
Total/NA	Prep	3050B			0.500 g	50 mL	31128	06/26/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31553	07/10/19 11:47	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-31148/14-B ^5
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.000 g	25 mL	31148	06/26/19 09:47	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	31252	06/29/19 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		5			31604	07/11/19 12:38	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-31253/14-B ^5
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.000 g	25 mL	31253	06/29/19 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	31256	06/30/19 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		5			31604	07/11/19 14:11	KNC	TAL KNX
	Instrument ID: DUO									

LUMINANT

Lab Chronicle

Client: Golder Associates Inc. Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-31257/14-B
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	31257	06/30/19 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	31338	07/02/19 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			31604	07/11/19 15:56	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-31341/14-B
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	31341	07/02/19 09:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	31360	07/03/19 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			31604	07/11/19 17:29	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-31436/14-B ^5
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.000 g	75 mL	31436	07/08/19 07:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	31500	07/10/19 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			31651	07/12/19 11:44	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-31502/14-A
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	31502	07/10/19 08:00	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			31651	07/12/19 13:19	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-31615/14-A
Date Collected: N/A — **Matrix: Solid**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			31713	07/15/19 11:03	KNC	TAL KNX
	Instrument ID: DUO									

LUMINANT

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-30683/15-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
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31713	07/15/19 11:24	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-30683/15-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
Total/NA	Prep	Total			1.000 g	50 mL	30683	06/11/19 08:00	KNC	TAL KNX
Total/NA	Prep	7470A			5.0 mL	50.0 mL	30859	06/16/19 08:00	DKW	TAL KNX
Total/NA	Analysis	7470A		1			30868	06/16/19 14:02	DKW	TAL KNX
	Instrument ID: HG									

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-31148/15-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 1	SEP	Exchangeable			5.000 g	25 mL	31148	06/26/19 09:47	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	31252	06/29/19 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		5			31604	07/11/19 12:43	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-31253/15-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 2	SEP	Carbonate			5.000 g	25 mL	31253	06/29/19 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	31256	06/30/19 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		5			31604	07/11/19 14:16	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup — Lab Sample ID: LCSD 140-31257/15-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			5.000 g	25 mL	31257	06/30/19 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	31338	07/02/19 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			31604	07/11/19 16:01	KNC	TAL KNX
	Instrument ID: DUO									

LUMINANT

Lab Chronicle

Client: Golder Associates Inc.
Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-31341/15-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			5.000 g	25 mL	31341	07/02/19 09:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	31360	07/03/19 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			31604	07/11/19 17:44	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-31436/15-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			5.000 g	75 mL	31436	07/08/19 07:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	31500	07/10/19 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			31651	07/12/19 11:49	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-31502/15-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			5.000 g	250 mL	31502	07/10/19 08:00	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			31651	07/12/19 13:24	KNC	TAL KNX
	Instrument ID: DUO									

Client Sample ID: Lab Control Sample Dup
Lab Sample ID: LCSD 140-31615/15-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			1.000 g	50 mL	31615	07/12/19 09:08	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			31713	07/15/19 11:08	KNC	TAL KNX
	Instrument ID: DUO									

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

LUMINANT

Method Summary

Client: Golder Associates Inc.
Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

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
7470A	SEP Mercury (CVAA) - Total	SW846	TAL KNX
Moisture	Percent Moisture	EPA	TAL KNX
3010A	Preparation, Total Metals	SW846	TAL KNX
3050B	Preparation, Metals	SW846	TAL KNX
7470A	Preparation, Mercury	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

LUMINANT

Sample Summary

Client: Golder Associates Inc.
Job ID: 140-15492-1
Project/Site: Martin Lake A1 Area LF SEP + Totals

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-15492-1	BMW-29 (30-31)	Solid	05/31/19 16:45	06/05/19 09:20	
140-15492-2	BMW-30 (40-41)	Solid	05/30/19 15:55	06/05/19 09:20	
140-15492-3	BMW-31 (14-15)	Solid	05/31/19 11:15	06/05/19 09:20	
140-15492-4	BMW-32 (25-26)	Solid	05/29/19 15:45	06/05/19 09:20	
140-15492-5	BMW-33 (38-39)	Solid	05/30/19 11:35	06/05/19 09:20	

LUMINANT

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

Chain of Custody Record

eurofins | Environment Testing TestAmerica

Client Information	Sampler: S. Ruiz / K. Worley	Lab PM: Walker Wasmund, Terry	Carrier Tracking No(s):	COC No: 140-6682-2228.1
Client Contact: Will Vienne	Phone: 281-750-2734	E-Mail: terry.wasmund@testamericainc.com		Page: Page 1 of 1
Company: Golder Associates Inc.				Job #:
Address: 2201 Double Creek Dr Suite 4004	Due Date Requested:			
City: Round Rock	TAT Requested (days): Standard			
State, Zip: TX, 78664				
Phone: 512-671-3434(Tel)	PO #: 19122434-D			
Email: William_Vienne@golder.com	WO #: 19122434-D			
Project Name: Martin Lake A1 Area LF SEP + Totals	Project #: 14005267			
Site:	SSOW#:			

Analysis Requested

140-15492 Chain of Custody

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

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 (12 Metals)	6010B - Total B, Cr, Pb	Total Number of containers	Special Instructions/Note:
			Preservation Code:		N		N	I		
Bmw-29 (30-31)	5/31/19	1645	C	S	N		X	X		On Ice
Bmw-30 (40-41)	5/30/19	1555	C	S	N		X	X		" "
Bmw-31 (14-15)	5/31/19	1115	C	S	N		X	X		" "
Bmw-32 (25-26)	5/29/19	1545	C	S	N		X	X		" "
Bmw-33 (38-39)	5/30/19	1135	C	S	N		X	X		" "

RT: 1.4°C CT: 1.4°C, 1 Cooler
FedEx SO, trk# 7876 7321 5641
Custody Seal intact
KL 6/5/19

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:	Date/Time:	Company	Received by:	Date/Time:	Company
[signature]	06/04/19 1245	Golder	[signature]	6/5/19 0920	TA Knox
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:

LOANSAFE

Loc: 140
15492

TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Log In Number:

Review Items	Yes	No	NA	If No, what was the problem?
1. Are the shipping containers intact?	/			☐ **Containers, Broken**
2. Were ambient air containers received intact?			/	☐ Checked in lab
3. The coolers/containers custody seal if present, is it intact?	/			☐ Yes ☐ NA
4. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C) Thermometer ID : SC68 Correction factor: +0.0	/			☐ **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

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 #: 1400526 7 PM Instructions:

Sample Receiving Associate: Ken Zl Date: 6/5/19

QA026R31.doc, 112618

LUMP KEPT

APPENDIX C

GROUNDWATER SAMPLING RECORDS

LUMINANT

RECORD OF WATER LEVEL READINGS

GOLDER

Project Name: LUMINANT- MLSES-A1 Location: TAYLOR TX Project No.: 191222262-D

Borehole No.	Date	Time	Measuring Device / Serial No.	Measurement Point (M.P)	Water Level Below M.P.	Correction To Survey Mark	Survey Mark Elevation	Water Level Elevation	By	Comments
BMW-24	5-15-19	0701	SOLINST	TOC	9.83				JTB	
BMW-23	5-15-19	0751		TOC	9.98					
BMW-22	5-15-19	0838		TOC	4.47					
BMW-21	5-15-19	0923		TOC	4.23					
BMW-27	5-15-19	1019		TOC	2.79					
BMW-26	5-15-19	1106		TOC	1.62					
BMW-11AR	5-15-19	1159		TOC	31.87					
BMW-19	5-15-19	1250		TOC	12.49					
BMW-18	5-15-19	1336		TOC	21.97					
BMW-28	5-15-19	1424		TOC	18.22					
BMW-20	5-15-19	1523		TOC	2.16					

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222G2-D Project Name: LUMINANT - MCSES - A1 Date: 5-15-19

Sample Number: BMW-20	Starting Water Level (ft. BMP): 7.14
Sampling Location (well ID, etc.): BMW-20	Casing Stickup (ft.): —
Sampled by: JTB	Starting Water Level (ft. BGL): 7.14
Measuring Point (MP) of Well: TOC/PVC	Total Depth (ft. BGL): —
Screened Interval (ft. BGL): —	Casing Diameter (in ID): 2.0
Filter Pack Interval (ft. BGL): —	Casing Volume (gal.): —

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: alconox & DI rinse

Purging: peristaltic / bladder Sampling: same

Disposal of Discharged Water: on site

INSTRUMENTS (Indicate make, model, I.d.)

Water Level:	KECK	Thermometer:	HORIBA
pH Meter:	HORIBA	Field Calibration:	7-4
Conductivity Meter:	HORIBA	Field Calibration:	1413
Filter / Filter Size:	—	Other:	

SAMPLING MEASUREMENTS

Time	Cum. Vol. (gal. or L)	Purge Rate (gal. or L/m)	Temp. (oC)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
1526	—	.2	22.7	6.71	1640	0.47	-52	4.8	7.39
1541		↓	22.9	6.72	1640	0.39	-51	5.6	7.41
1546		↓	22.9	6.71	1640	0.38	-51	5.8	7.42

Water Level (ft. BMP) at End of Purge: 7.42 Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected				Filtration		Remarks
Time	Volume	Composition (G, P)	No.	(Y / N)	Preservation	(quality control sample, other)
1600	250mL	P	1	N	—	GEN CHEM
↓	500mL	P	1	N	HNO_3	METALS
	1L	P	2	N	HNO_3	—
	40mL	G	3	N	—	—

Comments:

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
(512) 671-3434 Fax (512) 671-3446

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222G2-D Project Name: LUMINANT - MCSES - AI Date: 5-15-19

Sample Number: BMW-28

Sampling Location (well ID, etc.): BMW-28

Sampled by: JTB

Measuring Point (MP) of Well: TOC/PVC

Screened Interval (ft. BGL): —

Filter Pack Interval (ft. BGL): —

Starting Water Level (ft. BMP): 18.22

Casing Stickup (ft.): —

Starting Water Level (ft. BGL): 18.22

Total Depth (ft. BGL): —

Casing Diameter (in ID): 2.0

Casing Volume (gal.): —

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: alconox & DI rinse

Purging: peristaltic / bladder Sampling: same

Disposal of Discharged Water: on site

INSTRUMENTS (Indicate make, model, I.d.)

Water Level: KECK Thermometer: HORIBA

pH Meter: HORIBA Field Calibration: 7-4

Conductivity Meter: HORIBA Field Calibration: 1413

Filter / Filter Size: — Other:

SAMPLING MEASUREMENTS

Time (1427)	Cum. Vol. (gal. or L)	Purge Rate (gal. or L/m)	Temp. (oC)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
1437	—	.2	23.2	6.79	1720	0.41	-41	6.9	18.41
1442		↓	23.1	6.77	1740	0.26	-44	5.7	18.42
1447		↓	23.2	6.77	1740	0.25	-43	5.9	18.41

Water Level (ft. BMP) at End of Purge: 18.41 Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected				Filtration		Remarks
Time	Volume	Composition (G, P)	No.	(Y / N)	Preservation	(quality control sample, other)
1500	250mL	P	1	N	—	GEN CHEM
↓	500mL	P	1	N	HNO_3	METALS
	1L	P	2	N	HNO_3	—
	40mL	G	3	N	—	—

Comments:

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
(512) 671-3434 Fax (512) 671-3446

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222b2-D Project Name: LUMINANT - MCSES - A1 Date: 5-15-19

Sample Number: BMW-18	Starting Water Level (ft. BMP): 21.97
Sampling Location (well ID, etc.): BMW-18	Casing Stickup (ft.): -
Sampled by: JTB	Starting Water Level (ft. BGL): 21.97
Measuring Point (MP) of Well: TOC/PVC	Total Depth (ft. BGL): -
Screened Interval (ft. BGL): -	Casing Diameter (in ID): 2.0
Filter Pack Interval (ft. BGL): -	Casing Volume (gal.): -

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: alconox & DI rinse

Purging: peristaltic / bladder Sampling: same

Disposal of Discharged Water: on site

INSTRUMENTS (Indicate make, model, I.d.)

Water Level:	KECK	Thermometer:	HORIBA
pH Meter:	HORIBA	Field Calibration:	7-4
Conductivity Meter:	HORIBA	Field Calibration:	1413
Filter / Filter Size:	-	Other:	

SAMPLING MEASUREMENTS

Time (1338)	Cum. Vol. (gal. or L)	Purge Rate (gal. or L/m)	Temp. (oC)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
1348	-	.2	23.4	6.68	1870	0.61	-29	6.7	22.17
1352		↓	23.5	6.64	1910	0.49	-31	7.1	22.16
1358			23.4	6.65	1920	0.49	-32	7.2	22.16

Water Level (ft. BMP) at End of Purge: 22.16 Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected: Time	Volume	Composition (G, P)	No.	Filtration (Y / N)	Preservation	Remarks (quality control sample, other)
1410	250mL	P	1	N	-	GEN CHEM
↓	500mL	P	1	N	HNO_3	METALS
	1L	P	2	N	HNO_3	-
	40mL	G	3	N	-	-

Comments:

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
(512) 671-3434 Fax (512) 671-3446

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222b2-D Project Name: LUMINANT - MCSES - A1 Date: 5-15-19

Sample Number:	BMW-19	Starting Water Level (ft. BMP):	12.49
Sampling Location (well ID, etc.):	BMW-19	Casing Stickup (ft.):	-
Sampled by:	JTB	Starting Water Level (ft. BGL):	12.49
Measuring Point (MP) of Well:	TOC/PVC	Total Depth (ft. BGL):	-
Screened Interval (ft. BGL):	-	Casing Diameter (in ID):	2.0
Filter Pack Interval (ft. BGL):	-	Casing Volume (gal.):	-

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: alconox & DI rinse

Purging: peristaltic / bladder Sampling: same

Disposal of Discharged Water: on site

INSTRUMENTS (Indicate make, model, I.d.)

Water Level:	KECK	Thermometer:	HORIBA
pH Meter:	HORIBA	Field Calibration:	7-4
Conductivity Meter:	HORIBA	Field Calibration:	1413
Filter / Filter Size:	-	Other:	

SAMPLING MEASUREMENTS

1252 Time	Cum. Vol. (gal. or L)	Purge Rate (gal. or L/m)	Temp. (oC)	pH	Spec. Cond. (mmhos/cm)	D.O	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
1302	-	.2	22.9	6.86	1830	1.16	-13	9.6	12.71
1308		"	27.0	6.89	1860	1.09	-14	4.6	12.70
1315		"	23.0	6.88	1870	1.16	-14	5.2	12.70

Water Level (ft. BMP) at End of Purge: 12.70 Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected				Filtration		Remarks
Time	Volume	Composition (G, P)	No.	(Y / N)	Preservation	(quality control sample, other)
1325	250mL	P	1	N	-	GEN CHEM
"	500mL	P	1	N	HNO_3	METALS
"	1L	P	2	N	HNO_3	-
"	40mL	G	3	N	-	-

Comments:

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
(512) 671-3434 Fax (512) 671-3446

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222b2-D Project Name: LUMINANT - MCSES - AI Date: 5-15-19

Sample Number: BMW-11AR
Sampling Location (well ID, etc.): BMW-11AR
Sampled by: JTB
Measuring Point (MP) of Well: TOC/PVC
Screened Interval (ft. BGL): —
Filter Pack Interval (ft. BGL): —

Starting Water Level (ft. BMP): 31.87
Casing Stickup (ft.): —
Starting Water Level (ft. BGL): 31.87
Total Depth (ft. BGL): —
Casing Diameter (in ID): 2.0
Casing Volume (gal.): —

QUALITY ASSURANCE

METHODS (describe):
Cleaning Equipment: alconox & DI rinse
Purging: peristaltic / bladder Sampling: Same
Disposal of Discharged Water: on site

INSTRUMENTS (Indicate make, model, I.d.)

Water Level: KECK Thermometer: HORIBA
pH Meter: HORIBA Field Calibration: 7-4
Conductivity Meter: HORIBA Field Calibration: 1413
Filter / Filter Size: — Other:

SAMPLING MEASUREMENTS

1302 Time	Cum. Vol. (gal. or L)	Purge Rate (gal. or L/m)	Temp. (oC)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
1211	—	.2	22.7	6.83	1570	0.39	-17	4.8	32.09
1216		↓	22.9	6.84	1590	0.33	-21	3.8	32.11
1223		↓	22.9	6.84	1590	0.34	-22	4.4	32.12

Water Level (ft. BMP) at End of Purge: 32.12 Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected				Filtration		Remarks
Time	Volume	Composition (G, P)	No.	(Y / N)	Preservation	(quality control sample, other)
1235	250mL	P	1	N	—	GEN CHEM
↓	500mL	P	1	N	HNO_3	METALS
	1L	P	2	N	HNO_3	—
↓	40mL	G	3	N	—	—

Comments:

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
(512) 671-3434 Fax (512) 671-3446

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222b2-D Project Name: LUMINANT - MCSES - A1 Date: 5-15-19

Sample Number:	BMW-26	Starting Water Level (ft. BMP):	1.62
Sampling Location (well ID, etc.):	BMW-26	Casing Stickup (ft.):	-
Sampled by:	JTB	Starting Water Level (ft. BGL):	1.62
Measuring Point (MP) of Well:	TOC/PVC	Total Depth (ft. BGL):	-
Screened Interval (ft. BGL):	-	Casing Diameter (in ID):	2.0
Filter Pack Interval (ft. BGL):	-	Casing Volume (gal.):	-

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: alconox & DI rinse

Purging: peristaltic / bladder Sampling: Same

Disposal of Discharged Water: on site

INSTRUMENTS (Indicate make, model, I.d.)

Water Level:	KECK	Thermometer:	HORIBA
pH Meter:	HORIBA	Field Calibration:	7-4
Conductivity Meter:	HORIBA	Field Calibration:	1413
Filter / Filter Size:	-	Other:	

SAMPLING MEASUREMENTS

1409 Time	Cum. Vol. (gal. or (L))	Purge Rate (gal. or (L)/m)	Temp. (oC)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
1119	-	.2	23.9	6.91	1320	0.71	-47	8.6	1.81
1123			24.1	6.90	1360	0.49	-44	6.7	1.82
1129		↓	24.2	6.90	1370	0.51	-46	6.8	1.81

Water Level (ft. BMP) at End of Purge: 1.81 Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected				Filtration		
Time	Volume	Composition (G, P)	No.	(Y / N)	Preservation	Remarks (quality control sample, other)
1140	250mL	P	1	N	-	GEN CHEM
↓	500mL	P	1	N	HNO_3	METALS
	1L	P	2	N	HNO_3	-
↓	40mL	G	3	N	-	-

Comments:

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
(512) 671-3434 Fax (512) 671-3446

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222b2-D Project Name: LUMINANT - MCSES - AI Date: 5-15-19

Sample Number:	BMW-27	Starting Water Level (ft. BMP):	2.79
Sampling Location (well ID, etc.):	BMW-27	Casing Stickup (ft.):	-
Sampled by:	JTB	Starting Water Level (ft. BGL):	2.79
Measuring Point (MP) of Well:	TOC/PVC	Total Depth (ft. BGL):	-
Screened Interval (ft. BGL):	-	Casing Diameter (in ID):	2.0
Filter Pack Interval (ft. BGL):	-	Casing Volume (gal.):	-

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: alconox & DI rinse

Purging: peristaltic / bladder Sampling: Same

Disposal of Discharged Water: on site

INSTRUMENTS (Indicate make, model, I.d.)

Water Level:	KECK	Thermometer:	HORIBA
pH Meter:	HORIBA	Field Calibration:	7-4
Conductivity Meter:	HORIBA	Field Calibration:	1413
Filter / Filter Size:	-	Other:	

SAMPLING MEASUREMENTS

Time (1022)	Cum. Vol. (gal. or L)	Purge Rate (gal. or L/m)	Temp. (oC)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
1032	-	.2	23.4	6.71	1970	0.60	-27	13	3.11
1037		↓	23.3	6.72	1940	0.46	-28	9.1	3.12
1043		↓	23.3	6.72	1950	0.44	-28	7.8	3.12

Water Level (ft. BMP) at End of Purge: 3.12 Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected				Filtration		Remarks
Time	Volume	Composition (G, P)	No.	(Y / N)	Preservation	(quality control sample, other)
1055	250mL	P	1	N	-	GEN CHEM
↓	500mL	P	1	N	HNO_3	METALS
	1L	P	2	N	HNO_3	-
↓	40mL	G	3	N	-	-

Comments:

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
(512) 671-3434 Fax (512) 671-3446

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222G2-D Project Name: LUMINANT - MCSES - A1 Date: 5-15-19

Sample Number: BMW-21

Sampling Location (well ID, etc.): BMW-21

Sampled by: JTB

Measuring Point (MP) of Well: TOC/PVC

Screened Interval (ft. BGL): —

Filter Pack Interval (ft. BGL): —

Starting Water Level (ft. BMP): 4.23

Casing Stickup (ft.): —

Starting Water Level (ft. BGL): 4.23

Total Depth (ft. BGL): —

Casing Diameter (in ID): 2.0

Casing Volume (gal.): —

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: alconox & DI rinse

Purging: peristaltic / bladder Sampling: same

Disposal of Discharged Water: on site

INSTRUMENTS (Indicate make, model, I.d.)

Water Level: KECK Thermometer: HORIBA

pH Meter: HORIBA Field Calibration: 7-4

Conductivity Meter: HORIBA Field Calibration: 1413

Filter / Filter Size: — Other:

SAMPLING MEASUREMENTS

Time	Cum. Vol (gal. or L)	Purge Rate (gal. or L/m)	Temp. (oC)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
0926	—	.2	22.9	6.89	1810	0.91	-6	5.7	4.91
0942		↓	22.7	6.91	1840	0.77	-11	5.1	4.43
0947		↓	22.7	6.92	1850	0.78	-12	6.8	4.43

Water Level (ft. BMP) at End of Purge: 4.43 Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected				Filtration		Remarks
Time	Volume	Composition (G, P)	No.	(Y / N)	Preservation	(quality control sample, other)
0955	250mL	P	1	N	—	GEN CHEM
↓	500mL	P	1	N	HNO_3	METALS
	1L	P	2	N	HNO_3	—
	40mL	G	3	N	—	—

Comments:

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
(512) 671-3434 Fax (512) 671-3446

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222G2-D Project Name: LUMINANT - MCSES - AI Date: 5-15-19

Sample Number: BMW-22

Sampling Location (well ID, etc.): BMW-22

Sampled by: JTB

Measuring Point (MP) of Well: TOC/PVC

Screened Interval (ft. BGL): —

Filter Pack Interval (ft. BGL): —

Starting Water Level (ft. BMP): 4.47

Casing Stickup (ft.): —

Starting Water Level (ft. BGL): 4.47

Total Depth (ft. BGL): —

Casing Diameter (in ID): 2.0

Casing Volume (gal.): —

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: alconox & DI rinse

Purging: peristaltic / bladder Sampling: None

Disposal of Discharged Water: on site

INSTRUMENTS (Indicate make, model, I.d.)

Water Level: KECK Thermometer: HORIBA

pH Meter: HORIBA Field Calibration: 7-4

Conductivity Meter: HORIBA Field Calibration: 1413

Filter / Filter Size: — Other:

SAMPLING MEASUREMENTS

~~Time~~ 0848	Cum. Vol (gal. or L)	Purge Rate (gal. or L/m)	Temp. (oC)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
0852	—	.2	23.1	6.64	1790	1.26	-39	13	4.61
0858		1	23.2	6.69	1810	0.92	-41	10	4.64
0902		↓	23.1	6.68	1810	0.91	-42	10	4.63

Water Level (ft. BMP) at End of Purge: 4.63 Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected				Filtration		Remarks
Time	Volume	Composition (G, P)	No.	(Y / N)	Preservation	(quality control sample, other)
0915	250mL	P	1	N	—	GEN CHEM
↓	500mL	P	1	N	HNO_3	METALS
↓	1L	P	2	N	HNO_3	—
↓	40mL	G	3	N	—	—

Comments:

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
(512) 671-3434 Fax (512) 671-3446

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222G2-D Project Name: LUMINANT - MCSES - A1 Date: 5-15-19

Sample Number:	BMW-23	Starting Water Level (ft. BMP):	9.98
Sampling Location (well ID, etc.):	BMW-23	Casing Stickup (ft.):	—
Sampled by:	JTB	Starting Water Level (ft. BGL):	9.98
Measuring Point (MP) of Well:	TOC/PVC	Total Depth (ft. BGL):	—
Screened Interval (ft. BGL):	—	Casing Diameter (In ID):	2.0
Filter Pack Interval (ft. BGL):	—	Casing Volume (gal.):	—

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: alconox & DI rinse

Purging: peristaltic / bladder Sampling: same

Disposal of Discharged Water: on site

INSTRUMENTS (Indicate make, model, I.d.)

Water Level:	KECK	Thermometer:	HORIBA
pH Meter	HORIBA	Field Calibration:	7-4
Conductivity Meter:	HORIBA	Field Calibration:	1413
Filter / Filter Size:	—	Other:	

SAMPLING MEASUREMENTS

0753 Time	Cum. Vol (gal. or (L))	Purge Rate (gal. or (L)/m)	Temp. (oC)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
0802	—	.2	22.7	6.82	1960	0.79	-27	11	10.27
0808		↓	23.1	6.84	1940	0.52	-26	7.6	10.28
0814		↓	23.2	6.84	1940	0.53	-26	8.2	10.28

Water Level (ft. BMP) at End of Purge:

Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected				Filtration		Remarks
Time	Volume	Composition (G, P)	No.	(Y / N)	Preservation	(quality control sample, other)
0825	250mL	P	1	N	—	GEN CHEM
	500mL	P	1	N	HNO_3	METALS
↓	1L	P	2	N	HNO_3	—
↓	40mL	G	3	N	—	—

Comments:

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
(512) 671-3434 Fax (512) 671-3446

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222G2-D Project Name: LUMINANT - MCSES - AI Date: 5-15-19

Sample Number: BMW-24

Sampling Location (well ID, etc.): BMW-24

Sampled by: JTB

Measuring Point (MP) of Well: TOC/PVC

Screened Interval (ft. BGL): -

Filter Pack Interval (ft. BGL): -

Starting Water Level (ft. BMP): 9.83

Casing Stickup (ft.): -

Starting Water Level (ft. BGL): 9.83

Total Depth (ft. BGL): -

Casing Diameter (in ID): 2.0

Casing Volume (gal.): -

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: alconox & DI rinse

Purging: peristaltic / bladder Sampling: same

Disposal of Discharged Water: on site

INSTRUMENTS (Indicate make, model, I.d.)

Water Level: KECK Thermometer: HORIBA

pH Meter: HORIBA Field Calibration: 7-4

Conductivity Meter: HORIBA Field Calibration: 1413

Filter / Filter Size: - Other:

SAMPLING MEASUREMENTS

0709 Time	Cum. Vol. (gal. or L)	Purge Rate (gal. or L/m)	Temp. (oC)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
0713	-	.2	21.7	6.74	2320	0.61	-17	6.6	10.16
0718		↓	22.1	6.77	2210	0.60	-16	7.8	10.17
0723			22.2	6.78	2210	0.60	-16	7.7	10.17

Water Level (ft. BMP) at End of Purge: 10.17 Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected				Filtration		
Time	Volume	Composition (G, P)	No.	(Y / N)	Preservation	Remarks (quality control sample, other)
0735	250mL	P	1	N	-	GEN CHEM
↓	500mL	P	1	N	HNO_3	METALS
	1L	P	2	N	HNO_3	-
↓	40mL	G	3	N	-	-

Comments:

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
(512) 671-3434 Fax (512) 671-3446

LUMINANT

Groundwater Sample Collection

Page ___ of ___

GOLDER

Project/Phase	19122484-D	**Equipment Decon**	☒ Dedicated equipment	**Depth to Water**	9.50 ft. BMP
Site Location	A-1		☐ Decon between locations	**Casing Stickup**	___ ft.
Date	6-13-19	**Reference Point**	☒ Top of casing	**Depth to Water**	___ ft. BGL
MW ID	BMW-25	**Location**	☐ Other ___	**Total MW Depth**	___ ft. BGL
Sample ID	BMW-25	**Water Quality**		**MW Diameter**	2 inches
Pump	☒ Waterra ☐ Submersible	**Meter Model**	1-607604 U-52	**MW Volume**	___ gallons
	☒ Peristaltic ☐ Bladder	**Unit Number**	___	**Pump Intake Depth**	___ ft. BGL

Standard volume capacity of monitoring wells: Schedule 40 PVC (1-inch OD, 0.04 gallons/foot; 2-inch OD, 0.16 gallons/foot; 4-inch OD, 0.65 gallons/foot)

Time	Purge Rate (L/min)	Cumulative Purge Volume (L)	Depth to Water (ft)	Temp (°C) ☐ NM	pH ☐ NM	Conductivity (µS/m or mS/cm) ☐ not measured	Dissolved Oxygen (mg/L) ☐ not measured	Redox Potential (mV) ☐ not measured	Turbidity (NTU) ☐ NM
0900	0.1	1.0		21.96	6.74	3.56	10.93	330	10.6
0910		2.0		21.42	6.96	3.62	9.38	316	10.9
0915		2.5		20.21	7.00	2.48	9.27	317	14.2
0920		3.0		21.36	7.01	2.21	9.19	312	16.9
0925		3.5		21.42	7.02	2.13	9.19	309	8.4
0930		4.0		21.93	7.01	2.16	9.21	306	7.0
Purging was completed based on:	☐ stabilization of water quality parameters ☐ removal of three well volumes ☐ removal of at least one half well volume (low yield well)								

Bottles Collected				Filtration	Preserved	Notes and Observations
Time	Volume	Composition (G / P)	No.	(10µm / 45µm)	(type)	(quality control sample, other)
0930				☐ filtered ☒ unfiltered		
0				☐ filtered ☒ unfiltered		

Notes: record time at which purging is started. For low flow sampling, recommended stabilization criteria: temp ± 0.5°C; pH ± 0.1 units; conductivity ± 3%; DO ± 1 mg/L; ORP ± 10 mV; for at least three successive measurements that are made every 3-5 minutes with <1 foot of stable draw down.

Unless otherwise noted, groundwater sample collection was completed in accordance with the applicable requirements of Golder's Quality Assurance Program and Standard Operating Procedure ☐ 9 Conventional Groundwater Sample Collection ☐ 10 Low Flow Groundwater Sample Collection.

Field Team Leader Alex Bartlo (name) _____ (signature)

LUMINANT

Groundwater Sample Collection

Page ___ of ___

GOLDER

Project/Phase	19122484-D	**Equipment Decon**	☐ Dedicated equipment	**Depth to Water**	29.80 ft. BMP
Site Location	A-1		☐ Decon between locations	**Casing Stickup**	___ ft.
Date	6-13-19	**Reference Point**	~~☐ Top~~ of casing	**Depth to Water**	___ ft. BGL
MW ID	BMW-29	**Location**	☐ Other ___	**Total MW Depth**	___ ft. BGL
Sample ID	BMW-29	**Water Quality**		**MW Diameter**	2 inches
Pump	~~☐ Waterra~~ ☐ Submersible	**Meter Model**	Hydrolab U-50	**MW Volume**	___ gallons
	☐ Peristaltic ☐ Bladder	**Unit Number**		**Pump Intake Depth**	___ ft. BGL

Standard volume capacity of monitoring wells: Schedule 40 PVC (1-inch OD, 0.04 gallons/foot; 2-inch OD, 0.16 gallons/foot; 4-inch OD, 0.65 gallons/foot)

Time	Purge Rate (L/min)	Cumulative Purge Volume (L)	Depth to Water (ft)	Temp (°C) ☐ NM	pH ☐ NM	Conductivity (µS/m or mS/cm) ☐ not measured	Dissolved Oxygen (mg/L) ☐ not measured	Redox Potential (mV) ☐ not measured	Turbidity (NTU) ☐ NM
1000	0.1	1.0		22.94	6.36	1.98	10.36	246	131.2
1010		2.0		23.36	6.41	2.02	10.41	256	84.0
1015		2.5		24.04	7.30	2.01	10.74	274	62.8
1020		3.0		24.13	7.10	2.00	9.96	281	71.9
1025		3.5		24.24	7.11	2.00	9.34	295	62.1
1030		4.0		24.19	7.19	2.00	9.24	299	92.4
Purging was completed based on:	☐ stabilization of water quality parameters ☐ removal of three well volumes ☐ removal of at least one half well volume (low yield well)								

Bottles Collected				Filtration (10µm / 45µm)	Preserved (type)	Notes and Observations (quality control sample, other)
Time	Volume	Composition (G / P)	No.			
1030				☐ filtered ☐ unfiltered		
				☐ filtered ☐ unfiltered		

Notes: record time at which purging is started. For low flow sampling, recommended stabilization criteria: temp ± 0.5°C; pH ± 0.1 units; conductivity ± 3%; DO ± 1 mg/L; ORP ± 10 mV; for at least three successive measurements that are made every 3-5 minutes with <1 foot of stable draw down.

Unless otherwise noted, groundwater sample collection was completed in accordance with the applicable requirements of Golder's Quality Assurance Program and Standard Operating Procedure ☐ 9 Conventional Groundwater Sample Collection ☐ 10 Low Flow Groundwater Sample Collection.

Field Team Leader Alex Bozzelo (name) Alex Bozzelo (signature)

LUMINANT

Groundwater Sample Collection

Page ___ of ___

GOLDER

Project/Phase	19122434-D	**Equipment Decon**	☐ Dedicated equipment	**Depth to Water**	31.54	ft. BMP
Site Location	A-1		☐ Decon between locations	**Casing Stickup**		ft.
Date	6-13-19	**Reference Point**	~~☑ Top~~ of casing	**Depth to Water**		ft. BGL
MW ID	BMW-30	**Location**	☐ Other ___	**Total MW Depth**		ft. BGL
Sample ID	BMW-30	**Water Quality**	Bladder Pump	**MW Diameter**	2	inches
Pump	~~☑ Waterra~~ ☐ Submersible	**Meter Model**	1 ORIBA U52	**MW Volume**		gallons
	☐ Peristaltic ~~☑ Bladder~~	**Unit Number**		**Pump Intake Depth**		ft. BGL

Standard volume capacity of monitoring wells: Schedule 40 PVC (1-inch OD, 0.04 gallons/foot; 2-inch OD, 0.16 gallons/foot; 4-inch OD, 0.65 gallons/foot)

Time	Purge Rate (L/min)	Cumulative Purge Volume (L)	Depth to Water (ft)	Temp (°C) ☐ NM	pH ☐ NM	Conductivity (µS/m or mS/cm) ☐ not measured	Dissolved Oxygen (mg/L) ☐ not measured	Redox Potential (mV) ☐ not measured	Turbidity (NTU) ☐ NM
1220	0.1	1.0		24.26	6.94	1.01	9.36	146	101
1230		2.0		24.52	6.92	0.92	8.41	202	97
1235		2.5		24.76	7.08	1.30	6.24	219	88
1240		3.0		24.69	7.09	1.21	7.69	256	100
1245		3.5		24.52	7.09	1.13	7.38	292	90
1250		4.0		24.61	7.09	1.15	7.94	303	82
Purging was completed based on:	~~☑ stabilization of water quality parameters~~ ☐ removal of three well volumes ☐ removal of at least one half well volume (low yield well)								

Bottles Collected				Filtration	Preserved	Notes and Observations
Time	Volume	Composition (G / P)	No.	(10µm / 45µm)	(type)	(quality control sample, other)
1250				☐ filtered ~~☑ unfiltered~~		
				☐ filtered ~~☑ unfiltered~~		

Notes: record time at which purging is started. For low flow sampling, recommended stabilization criteria: temp ± 0.5°C; pH ± 0.1 units; conductivity ± 3%; DO ± 1 mg/L; ORP ± 10 mV; for at least three successive measurements that are made every 3-5 minutes with <1 foot of stable draw down.

Unless otherwise noted, groundwater sample collection was completed in accordance with the applicable requirements of Golder's Quality Assurance Program and Standard Operating Procedure ☐ 9 Conventional Groundwater Sample Collection ☐ 10 Low Flow Groundwater Sample Collection.

Field Team Leader Alex Bartlo (name) Alex Bartlo (signature)

LUMINANT

Groundwater Sample Collection

Page ___ of ___

GOLDER

Project/Phase	19122484-D	**Equipment Decon**	☑ Dedicated equipment	**Depth to Water**	9.26 ft. BMP
Site Location	A-1		☐ Decon between locations	**Casing Stickup**	___ ft.
Date	6-13-19	**Reference Point**	☑ Top of casing	**Depth to Water**	___ ft. BGL
MW ID	BMW-31	**Location**	☐ Other ___	**Total MW Depth**	___ ft. BGL
Sample ID	BMW-31	**Water Quality**		**MW Diameter**	___ inches
Pump	☑ Waterra ☐ Submersible	**Meter Model**	H9828	**MW Volume**	___ gallons
	☑ Peristaltic ☐ Bladder	**Unit Number**		**Pump Intake Depth**	___ ft. BGL

Standard volume capacity of monitoring wells: Schedule 40 PVC (1-inch OD, 0.04 gallons/foot; 2-inch OD, 0.16 gallons/foot; 4-inch OD, 0.65 gallons/foot)

Time	Purge Rate (L/min)	Cumulative Purge Volume (L)	Depth to Water (ft)	Temp (°C) ☐ NM	pH ☐ NM	Conductivity (µS/m or mS/cm) ☐ not measured	Dissolved Oxygen (mg/L) ☐ not measured	Redox Potential (mV) ☐ not measured	Turbidity (NTU) ☐ NM
1400	0.1	1.0		24.90	6.90	2.16	8.36	209	126
1410		2.0		23.26	7.01	2.01	6.31	213	131
1415		2.5		24.01	7.04	2.06	9.24	224	145
1420		3.0		24.21	7.06	1.97	9.30	239	111
1425		3.5		24.11	7.01	1.92	9.21	250	130
1430		4.0		24.52	7.01	1.80	9.14	254	124
Purging was completed based on:	☒ stabilization of water quality parameters ☐ removal of three well volumes ☐ removal of at least one half well volume (low yield well)								

Bottles Collected				Filtration	Preserved	Notes and Observations
Time	Volume	Composition (G / P)	No.	(10µm / 45µm)	(type)	(quality control sample, other)
1430				☐ filtered ☒ unfiltered		
1C				☐ filtered ☒ unfiltered		

Notes: record time at which purging is started. For low flow sampling, recommended stabilization criteria: temp ± 0.5°C; pH ± 0.1 units; conductivity ± 3%; DO ± 1 mg/L; ORP ± 10 mV; for at least three successive measurements that are made every 3-5 minutes with <1 foot of stable draw down.

Unless otherwise noted, groundwater sample collection was completed in accordance with the applicable requirements of Golder's Quality Assurance Program and Standard Operating Procedure ☐ 9 Conventional Groundwater Sample Collection ☐ 10 Low Flow Groundwater Sample Collection.

Field Team Leader Alex Bartlo (name) Alex Bartlo (signature)

LUMINANT

Groundwater Sample Collection

Page ___ of ___

GOLDER

Project/Phase	19122434-D	**Equipment Decon**	☒ Dedicated equipment ☐ Decon between locations	**Depth to Water**	12.53 ft. BMP
Site Location	A-1			**Casing Stickup**	3.00 ft.
Date	6-13-19	**Reference Point**	☒ Top of casing	**Depth to Water**	9.53 ft. BGL
MW ID	BMW-32	**Location**	☐ Other ___	**Total MW Depth**	40.00 ft. BGL
Sample ID	BMW-32	**Water Quality**	Horiba U 50	**MW Diameter**	2 inches
Pump	☒ Waterra ☐ Submersible	**Meter Model**		**MW Volume**	14 gallons
	☒ Peristaltic ☐ Bladder	**Unit Number**		**Pump Intake Depth**	30.00 ft. BGL

Standard volume capacity of monitoring wells: Schedule 40 PVC (1-inch OD, 0.04 gallons/foot; 2-inch OD, 0.16 gallons/foot; 4-inch OD, 0.65 gallons/foot)

Time	Purge Rate (L/min)	Cumulative Purge Volume (L)	Depth to Water (ft)	Temp (°C) ☐ NM	pH ☐ NM	Conductivity (µS/m or mS/cm) ☐ not measured	Dissolved Oxygen (mg/L) ☐ not measured	Redox Potential (mV) ☐ not measured	Turbidity (NTU) ☐ NM
0700	0.1	1.0		20.58	6.59	2.32	9.98	167	15.8
0710		2.0		21.45	6.48	2.27	9.35	142	13.5
0715		2.5		20.09	6.52	2.26	9.03	134	13.4
0720		3.0		20.12	6.54	2.26	9.03	124	13.0
0725		3.5		20.01	6.56	2.26	9.01	116	14.2
0730		4.0		20.46	6.56	2.29	9.00	114	12.1

Purging was completed based on: ☒ stabilization of water quality parameters ☐ removal of three well volumes ☐ removal of at least one half well volume (low yield well)

Bottles Collected				Filtration	Preserved	Notes and Observations
Time	Volume	Composition (G / P)	No.	(10µm / 45µm)	(type)	(quality control sample, other)
0730				☐ filtered ☐ unfiltered		
0730				☐ filtered ☐ unfiltered		

Notes: record time at which purging is started. For low flow sampling, recommended stabilization criteria: temp ± 0.5°C; pH ± 0.1 units; conductivity ± 3%; DO ± 1 mg/L; ORP ± 10 mV; for at least three successive measurements that are made every 3-5 minutes with <1 foot of stable draw down.

Unless otherwise noted, groundwater sample collection was completed in accordance with the applicable requirements of Golder's Quality Assurance Program and Standard Operating Procedure ☐ 9 Conventional Groundwater Sample Collection ☐ 10 Low Flow Groundwater Sample Collection.

Field Team Leader Alex Barzdo (name) Alex Barzdo (signature)

LUMINANT

Groundwater Sample Collection

Page ___ of ___

GOLDER

Project/Phase	19122484-D	**Equipment Decon**	☐ Dedicated equipment	**Depth to Water**	26.01 ft. BMP
Site Location	A-1		☐ Decon between locations	**Casing Stickup**	2.85 ft.
Date	6-13-19	**Reference Point**	~~☑ Top~~ of casing	**Depth to Water**	ft. BGL
MW ID	BMW-33	**Location**	☐ Other	**Total MW Depth**	48.00 ft. BGL
Sample ID	BMW-33	**Water Quality**		**MW Diameter**	2 inches
Pump	~~☑ Waterra~~ ☐ Submersible	**Meter Model**	H6216A U50	**MW Volume**	gallons
	☑ Peristaltic ☐ Bladder	**Unit Number**		**Pump Intake Depth**	ft. BGL

Standard volume capacity of monitoring wells: Schedule 40 PVC (1-inch OD, 0.04 gallons/foot; 2-inch OD, 0.16 gallons/foot; 4-inch OD, 0.65 gallons/foot)

Time	Purge Rate (L/min)	Cumulative Purge Volume (L)	Depth to Water (ft)	Temp (°C) ☐ NM	pH ☐ NM	Conductivity (µS/m or mS/cm) ☐ not measured	Dissolved Oxygen (mg/L) ☐ not measured	Redox Potential (mV) ☐ not measured	Turbidity (NTU) ☐ NM
0745	0.1	1.0		23.79	7.07	1.48	0.42	240	7.1
0755		2.0		23.32	6.91	1.49	0.52	228	1.6
0800		2.5		23.63	6.82	1.47	0.51	227	2.7
0805		3.0		23.41	6.80	1.36	0.36	226	2.1
0810		3.5		23.64	6.80	1.40	0.21	226	1.9
0815		4.0		23.31	6.75	1.42	0.17	221	1.7
Purging was completed based on:	☐ stabilization of water quality parameters ☐ removal of three well volumes ☐ removal of at least one half well volume (low yield well)								

Bottles Collected				Filtration	Preserved	Notes and Observations
Time	Volume	Composition (G / P)	No.	(10µm / 45µm)	(type)	(quality control sample, other)
0815				☐ filtered ~~☑ unfiltered~~		
0815				☐ filtered ☑ unfiltered		

Notes: record time at which purging is started. For low flow sampling, recommended stabilization criteria: temp ± 0.5°C; pH ± 0.1 units; conductivity ± 3%; DO ± 1 mg/L; ORP ± 10 mV; for at least three successive measurements that are made every 3-5 minutes with <1 foot of stable draw down.

Unless otherwise noted, groundwater sample collection was completed in accordance with the applicable requirements of Golder's Quality Assurance Program and Standard Operating Procedure ☐ 9 Conventional Groundwater Sample Collection ☐ 10 Low Flow Groundwater Sample Collection.

Field Team Leader Alex Barzdo (name) Alex Barzdo (signature)

LOWMAN

Groundwater Sample Collection

Page ___ of ___

GOLDER

Project/Phase	19122484-D	**Equipment Decon**	☒ Dedicated equipment	**Depth to Water**	9.49 ft. BMP
Site Location	A-1		☐ Decon between locations	**Casing Stickup**	___ ft.
Date	6-13-19	**Reference Point**	☒ Top of casing	**Depth to Water**	___ ft. BGL
MW ID	MW PDP 2019-1	**Location**	☐ Other ___	**Total MW Depth**	___ ft. BGL
Sample ID	MW-PDP-2019-1	**Water Quality**		**MW Diameter**	___ inches
Pump	☒ Waterra ☐ Submersible	**Meter Model**	Horiba U-52	**MW Volume**	___ gallons
	☒ Peristaltic ☐ Bladder	**Unit Number**	___	**Pump Intake Depth**	___ ft. BGL

Standard volume capacity of monitoring wells: Schedule 40 PVC (1-inch OD, 0.04 gallons/foot; 2-inch OD, 0.16 gallons/foot; 4-inch OD, 0.65 gallons/foot)

Time	Purge Rate (L/min)	Cumulative Purge Volume (L)	Depth to Water (ft)	Temp (°C) ☐ NM	pH ☐ NM	Conductivity (µS/m or mS/cm) ☐ not measured	Dissolved Oxygen (mg/L) ☐ not measured	Redox Potential (mV) ☐ not measured	Turbidity (NTU) ☐ NM
1530	0.1	1.0		22.14	6.84	2.01	12.42	92	214
1540		2.0		22.04	7.36	1.36	12.36	109	105
1545		2.5		22.12	7.41	1.42	11.92	142	90
1550		3.0		22.16	7.02	1.01	10.34	139	69
1600		3.5		22.36	7.09	102	10.19	174	13
1605		4.0		22.41	7.10	1.00	10.61	202	15
Purging was completed based on:	☐ stabilization of water quality parameters ☐ removal of three well volumes ☐ removal of at least one half well volume (low yield well)								

Bottles Collected				Filtration (10µm / 45µm)	Preserved (type)	Notes and Observations (quality control sample, other)
Time	Volume	Composition (G / P)	No.			
1605				☐ filtered ☒ unfiltered		
				☐ filtered ☒ unfiltered		

Notes: record time at which purging is started. For low flow sampling, recommended stabilization criteria: temp ± 0.5°C; pH ± 0.1 units; conductivity ± 3%; DO ± 1 mg/L; ORP ± 10 mV; for at least three successive measurements that are made every 3-5 minutes with <1 foot of stable draw down.

Unless otherwise noted, groundwater sample collection was completed in accordance with the applicable requirements of Golder's Quality Assurance Program and Standard Operating Procedure ☐ 9 Conventional Groundwater Sample Collection ☐ 10 Low Flow Groundwater Sample Collection.

Field Team Leader Alex Bartlo (name) _____ (signature)

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 19122262-D Project Name: LUMINANT - HARDA LANDFILL Date: 7-9-19

Sampling Location (well ID, etc.): AIV-1B-OB-95

Sample Number: AIV-1B-OB-95

Sampled by: JTB

Measuring Point (MP) of Well: (TOC) - Steel or (PVC)

Screened Interval (ft. BGL): —

Filter Pack Interval (ft. BGL): —

Starting Water Level (ft. BMP): 23.12

Casing Stickup (ft.): _____

WL (ft. BMP): _____ (ft. BGL): _____

TD (ft. BMP): _____ (ft. BGL): _____

Ft. water: _____ Casing Dia. (In ID): _____

1X Casing Vol (gal.): _____ 3X (gal): _____

QUALITY ASSURANCE

Gallons/Foot: 2": 0.16 4": 0.65 5.25": 1.12 6": 1.47 6.25": 1.59

METHODS (describe): Low Flow - Dedicated Tubing/Equipment

Cleaning Equipment: DI/Alconox Rinse

Purge: (Peristaltic Pump) / SS Pump / Bailer Sampling: (Peristaltic Pump) / SS Pump / Bailer

Disposal of Discharged Water:

INSTRUMENTS (Indicate make, model, I.d.)

Water Level: SOLINST Other:

Multi Meter: HORIBA

Field Calibration: AUTO CAL

Filter / Filter Size:

SAMPLING MEASUREMENTS

Begin Purge: 1109

Time	DTW (ft BTOC)	Cum. Vol. (gal. or (L))	Purge Rate (gal. or (L/m))	Temp. (oC)	DO (mg/L)	Spec. Cond. (µs/cm)	pH	ORP (mV)	Turbidity (NTU)	Color & Sediment
1118	23.31	—	.1	20.6	0.62	1920	6.71	-23	5.7	neutral
1124	23.34		.1	20.7	0.51	1930	6.68	-26	6.7	"
1129	23.35		"	20.7	0.52	1930	6.67	-26	6.2	"

WL (ft. BMP) at End of Purge: Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected Time		Volume	Composition (G, P)	No.	Filtration (Y / N)	Preservation (type)	Remarks (quality control sample, other)
1135		500mL	P	1	N		
1135		250mL	P	1	N		

Comments:

GOLDER
2201 Double Creek Dr., Suite 4004
Round Rock, Texas 78664
Phone: (512) 671-3434 Fax: (512) 671-3446

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 19122262-D Project Name: LUMINANT - AI AREA LANDFILL Date: 7-9-19

Sampling Location (well ID, etc.): BMW-25

Sample Number: BMW-25

Sampled by: JTB

Measuring Point (MP) of Well: (TOC) - Steel or (PVC)

Screened Interval (ft. BGL): —

Filter Pack Interval (ft. BGL): —

Starting Water Level (ft. BMP): 9.34

Casing Stickup (ft.): _____

WL (ft. BMP): _____ (ft. BGL): _____

TD (ft. BMP): _____ (ft. BGL): _____

Ft. water: _____ Casing Dia. (In ID): _____

1X Casing Vol (gal.): _____ 3X (gal): _____

QUALITY ASSURANCE

Gallons/Foot: 2": 0.16 4": 0.65 5.25": 1.12 6": 1.47 6.25": 1.59

METHODS (describe): Low Flow - Dedicated Tubing/Equipment

Cleaning Equipment: DI/Alconox Rinse

Purge: (Peristaltic Pump) / SS Pump / Bailer Sampling: (Peristaltic Pump) / SS Pump / Bailer

Disposal of Discharged Water:

INSTRUMENTS (Indicate make, model, I.d.)

Water Level: SOLINST Other:

Multi Meter: HORIBA

Field Calibration: AUTO CAL

Filter / Filter Size:

SAMPLING MEASUREMENTS

Begin Purge:

1229 Time	DTW (ft BTOC)	Cum. Vol. (gal. or (L))	Purge Rate (gal. or (L/m))	Temp. (oC)	DO (mg/L)	Spec. Cond. (µs/cm)	pH	ORP (mV)	Turbidity (NTU)	Color & Sediment
1238	9.62	—	1	21.7	1.42	2030	6.82	27	7.4	mental
1244	9.64			21.5	1.17	2020	6.83	32	6.4	
1251	9.64			21.5	1.18	2030	6.82	29	7.1	

WL (ft. BMP) at End of Purge: Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected					Filtration (Y / N)	Preservation (type)	Remarks (quality control sample, other)
Time		Volume	Composition (G, P)	No.			
1255		500mL	P	1	N		
1295		250mL	P	1	N		

Comments:

GOLDER
2201 Double Creek Dr., Suite 4004
Round Rock, Texas 78664
Phone: (512) 671-3434 Fax: (512) 671-3446

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 19122262-D Project Name: LUMINANT- AI AREA LANDFILL Date: 7-9-19

Sampling Location (well ID, etc.): BMW-29 Starting Water Level (ft. BMP): 29.62

Sample Number: BMW-29 Casing Stickup (ft.): _____

Sampled by: JTB WL (ft. BMP): _____ (ft. BGL): _____

Measuring Point (MP) of Well: (TOC) - Steel or (PVC) TD (ft. BMP): _____ (ft. BGL): _____

Screened Interval (ft. BGL): — Ft. water: _____ Casing Dia. (In ID): _____

Filter Pack Interval (ft. BGL): — 1X Casing Vol (gal.): _____ 3X (gal): _____

QUALITY ASSURANCE

Gallons/Foot: 2": 0.16 4": 0.65 5.25": 1.12 6": 1.47 6.25": 1.59

METHODS (describe): Low Flow - Dedicated Tubing/Equipment

Cleaning Equipment: DI/Alconox Rinse

Purge: Peristaltic Pump / SS Pump / Bailer Bladder pump Sampling: Peristaltic Pump / SS Pump / Bailer bladder pump

Disposal of Discharged Water:

INSTRUMENTS (Indicate make, model, I.d.)

Water Level: SOLINST Other:

Multi Meter: HORIBA

Field Calibration: AUTOCAL

Filter / Filter Size:

SAMPLING MEASUREMENTS

Begin Purge:

0919 Time	DTW (ft BTOC)	Cum. Vol. (gal. or (L))	Purge Rate (gal. or (L /m))	Temp. (oC)	DO (mg/L)	Spec. Cond. (µs/cm)	pH	ORP (mV)	Turbidity (NTU)	Color & Sediment
0928	29.91	—	.1	22.6	2.16	1930	6.86	-17	16	mentual
0936	29.93		↓	22.7	1.76	1960	6.84	-13	7.3	
0940	29.92		↓	22.7	1.77	1960	6.83	-13	7.4	

WL (ft. BMP) at End of Purge: Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected					Filtration	Preservation	Remarks
Time		Volume	Composition (G, P)	No.	(Y / N)	(type)	(quality control sample, other)
0945		500mL	P	1	N		
0945		250mL	P	1	N		

Comments:

GOLDER
2201 Double Creek Dr., Suite 4004
Round Rock, Texas 78664
Phone: (512) 671-3434 Fax: (512) 671-3446

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222 62-D Project Name: LUMINANT - A1AREA LANDFILL Date: 7-9-19

Sampling Location (well ID, etc.): BMW-32

Sample Number: BMW-32

Sampled by: JTB

Measuring Point (MP) of Well: (TOC) - Steel or (PVC)

Screened Interval (ft. BGL): —

Filter Pack Interval (ft. BGL): —

Starting Water Level (ft. BMP): 12.39

Casing Stickup (ft.):

WL (ft. BMP): _____ (ft. BGL): _____

TD (ft. BMP): _____ (ft. BGL): _____

Ft. water: _____ Casing Dia. (In ID): _____

1X Casing Vol (gal.): _____ 3X (gal): _____

QUALITY ASSURANCE

Gallons/Foot: 2": 0.16 4": 0.65 5.25": 1.12 6": 1.47 6.25": 1.59

METHODS (describe): Low Flow - Dedicated Tubing/Equipment

Cleaning Equipment: DI/Alconox Rinse

Purge: (Peristaltic Pump) / SS Pump / Bailer Sampling: (Peristaltic Pump) / SS Pump / Bailer

Disposal of Discharged Water:

INSTRUMENTS (Indicate make, model, I.d.)

Water Level: SOLINST Other:

Multi Meter: HORIBA

Field Calibration: AUTO CAL

Filter / Filter Size:

SAMPLING MEASUREMENTS

Begin Purge: 1346

Time	DTW (ft BTOC)	Cum. Vol. (gal. or (L))	Purge Rate (gal. or (L/m))	Temp. (oC)	DO (mg/L)	Spec. Cond. (µs/cm)	pH	ORP (mV)	Turbidity (NTU)	Color & Sediment
1356	12.61	—	.1	21.3	1.62	2160	6.67	-7	6.7	neutral
1402	12.62		↓	21.4	1.32	2130	6.61	-11	7.2	↓
1413	12.62		↓	21.3	1.31	2130	6.62	-12	5.9	↓

WL (ft. BMP) at End of Purge:

Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected					Filtration	Preservation	Remarks
Time		Volume	Composition (G, P)	No.	(Y / N)	(type)	(quality control sample, other)
1420		500mL	P	1	N		
1420		250mL	P	1	N		

Comments:

GOLDER
2201 Double Creek Dr., Suite 4004
Round Rock, Texas 78664
Phone: (512) 671-3434 Fax: (512) 671-3446

LUMINANT

LUMINANT

GOLDER

golder.com