



REPORT

CCR ASSESSMENT OF CORRECTIVE MEASURES

*Big Brown Steam Electric Station - Ash Disposal Area II
Freestone County, Texas*

Submitted to:

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Submitted by:

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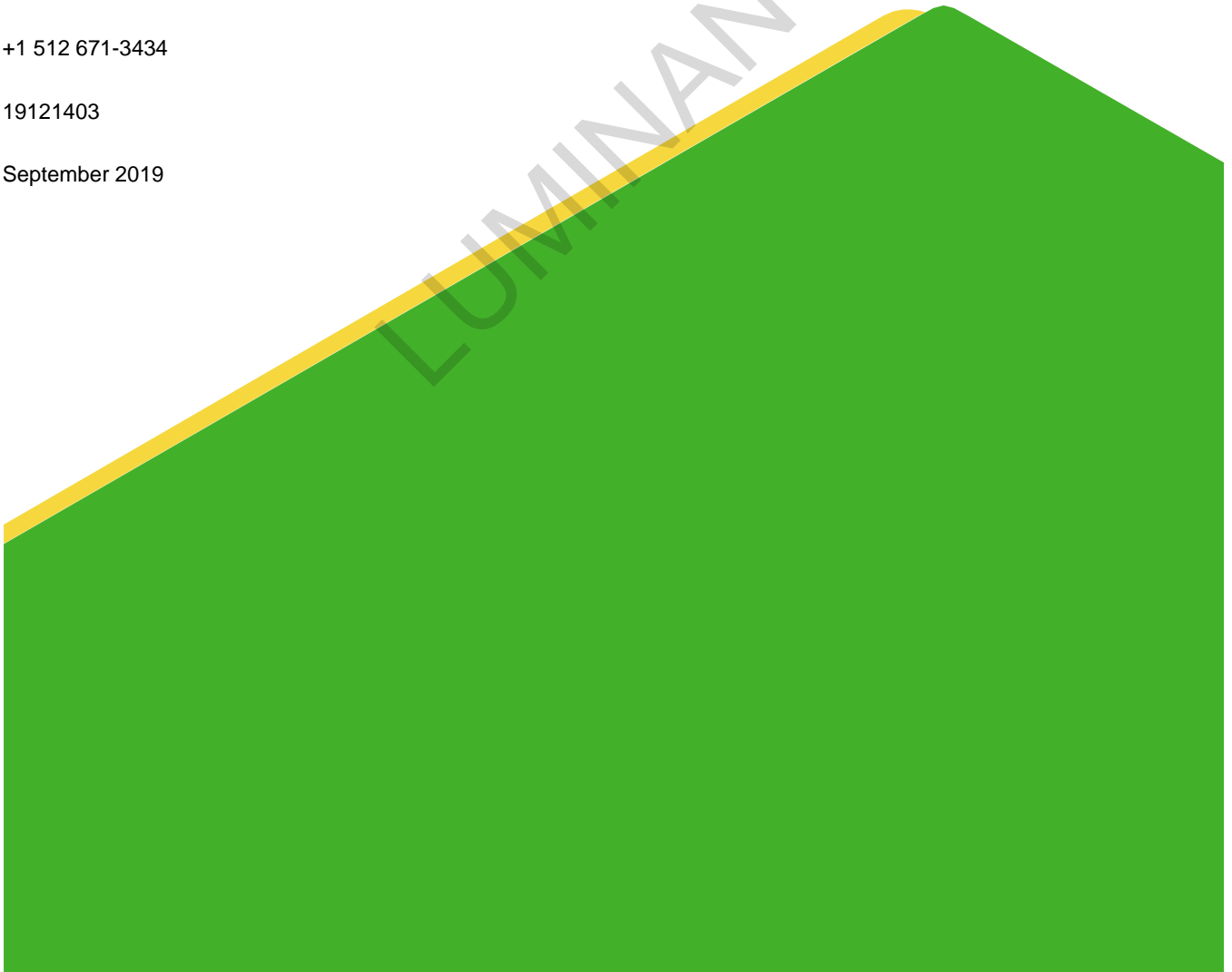


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1.0 INTRODUCTION

Golder Associates Inc. (Golder) has prepared this assessment of corrective measures (ACM) report for Ash Disposal Area II (ADA II) located at the Big Brown Steam Electric Station (BBSES) in Freestone 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 BBSES operating records in accordance with §257.105(h)(10).

This report also incorporates the results of a site investigation conducted at ADA II 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 alternative 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 BBSES suspended operations in early 2018; however, periodic waste disposal events continue. ADA II is located approximately 4,000 feet northeast of the BBSES power plant (Figure 1). ADA II is constructed partially above and partially below grade and is surrounded by engineered earthen dikes that extend approximately 10 to 15 feet above surrounding grade. ADA II is constructed with a 3-foot thick compacted clay liner. The majority of the surface areas of Cells 1 through 8 have been covered with either a permanent clay cap or a temporary soil cap. Small portions of Cells 1, 2, 3 and 8 and all of Cells 9 and 10 have not been covered. Cell 11 was used to manage contact water from the ADA II area; however, CCR was never placed in Cell 11.

2.0 REGIONAL AND SITE SETTING

2.1 Regional Geology

The Site is located in the outcrop area of the Eocene-aged Wilcox Group (Barnes 1970), which is divided into three formations in the region: the Calvert Bluff, Simsboro, and Hooper Formations (in order from youngest to oldest). The ADA II is completed in the Calvert Bluff Formation, which consists mostly of unconsolidated to moderately consolidated clay and silt, with various amounts of interbedded sand and lignite. The depositional environment of the Calvert Bluff Formation is associated with fluvial-deltaic processes such as inter-channel crevasse splays, overbank deposits, and localized channel fills. Lignite deposits of the Calvert Bluff Formation were formerly mined at the adjacent Big Brown Mine, which supplied lignite fuel to the former BBSES. The Simsboro Formation, which underlies the Calvert Bluff Formation, consists mostly of sand (locally indurated) with some clay, mudstone, and mudstone conglomerates. The Hooper Formation, which underlies the Simsboro Formation, consists mostly of mudstone with various amounts of sandstone and minor amounts of lignite.

2.2 Regional Hydrogeology

The most transmissive units in the Calvert Bluff Formation in the vicinity of BBSES are channel sands above the mineable lignite seams. Groundwater wells completed in the channel sands of the Calvert Bluff Formation are typically used for domestic and stock watering purposes. Groundwater within the upper 100 feet below ground surface (bgs) in the area typically flows under unconfined to semi-confined conditions. The direction and rate of groundwater movement in the Calvert Bluff Formation are affected by a number of physical features in the area, 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.

2.3 Site Hydrogeology and ADA II Monitoring Well Network

The CCR groundwater monitoring well network at the ADA II was established in 2015 using both historical wells (FMW-4R, AMW-10, AMW-13, and AMW-14) and newly installed wells (AMW-20, AMW-21, AMW-22, and AMW-23), which are located along the perimeter of the CCR unit in the uppermost groundwater-bearing unit (GWBU) of the Calvert Bluff Formation at the Site (Figure 2). Monitoring wells AMW-15, AMW-24, and AMW-25 were added to the CCR groundwater monitoring network in 2019 as part of the nature and extent evaluation. Boring logs for the CCR monitoring wells and nature and extent wells are provided in Appendix A. Based on soil borings completed in the upper approximate 80 feet bgs at the ADA II, the geology near the unit generally consists of laterally continuous unconsolidated to moderately consolidated silty to clayey sand units interbedded with clay units. The uppermost GWBU occurs under unconfined conditions within the shallow sand units at the Site. Geologic cross sections of the ADA II area are presented on Figures 3, 4, and 5.

Groundwater elevations are highest near the southwest corner of the ADA II, with an inferred groundwater flow direction to the east-northeast. A groundwater potentiometric surface map of the Site is presented on Figure 6. Based on the inferred groundwater flow direction, the location of each CCR monitoring well and nature and extent well relative to the ADA II is as follows:

Upgradient Wells	Downgradient Wells
FMW-4R	AMW-10 AMW-13 AMW-14 AMW-15 AMW-20 AMW-21 AMW-22 AMW-23 AMW-24 AMW-25

Rising- and falling-head aquifer tests (i.e., slug tests) were conducted in 2015 at monitoring wells FMW4-R, AMW-21, and AMW-22 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 $8.5E-4$ cm/sec and average lateral groundwater flow velocity of 23 feet per year.

Golder performed a survey of water supply wells located in the vicinity of the ADA II 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 3, 2019. No imminent threats to water wells or potentially affected drinking water wells were identified.

3.0 NATURE AND EXTENT EVALUATION

3.1 Groundwater Monitoring Summary

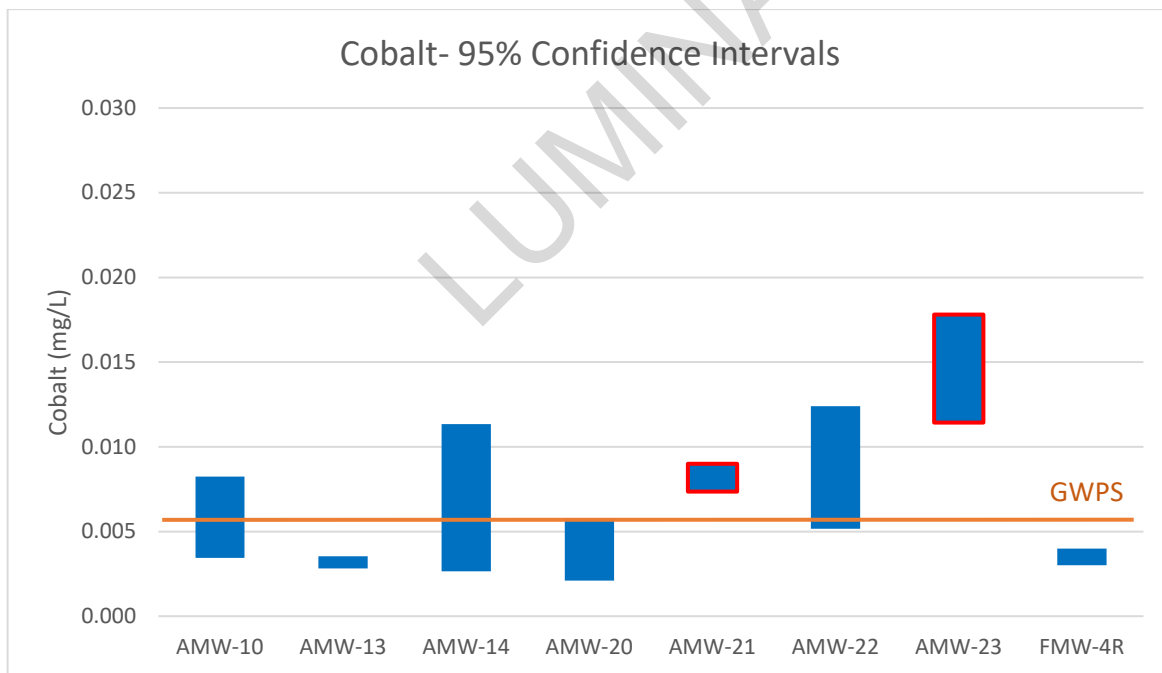
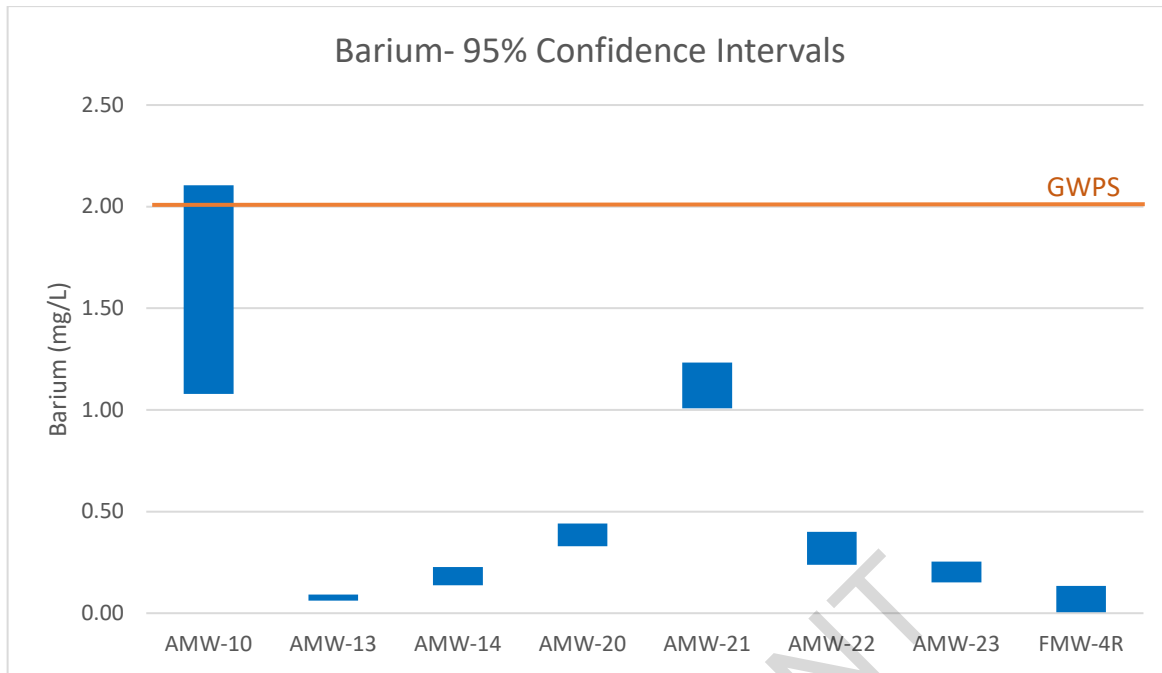
Background monitoring of groundwater in the vicinity of ADA II began in October 2015 and was completed in December 2016. Samples collected during this period were analyzed for Appendix III and Appendix IV constituents to establish background concentrations pursuant to §257.94(b).

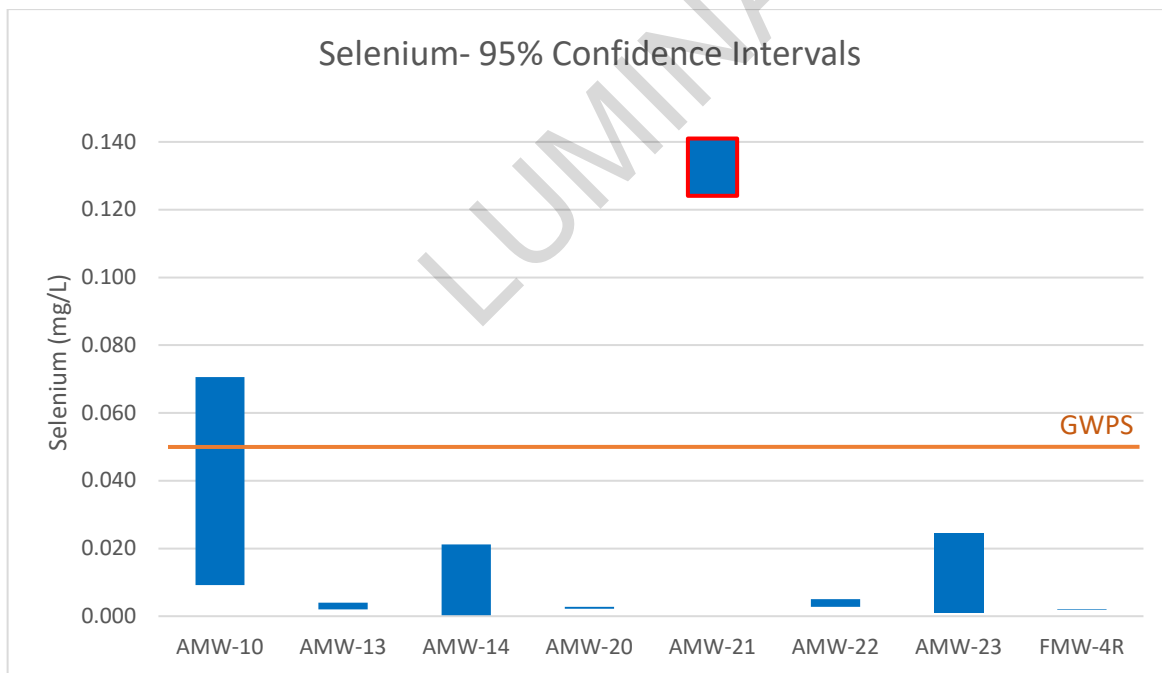
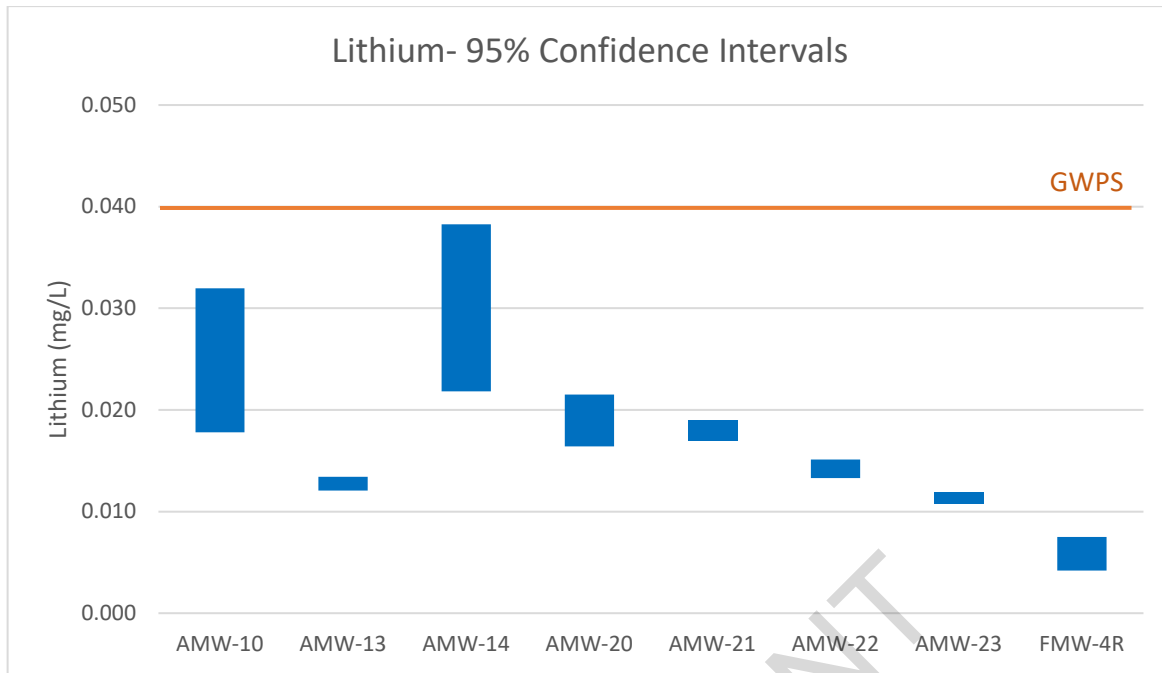
A detection monitoring program in accordance §257.94 was initiated in September 2017. The evaluation of those data was completed in 2018 using procedures described in the Statistical Analysis Plan (PBW 2017b) to identify statistically significant increases (SSIs) of Appendix III parameters above background 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).

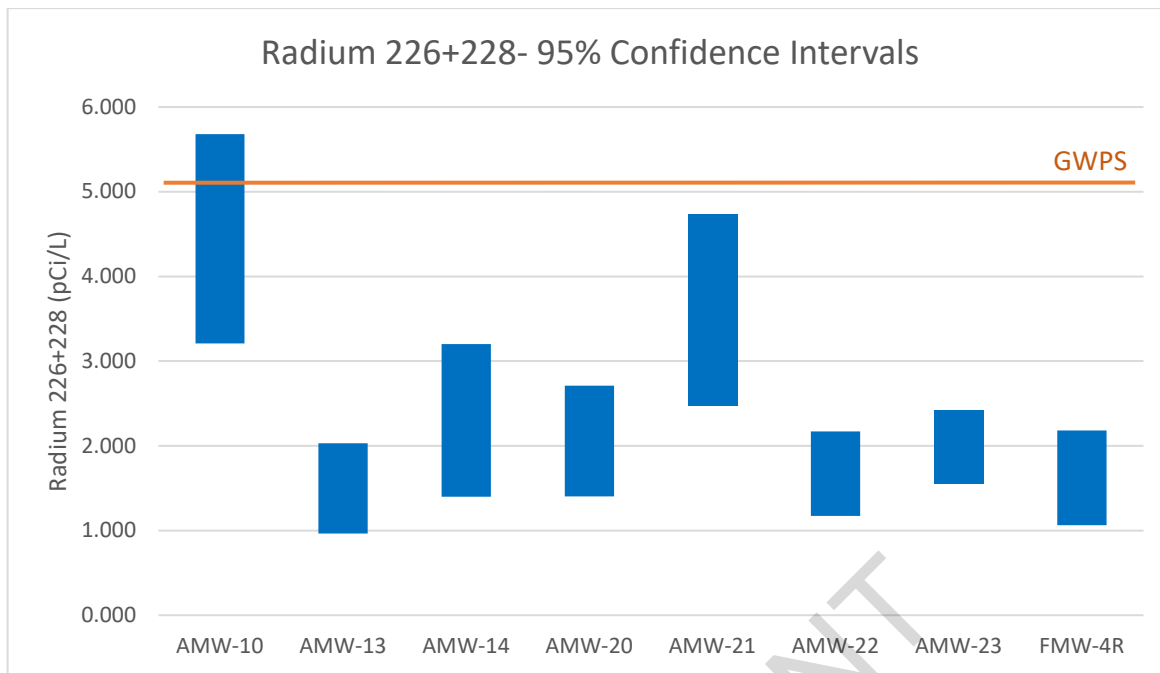
The initial assessment monitoring event was performed in June 2018 and a subsequent semi-annual assessment monitoring event was conducted in September 2018 in accordance with §257.95(a) and §257.95(d). Using the Appendix IV data collected during the assessment monitoring period through September 2018, SSLs above GWPSs were identified in downgradient wells in January 2019 for barium (AMW-10), cobalt (AMW-10, AMW-21 and AMW-23), lithium (AMW-14), radium (AMW-10), and selenium (AMW-10); therefore, an ACM was initiated on April 8, 2019 pursuant to §257.95(g). A justification letter for 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 performed to include 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 has historically had greater than one occurrence measured higher than the GWPS in any well within the monitoring network. Plots of the confidence intervals for each Appendix IV parameter that historically had greater than one occurrence at concentrations higher than the GWPS are presented below (SSLs are highlighted by red outline):







The previous statistical analysis using data collected during the assessment monitoring period through September 2018 indicated concentrations of barium, cobalt, lithium, selenium, and combined radium 226+228 in several wells at SSLs above their respective GWPSs as identified in the February 2019 SSL notification; however, the updated statistical analysis identified only cobalt and selenium as having SSLs in two wells (AMW-21 and AMW-23). Notwithstanding this, all of these parameters will continue to be monitored 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:

- barium (AMW-10),
- cobalt (AMW-10, AMW-21 and AMW-23),
- lithium (AMW-14),
- radium (AMW-10), and
- selenium (AMW-10 and AMW-21)

Figure 7 shows the extent of SSLs above GWPSs based on the initial and updated statistical analyses.

3.3 Field Investigation

3.3.1 General

Field investigation activities conducted as part of the ACM included collection of soil samples for a 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 June 2019 at proposed nature and extent monitoring well locations AMW-24 and AMW-25, and from a location near well AMW-23 (ADA-2019-1). 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.
- **Radionuclides:** Radium isotopes radium-226 and radium-228 were analyzed in soils to determine their concentration and provenance.
- **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 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

Two new nature and extent monitoring wells were completed at AMW-24 and AMW-25 to total depths of 35 feet bgs and 65 feet bgs, respectively. 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

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.

developed by surging the wells several times and purging the wells using an electric submersible pump to remove fine-sized particles and to establish a hydraulic connection between the well and the formation.

An existing monitoring well not previously part of the CCR monitoring program (AMW-15) was used as a third nature and extent well. AMW-15 was installed in 2012 in anticipation of a future landfill expansion, which did not occur.

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. Laboratory analytical reports are provided in Appendix B and groundwater sampling records, which include field-measured parameters, are provided in Appendix C.

Chemical/geochemical analysis of groundwater samples included field parameters and radionuclides, 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 and 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.
- **Radionuclides:** Analysis of radium-226 and radium-228 to better understand the nature and extent of radium in groundwater and lake water and evaluation of background contributions from natural 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.

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 (i.e. cobalt and selenium) 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 FMW-4R, monitoring wells AMW-10, 13, 14, 20, 21, 22, and 23, and nature and extent monitoring wells AMW-15, AMW-24, and AMW-25 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 6.8 in May 2019. Historically, the pH in the CCR monitoring well network has ranged from 5.6 to 7.3. However, other than a single sampling event in September 2018, the pH of groundwater in the CCR network has been consistently above 6.4.
- **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 well network. The lowest TDS concentrations (418 to 463 mg/L) were observed in groundwater at two CCR monitoring wells (AMW-10 and AMW-20) and at one nature and extent well (AMW-15); while the highest TDS value (1,090 to 1,110 mg/L) was observed in CCR monitoring wells AMW-14 and AMW-23.
- **Major ion chemistry:** A Piper plot was generated for groundwater samples to facilitate the identification of water types and source contributions (Figure 8a). Except for nature and extent well AMW-15, which was calcium-sulfate dominated, all other samples were of a sodium-chloride/calcium-chloride or sodium-bicarbonate nature. Upgradient groundwater, from well FMW-4R, was of the sodium-bicarbonate type, as was the water in the two other nature and extent wells, AMW-24 and AMW-25. Nature and extent wells AMW-25 and AMW-25 had the highest alkalinity of any other groundwater samples at the ADA II site. Groundwater from wells AMW-14 and AMW-23, while having the highest sulfate concentrations, was still a calcium-chloride type water.
- **Iron:** Oxidized iron (Fe^{+3}) concentrations were variable, ranging from non-detect (<0.05 mg/L) to 1.23 mg/L in May 2019 (Appendix B). Reduced iron (Fe^{+2}) was non-detect (<0.05 mg/L) in all groundwater samples. The highest trivalent iron concentration of 1.23 mg/L was observed in the sample collected from monitoring well AMW-20. Ferrihydrite, an oxidized iron hydroxide mineral, would likely be present based on these data, and ferrihydrite attenuation of cobalt and selenium has been well studied (Smith 1999).
- **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 1.87 mg/L as N at AMW-23 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 0.086 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

- **Barium:** Historically, barium concentrations in groundwater have only exceeded the GWPS of 2.0 mg/L in CCR monitoring well AMW-10 (Figure 8b). Since October 2015, the barium concentration in groundwater at AMW-10 has ranged from 0.272 mg/L to 2.51 mg/L and, as of May 2019, was 0.435 mg/L. Since September 2016, barium has only exceeded the GWPS on one occasion of the six sampling events. Based on 95% confidence intervals, barium in groundwater is not at an SSL in AMW-10, 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 (0.00369 mg/L) in May 2019 (Table 1). The highest observed cobalt concentration was in a groundwater sampled collected from monitoring well AMW-14 (0.0265 mg/L) which, prior to the May 2019 sampling, generally had cobalt levels below or near detection limits (Figure 8c). However, based on an evaluation of confidence intervals, this exceedance of the GWPS (0.006 mg/L) appears to be an outlier, and only AMW-21 and AMW-23 exceed the GWPS for cobalt (Section 3.2). Other than the cobalt outlier value in AMW-14, based on historical trends, cobalt concentrations at the ADA II site are stable or have not exceeded the previously highest recorded cobalt value of 0.0239 mg/L measured in groundwater of AMW-22 in October 2015 (Figure 8c). 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 known to adsorb cobalt, is expected to be stable (Figure 8a).
- **Lithium:** Lithium has only exceeded the GWPS (0.040 mg/L) since October 2015 in groundwater at one well: AMW-14 (Figure 8d). Of the three times lithium concentrations have exceeded the GWPS, the highest measured value was 0.047 mg/L in June 2018. Otherwise, lithium in groundwater at AMW-14 was below the GWPS during the eight other sampling events. Based on the evaluation of the 95% confidence intervals, the GWPS exceedances for lithium at AMW-14 are not an SSL above the GWPS for lithium.
- **Radium 226+228:** CCR Monitoring wells AMW-10, AMW-14, and AMW-21 have historically exceeded the GWPS for radium 226+228 (5.06 pCi/L) on at least one occasion (Figure 8e). The highest radium 226+228 concentration in groundwater was measured in AMW-10 at 8.09 pCi/L in September 2018. However, prior to this sampling event, and in the sampling event immediately after, radium 226+228 was measured at <3.58 pCi/L. Neither AMW-14 or AMW-21 have exceeded the radium 226+228 GWPS since March 2016. Based on the evaluation of the 95% confidence intervals developed for CCR monitoring wells, radium 226+228 exceedances in these wells do not represent an SSL above the GWPS.
- **Selenium:** The selenium concentration in groundwater samples collected in May 2019 from the nature and extent monitoring well AMW-24 was non-detect (<0.002 mg/L) (Appendix B). Historically, until the May 2019 sampling event, selenium has only exceeded the GWPS in AMW-20 and AMW-21 (Figure 8f). In May 2019, AMW-14 and AMW-23 also slightly exceeded the GWPS but, based on statistical analysis using confidence intervals, only the selenium occurrence in AMW-21 represents an SSL (Section 3.2). Selenium concentrations in monitoring well AMW-20 show substantial seasonality, with values above and below the GWPS. Selenium in groundwater at AMW-21 historically has been above the GWPS, but no statistically significant increase in selenium levels in groundwater at AMW-21 is observed, indicating levels are stable as of May 2019 (Figure 8f). Selenium in groundwater at the BBSES ADA II site would likely be present as HSeO_3^- , or hydrogen selenite (Figure 8b).

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 three overburden samples collected during the drilling activities - one sample from each of the soil borings completed in June 2019 (AMW-24, AMW-25, and ADA-2019-1). 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 borehole samples at the ADA II predominately consist of quartz with varying amounts of the silicate minerals K-feldspar, albite, muscovite, and montmorillonite, plus calcite. Trace amounts of ilmenite were encountered in one sample. The aluminum phyllosilicates identified in the samples, muscovite and montmorillonite, indicate the presence of clays at the ADA II site. 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 ADA II, 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:

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 27,000 mg/kg to 42,000 mg/kg, and the environmentally-available fraction ranged from just 939 mg/kg (AMW-24) to 1,432 mg/kg (AMW-25). Aluminum in the soil at the site is, therefore, largely (~80% to 90%) 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 8,300 mg/kg (AMW-24) to 11,000 mg/kg (ADA-2019-1). In all samples, the sulfide and residual fractions accounted for the largest proportion of total iron (56% to 58%) and, as such, most of the iron is not environmentally available. The remainder of the iron in the samples is present in the metal hydroxide phase. This phase, 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 and selenium.

Constituents Identified in February 2019 SSL Notification

- **Barium:** Total barium in soil ranged from 356 mg/kg to 452 mg/kg while the environmentally-available fraction ranged from 17.9 mg/kg in AMW-24 to 46.7 mg/kg in AMW-25, representing from 4% to 13% of total barium. The majority of barium (84% to 95%) was present in the silicate mineral or residual fraction, indicating the presence of a reservoir of naturally-occurring barium in soils. Of the barium that was present 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 3.2 mg/kg to 5.8 mg/kg while the environmentally-available fraction ranged from 1.9 mg/kg in AMW-24 to 3.9 mg/kg in AMW-25, representing from 62% to 72% of total cobalt. The majority of environmentally-available cobalt (> 62%) was present in the amorphous metal and metal hydroxide fractions, indicating potential attenuation or incorporation of cobalt into metal hydroxides, such as ferrihydrite. Notably, while cobalt was present in soils of AMW-24 and AMW-25, groundwater associated with those wells only contained cobalt concentrations just above detection (<0.004 mg/L), also suggestive of potential attenuation of cobalt by soils.
- **Lithium:** Total lithium in soil ranged from 6.45 mg/kg to 11.1 mg/kg, of which between only 8% and 11% of the lithium occurred in the environmentally-available fraction. Lithium that was environmentally available (0.72 mg/kg to 0.91 mg/kg), was all present in the metal hydroxide fraction. This indicates the high likelihood of the presence of naturally-occurring lithium contained within the non-environmentally available fractions and potential attenuation of lithium by metal hydroxide minerals at the site.
- **Radium 226+228:** Total radium 226+228 in soil ranged from 0.39 pCi/g to 1.30 pCi/g, representing levels that are within the range of naturally-occurring radium in soils (USEPA 2009a). Radium 226+228 was not analyzed as part of the sequential extraction test.
- **Selenium:** Total selenium in soil ranged from 0.85 mg/kg to 1.61 mg/kg, of which all 100% of the selenium was present in the environmentally-available fraction. The majority (>50%) of selenium occurred in the carbonate or metal hydroxide fractions in the samples. The presence of selenium associated with carbonate and metal hydroxides suggests the potential for attenuation of selenium in groundwater.

The results from the soil analysis indicate the following:

- Naturally-occurring sources of barium, lithium and radium 226+228 are present in the vicinity of ADA II; and
- Attenuation of barium, cobalt, lithium and selenium in groundwater is likely occurring in the vicinity of ADA II.

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:

- **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 AMW-10 based on the February 2019 SSL notification.
- **Cobalt:** CCR monitoring wells where cobalt exceeded the GWPS based on historical data show stable or decreasing cobalt concentrations. Cobalt statistically exceeds the GWPS in two CCR monitoring wells (AMW-21 and AMW-23) and cobalt concentrations in groundwater at all nature and extent monitoring wells are below the GWPS for cobalt. Therefore, cobalt in groundwater is likely limited to the immediate perimeter of the ADA II 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 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. 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 purposes of this ACM evaluation, lithium concentrations are conservatively assumed to be present at an SSL above the GWPS in well AMW-14 based on the February 2019 SSL notification.
- **Radium 226+228:** The concentrations of radium 226+228 statistically no longer exceed the GWPS in groundwater at any monitoring or nature and extent well. Based on the data collected to date, radium 226+228 concentrations are no longer considered to be present at an SSL above the GWPS; however, radium 226+228 concentrations in groundwater will continue to be monitored to confirm that levels remain below the GWPS in the future. For the purposes of this ACM evaluation, radium 226+228 concentrations are conservatively assumed to be present at an SSL above the GWPS in well AMW-10 based on the February 2019 SSL notification.
- **Selenium:** The concentration of selenium statistically exceeded the GWPS in groundwater from only one CCR monitoring well (AMW-21). Selenium in the nature and extent monitoring well (AMW-24) downgradient of this well was below the GWPS. Thus, if selenium in groundwater originates from the ADA II, the distribution of selenium is limited in extent, and is potentially being attenuated by carbonate minerals and metal hydroxides, as indicated by sequential extraction testing of soil samples. Selenium should, therefore, be considered for further evaluation as a viable candidate for monitored natural attenuation based on the results of this initial assessment (USEPA 2007a, b).

4.0 ASSESSMENT OF CORRECTIVE MEASURES

In accordance with §257.96 and §257.97, an ACM was conducted for ADA II 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:

- barium concentrations in monitoring well AMW-10;
- cobalt concentrations in monitoring wells AMW-10, AMW-21 and AMW-23;
- lithium concentrations in monitoring well AMW-14;
- radium 226+228 concentrations in monitoring well AMW-10; and
- selenium concentrations in monitoring wells AMW-10 and AMW-21.

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).

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 ADA II.

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 ADA II 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 ADA II 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 ADA II, or
- Siting, regulatory approval, designing, and constructing a new lined repository for the material from ADA II.

All material would be excavated from ADA II, 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 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 ADA II, it is estimated that it will take 7 to 10 years or more to excavate, transport and place the CCR from ADA II in the new repository. Other significant limitations to removal as a source control option include:

- Much of the CCR in ADA II 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 ADA II. 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 ADA II:

- Closure in Place/Capping

4.3 Potential Groundwater Response Technologies

For the purposes of this ACM, barium, cobalt, lithium, radium 226+228 and selenium 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 ADA II.

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 (EPA 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 contaminant 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 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 barium, cobalt, radium 226+228 and selenium concentrations in groundwater (ITRC 2010; EPA 2007b; EPA 2007c). 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). Radium 226+228 is removed through coprecipitation with sulfate minerals or sorption or ion exchange onto clay minerals, iron/manganese and oxyhydroxides (EPA 2007c). Selenium is removed through adsorption to iron oxyhydroxides, iron sulfides, or other mineral surfaces; precipitation of metal selenates or selenites; and/or biotic (microbial) or abiotic reduction by reduced iron-bearing minerals of selenate/selenite to elemental selenium and/or selenide with precipitation as a metal selenide (EPA 2007b). The removal mechanisms for lithium via MNA were not identified in the professional literature. As described in Sections 3.4 through 3.6 of this report, the Site is a good candidate for MNA, since natural attenuation of barium, cobalt, lithium, and selenium is on-going in the vicinity of ADA II.

MNA would be effective in remediating groundwater beneath ADA II 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 modelling is needed to evaluate remedial timeframes. Groundwater Extraction and Treatment

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.).

For ADA II, 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 Fairfield Lake or re-injected into the aquifer.

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

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

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 be managed.

Groundwater extraction and treatment would be effective in reducing contaminant concentrations in groundwater downgradient of ADA II 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 (EPA 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 ADA II, 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

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 be 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 ADA II, PRB system would be constructed along the downgradient edge of the landfill to provide control of the target Appendix IV constituent 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:

- Barium – potentially precipitated as phosphate, sulfate or hydroxide (Arnseth 2018)
- Cobalt - potentially removed using sulfate-reducing media or combination of zero-valent iron (ZVI) and organic material (Ludwig 2002; ITRC 2011);
- Lithium – potentially precipitated as phosphate using phosphate media (Arnseth 2018).
- Radium – potentially precipitated as sulfate (Arnseth 2018)
- Selenium – potentially remediated using organic material to decrease red-ox conditions for removal through sorption and/or precipitation (EPA 2019b; ITRC 2011).

Removal of the 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.

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 (EPA 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.

Barium and radium have 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 and selenium have the potential to be removed through adsorption and/or coprecipitation under reducing groundwater conditions (Goldmund and Robb 2018).

Injection wells would be installed into the aquifer along the downgradient edge of ADA II 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 ICR 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, groundwater, surface water, and wastewater (EPA 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.

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 cobalt and selenium removal from groundwater has not been demonstrated under full-scale conditions and no information concerning the effectiveness of phytoremediation for barium, lithium, and radium 226+228 removal was identified (EPA 2001).

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

- 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 ADA II 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 be noted that, for the purposes of this ACM, barium, cobalt, lithium, radium 226+228 and selenium concentrations were all 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, barium, lithium and radium 226+228 concentrations are no longer considered to be present at SSLs above the GWPSs based on updated statistical analysis and naturally occurring sources of barium, lithium, and radium 226+228 exist in the vicinity of ADA II. Barium, cobalt, lithium, radium 226+228 and selenium concentrations in groundwater will continue to be monitored in accordance with the CCR rule to confirm that the concentrations of these constituents exceed or remain below their respective 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.

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Signature Page

Golder Associates Inc.



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William F. Vienne, P.G.
Senior Hydrogeologist

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[https://golderassociates.sharepoint.com/sites/114142/project files/5 technical work/phase 3000 - bb ash disposal area ii/ccr assessment of corrective measures report - bb ada ii_9-5-19.docx](https://golderassociates.sharepoint.com/sites/114142/project%20files/5%20technical%20work/phase%203000%20-%20bb%20ash%20disposal%20area%20ii/ccr%20assessment%20of%20corrective%20measures%20report%20-%20bb%20ada%20ii_9-5-19.docx)

LUMINANT

TABLES

TABLE 1
APPENDIX IV GROUNDWATER ANALYTICAL DATA SUMMARY
ASH DISPOSAL AREA II
BIG BROWN STEAM ELECTRIC STATION

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 Combined [^] (pCi/L)
GWPS:		0.006	0.01	2	0.004	0.005	0.1	0.006	4	0.015	0.04	0.002	0.1	0.05	0.002	--	--	5.06
AMW-24	06/10/19	NA	NA	NA	NA	NA	NA	0.0037 J	0.285 J	NA	NA	NA	NA	<0.002	NA	NA	NA	NA
AMW-25	06/10/19	NA	NA	0.307	NA	NA	NA	0.0032 J	0.495	NA	NA	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
 Big Brown Steam Electric Station
 Ash Disposal Area II

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

Table 3
Screening of Potential Groundwater Response Technologies
Big Brown Steam Electric Station
Ash Disposal Area II

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 Fairfield 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

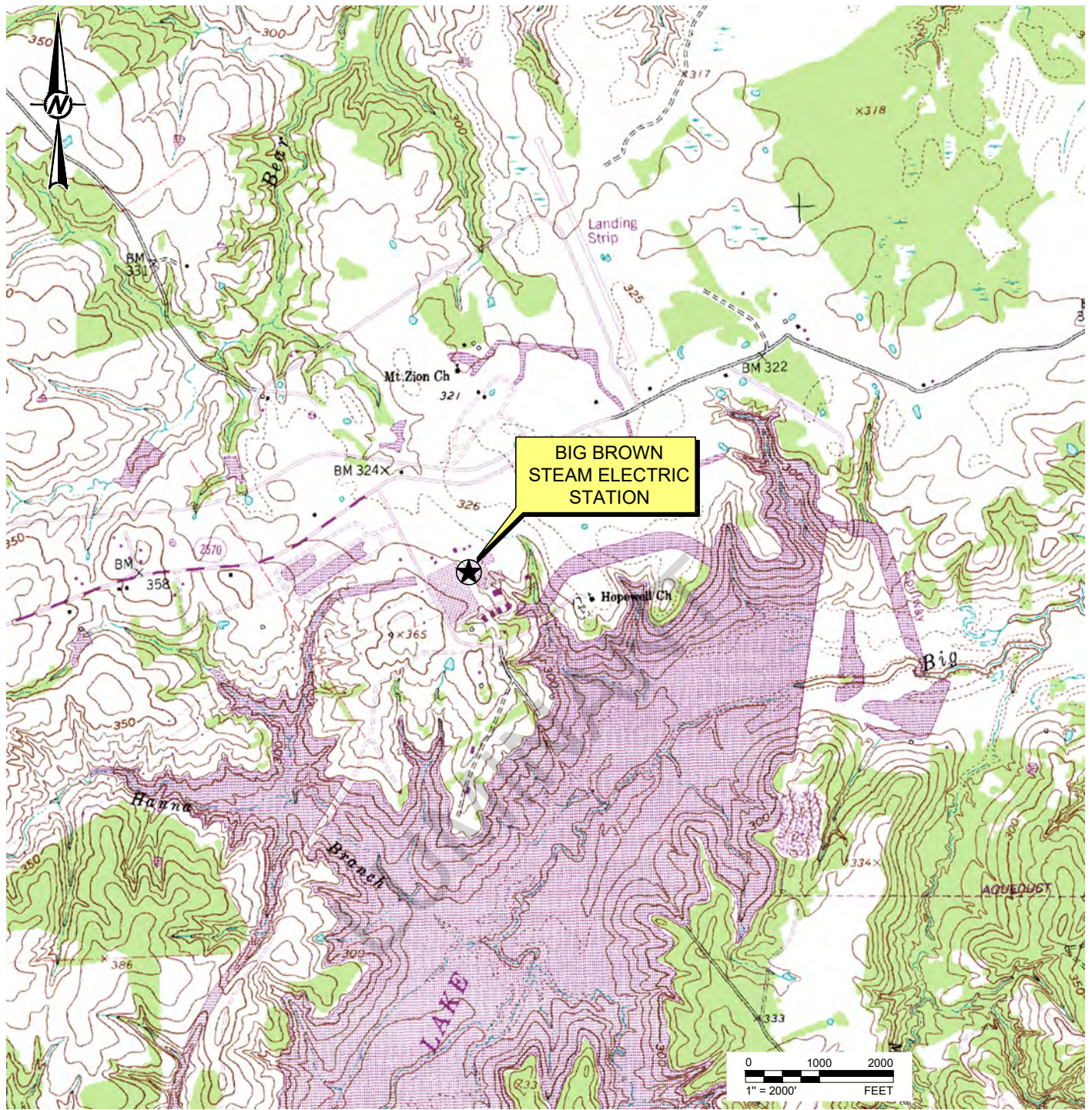
Groundwater Response Technology	Description	Protective of Human Health and Environment	Attain Groundwater Protection Standard	Control Source of Release	Remove Contaminated Material From Environment	RCRA Compliance	Screening Comments	Retained for Further Evaluation
Permeable Reactive Barrier	In-situ, 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, coprecipitation, 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

Table 4
Evaluation of Corrective Measures Alternatives
Big Brown Steam Electric Station
Ash Disposal Area II

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.
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 Fairfield 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.

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FIGURES



REFERENCE(S)

BASE MAP TAKEN FROM WWW.TNRIS.GOV, YOUNG, TX 7.5 MIN. USGS QUADRANGLE DATED 1961, REVISED 1982.

CLIENT
LUMINANT

PROJECT
**BIG BROWN STEAM ELECTRIC STATION
FAIRFIELD, TEXAS**

TITLE
SITE LOCATION MAP

CONSULTANT

YYYY-MM-DD 2019-08-15

DESIGNED AJD

PREPARED AJD

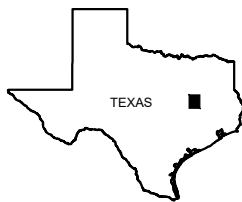
REVIEWED WFV

APPROVED WFV

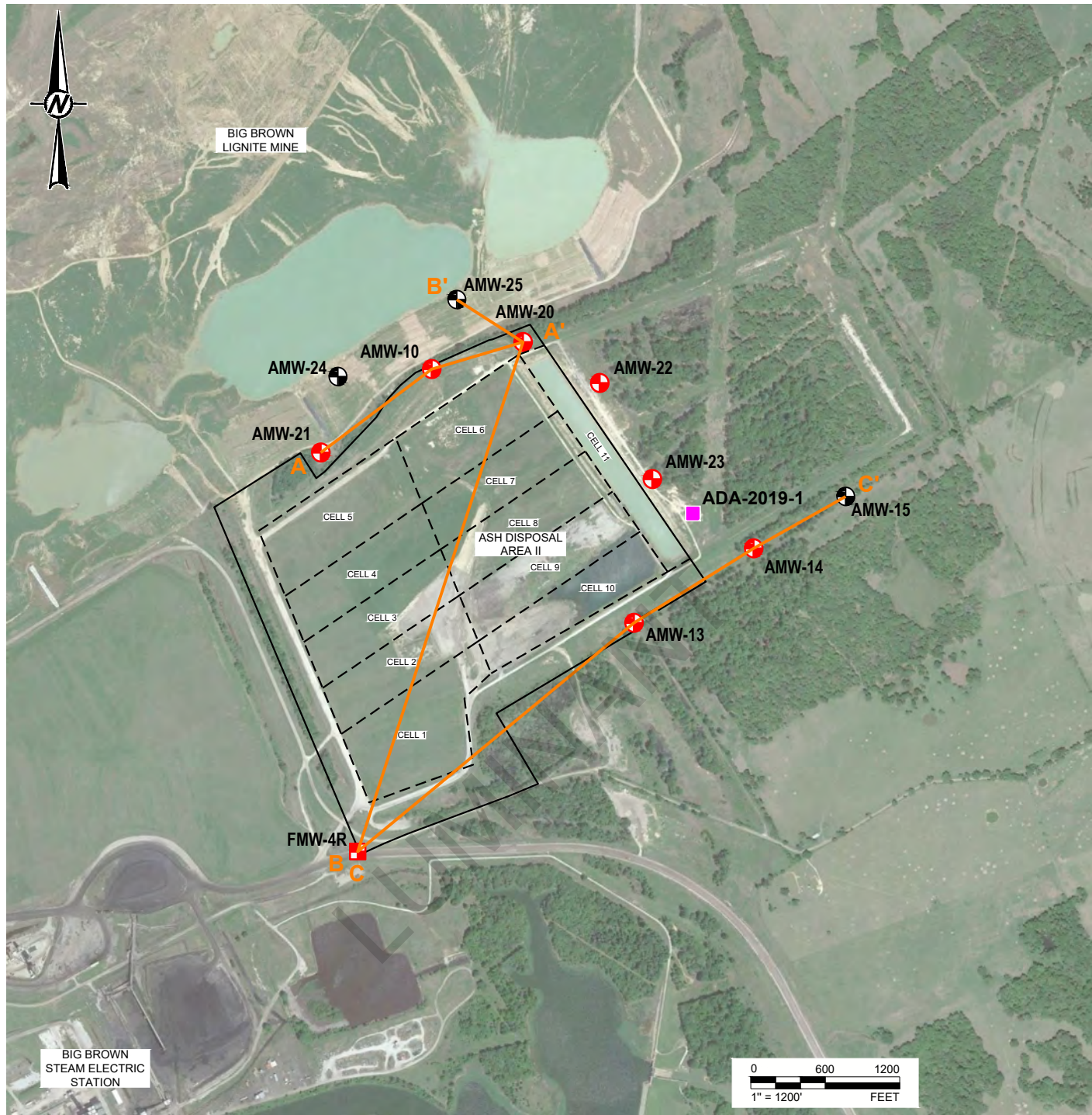
PROJECT NO.
19121403

REV.
0





FIGURE
1



QUADRANGLE LOCATION



LEGEND

-  DOWNGRADIENT CCR MONITORING WELL
-  UPGRADIENT CCR MONITORING WELL
-  CCR DELINEATION WELL
-  MNA SOIL BORING

A — A' CROSS SECTION LOCATION

CLIENT
LUMINANT

PROJECT
**BIG BROWN STEAM ELECTRIC STATION
FAIRFIELD, TEXAS**

TITLE
**ASH DISPOSAL AREA II
MONITORING WELL NETWORK AND
GEOLOGIC CROSS SECTION LOCATION MAP**

CONSULTANT	YYYY-MM-DD	2019-08-15
DESIGNED		AJD
PREPARED		AJD
REVIEWED		WVW
APPROVED		WVW



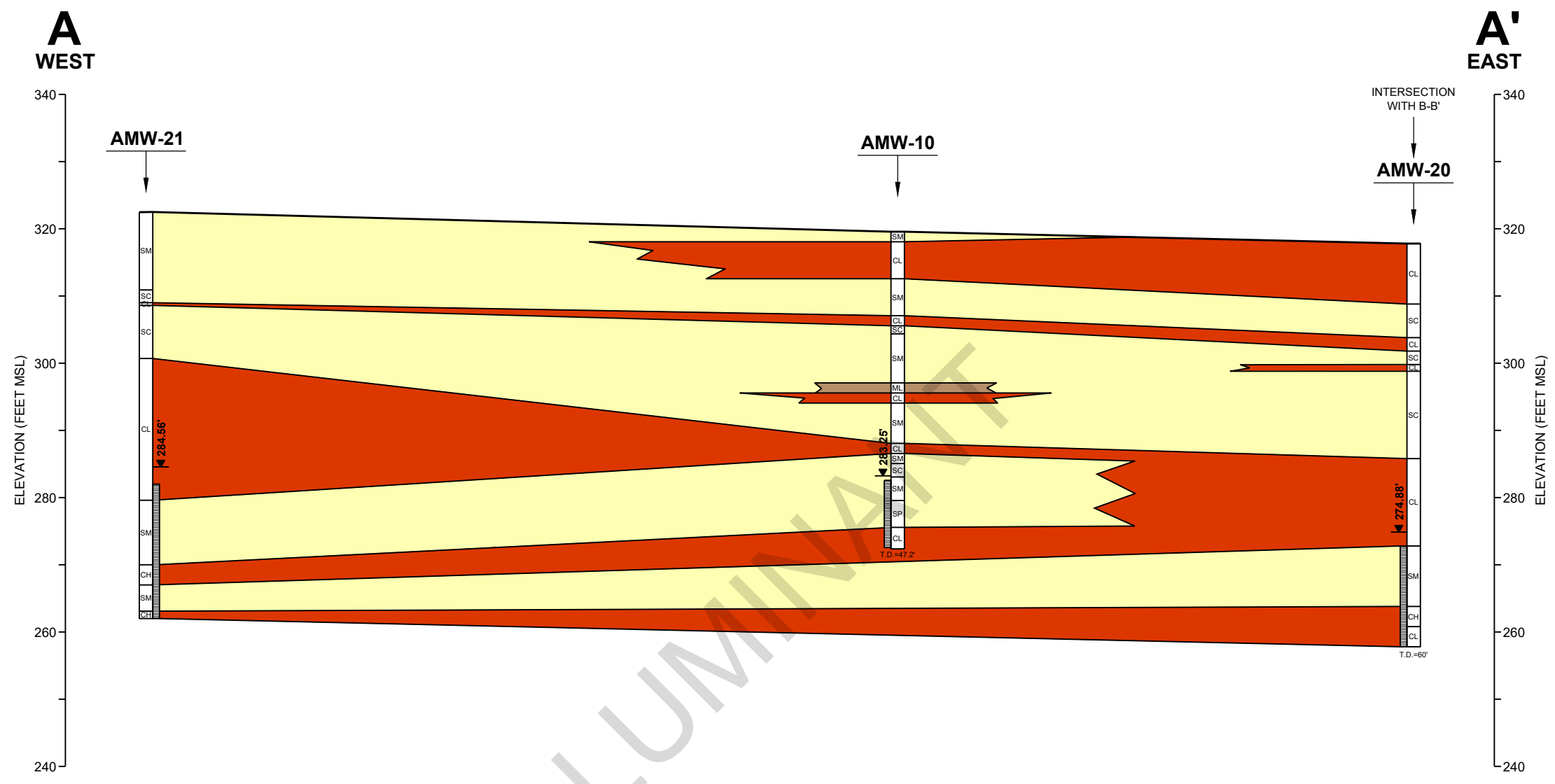
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BASE MAP TAKEN FROM GOOGLE EARTH, IMAGERY DATED 3/30/17.

PROJECT NO. 19121403 REV. 0 FIGURE 2

Last Edited By: adiamond Date: 2019-08-14 Time: 4:28:55 PM | Printed By: adiamond Date: 2019-08-15 Time: 3:50:00 PM Path: \\luminant\data\Projects - Round Rook\19121403 - Luminant\Big Brown | File Name: FIG 2 - MW Network & Cross Section Location Map (Ash Disposal Area II).dwg

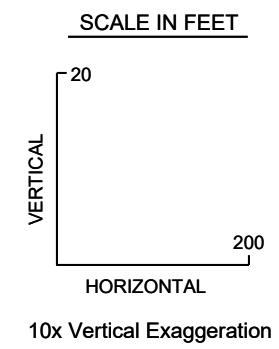
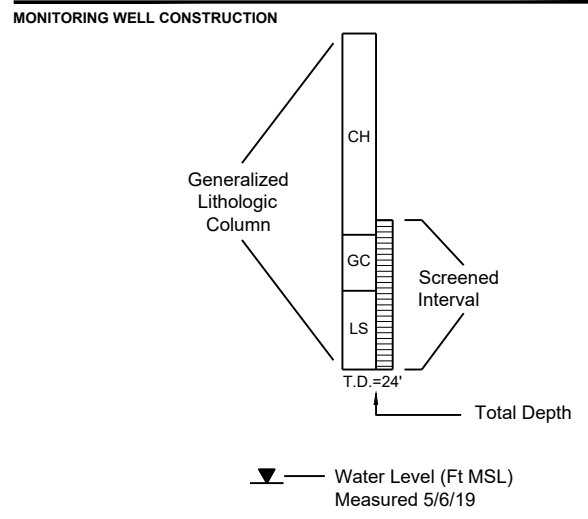
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LEGEND

	SAND
	CLAY
	SILT



CLIENT
LUMINANT

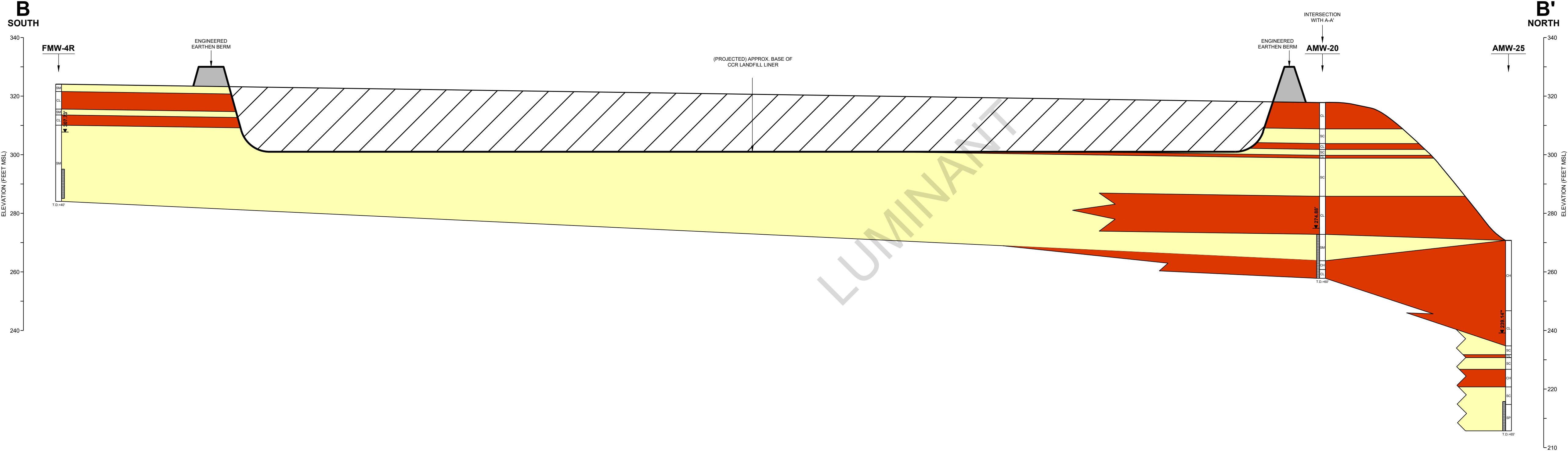
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**BIG BROWN STEAM ELECTRIC STATION
FAIRFIELD, TEXAS**

TITLE
**ASH DISPOSAL AREA II
GEOLOGIC CROSS SECTION A-A'**

CONSULTANT	YYYY-MM-DD	2019-08-15
	DESIGNED	AJD
	PREPARED	AJD
	REVIEWED	SG
	APPROVED	WFV

PROJECT NO. 19121403	REV. 0	FIGURE 3
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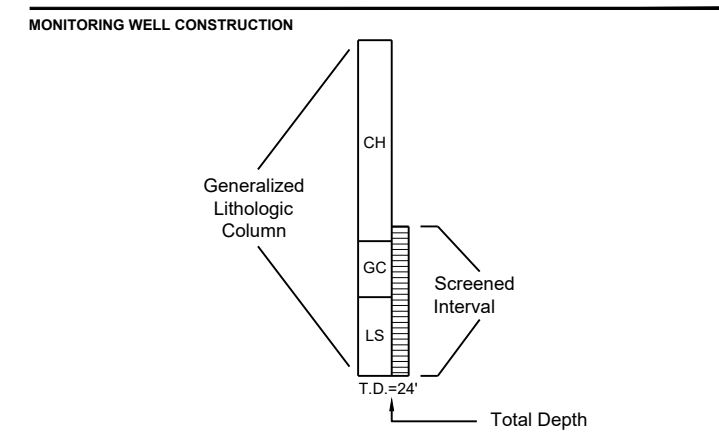
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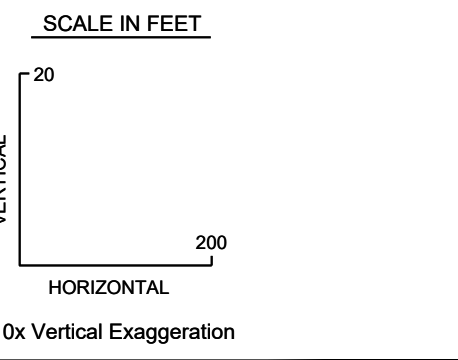
LEGEND

[Yellow Box]	SAND
[Red Box]	CLAY
[Brown Box]	SILT
[Grey Box]	FILL
[Hatched Box]	CCR LANDFILL CELL

NOTE(S)
 1. ENTIRE SOIL COLUMN AT AMW-25 IS RECLAIMED MINE SPOIL.



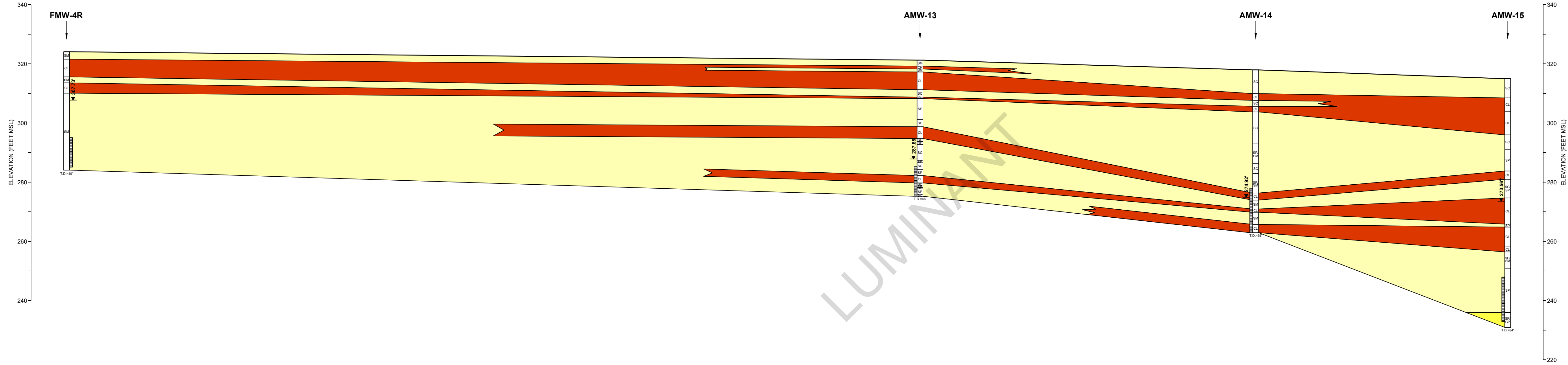
Water Level (Ft MSL)
 Measured 5/6/19
 * Measured 6/10/19



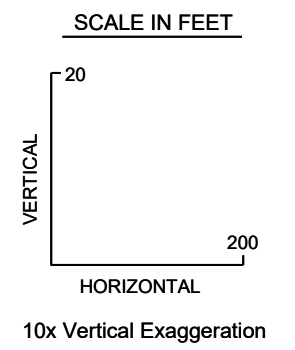
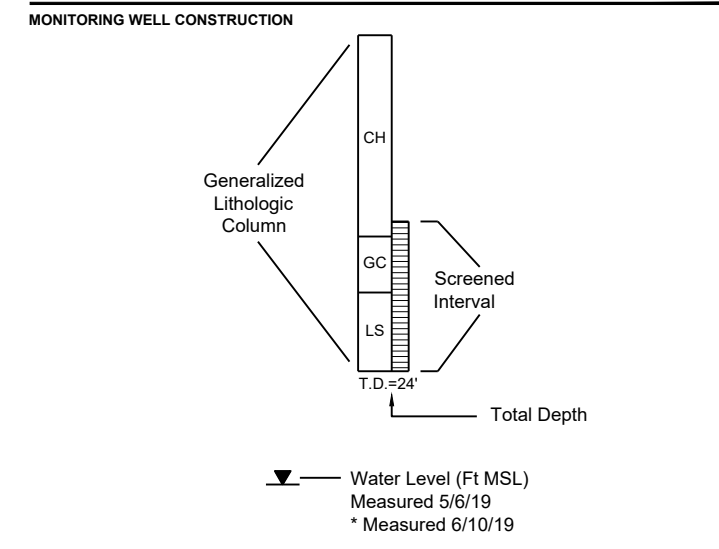
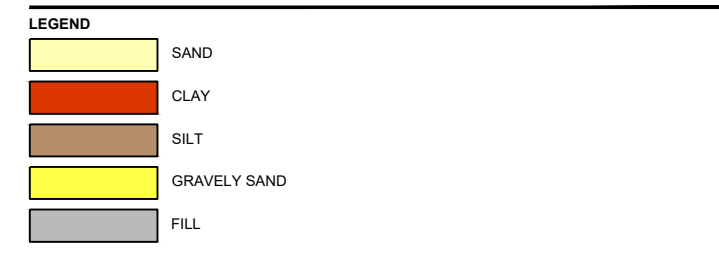
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PROJECT	BIG BROWN STEAM ELECTRIC STATION FAIRFIELD, TEXAS
TITLE	ASH DISPOSAL AREA II GEOLOGIC CROSS SECTION B-B'
CONSULTANT	YYYY-MM-DD 2019-08-15
DESIGNED	AJD
PREPARED	AJD
REVIEWED	SG
APPROVED	WFV
PROJECT NO.	19121403
REV.	0
FIGURE	4

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C
WEST



C'
EAST



CLIENT
LUMINANT

PROJECT
**BIG BROWN STEAM ELECTRIC STATION
FAIRFIELD, TEXAS**

TITLE
**ASH DISPOSAL AREA II
GEOLOGIC CROSS SECTION C-C'**

CONSULTANT	YYYY-MM-DD	2019-08-15
	DESIGNED	AJD
	PREPARED	AJD
	REVIEWED	SG
	APPROVED	WFV

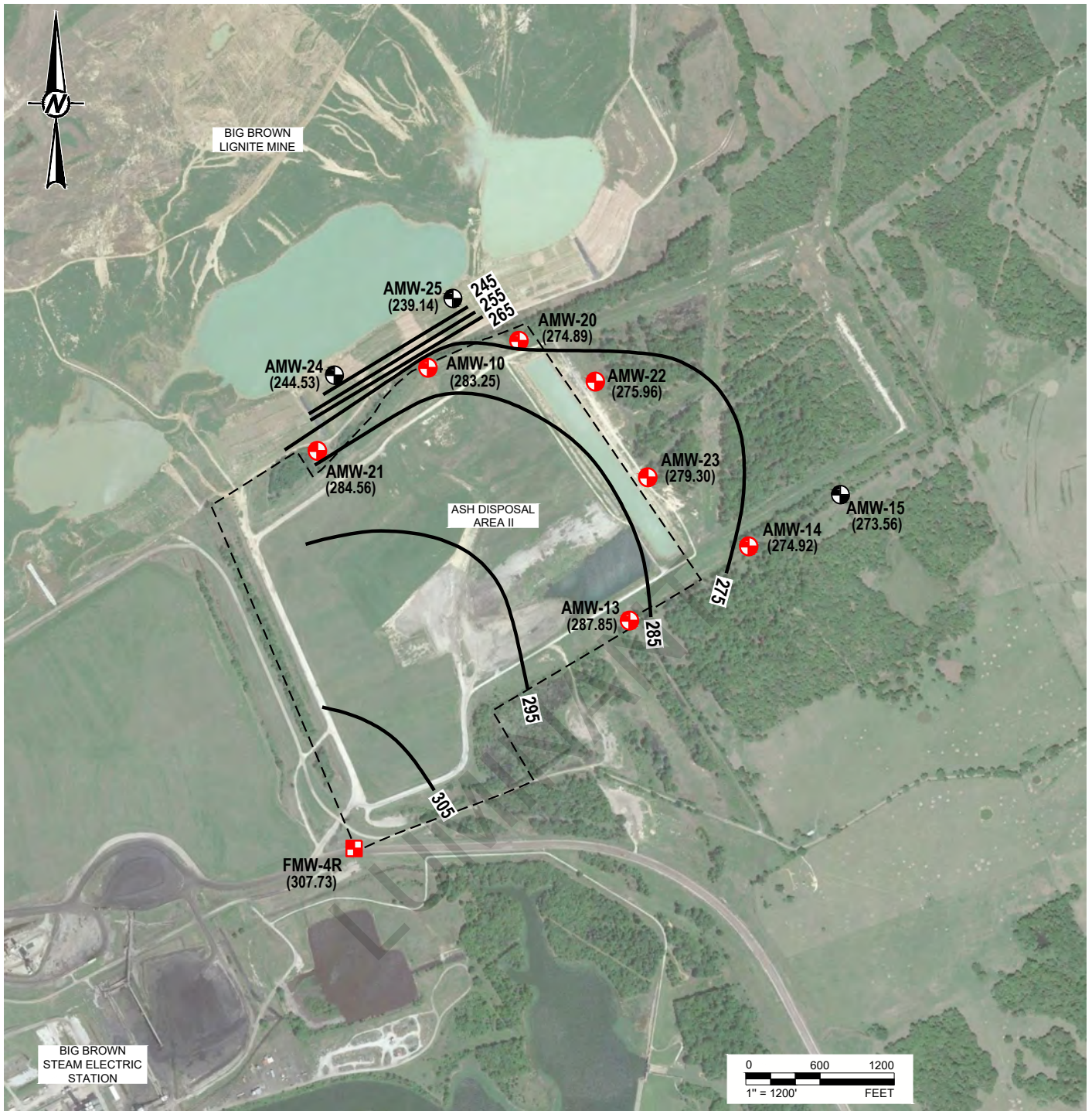
PROJECT NO.
19121403

REV.
0






FIGURE
5

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IF THIS DIMENSION DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3B8



LEGEND

-  DOWNGRADIENT CCR MONITORING WELL
-  UPGRADIENT CCR MONITORING WELL
-  CCR DELINEATION WELL
-  (294.01) GROUNDWATER POTENTIOMETRIC SURFACE (FT. MSL)
-  300 GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR (C.I. = 10 FT)

NOTE(S)

1. CCR MONITORING WELL WATER LEVELS MEASURED 5/6/19. CCR DELINEATION WATER LEVELS MEASURED 6/10/19.

REFERENCE(S)

BASE MAP TAKEN FROM GOOGLE EARTH, IMAGERY DATED 3/30/17.

CLIENT
LUMINANT

PROJECT
**BIG BROWN STEAM ELECTRIC STATION
FAIRFIELD, TEXAS**

TITLE
**ASH DISPOSAL AREA II
POTENTIOMETRIC SURFACE MAP**

CONSULTANT

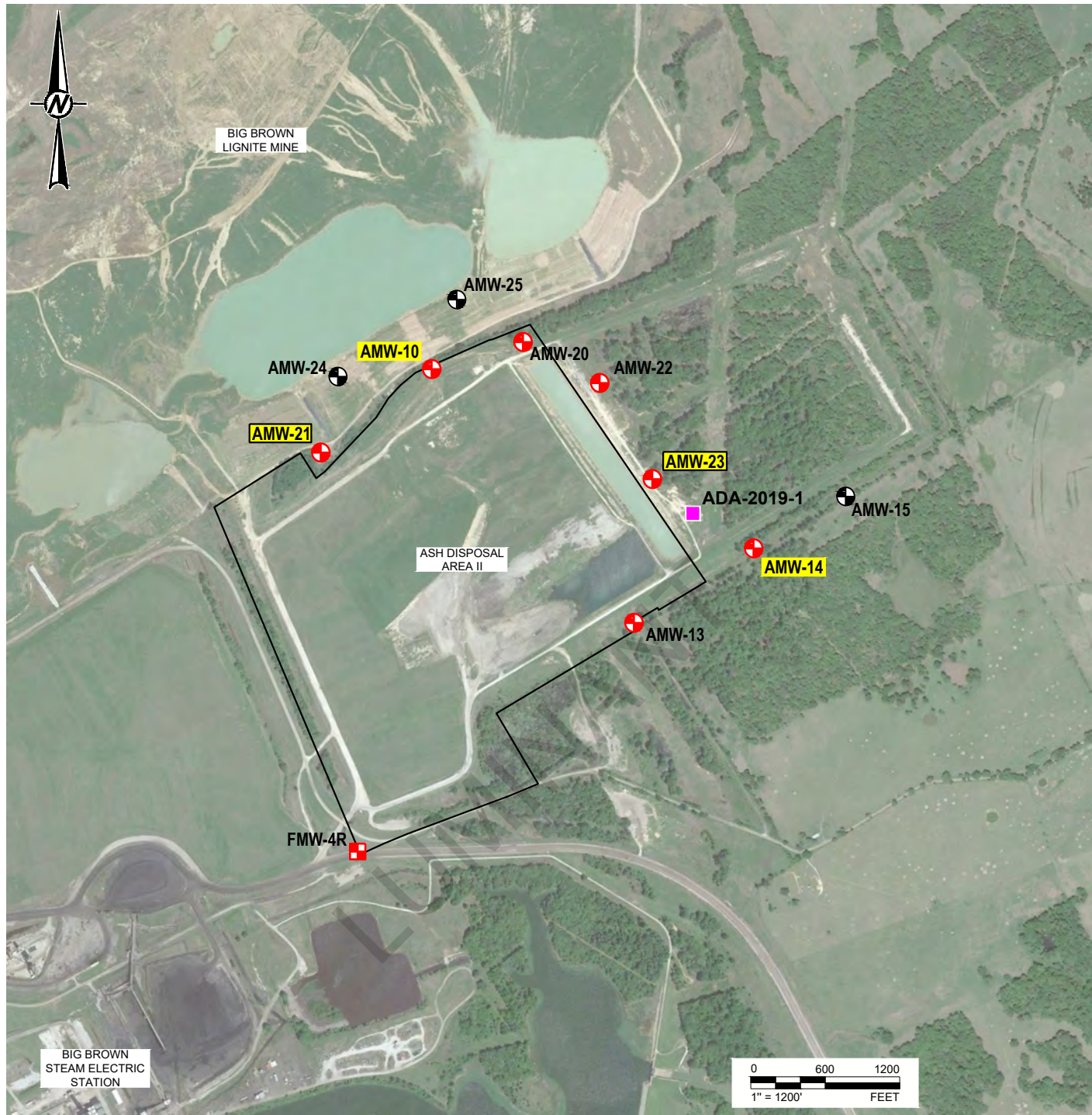


YYYY-MM-DD	2019-08-15
DESIGNED	AJD
PREPARED	AJD
REVIEWED	WVW
APPROVED	WVW

PROJECT NO.
19121403

REV.
0

FIGURE
6



LEGEND

- DOWNGRADIENT CCR MONITORING WELL
- UPGRADIENT CCR MONITORING WELL
- CCR DELINEATION WELL
- MNA SOIL BORING
- SSLs FOR ONE OR MORE APPENDIX IV CONSTITUENTS BASED ON INITIAL STATISTICAL EVALUATION
- SSLs FOR ONE OR MORE APPENDIX IV CONSTITUENTS BASED ON UPDATED STATISTICAL EVALUATION

REFERENCE(S)

BASE MAP TAKEN FROM GOOGLE EARTH, IMAGERY DATED 3/30/17.

CLIENT
LUMINANT

PROJECT
**BIG BROWN STEAM ELECTRIC STATION
FAIRFIELD, TEXAS**

TITLE
**ASH DISPOSAL AREA II
EXTENT OF APPENDIX IV CONSTITUENTS
DETECTED AT SSLs ABOVE GWPSs**

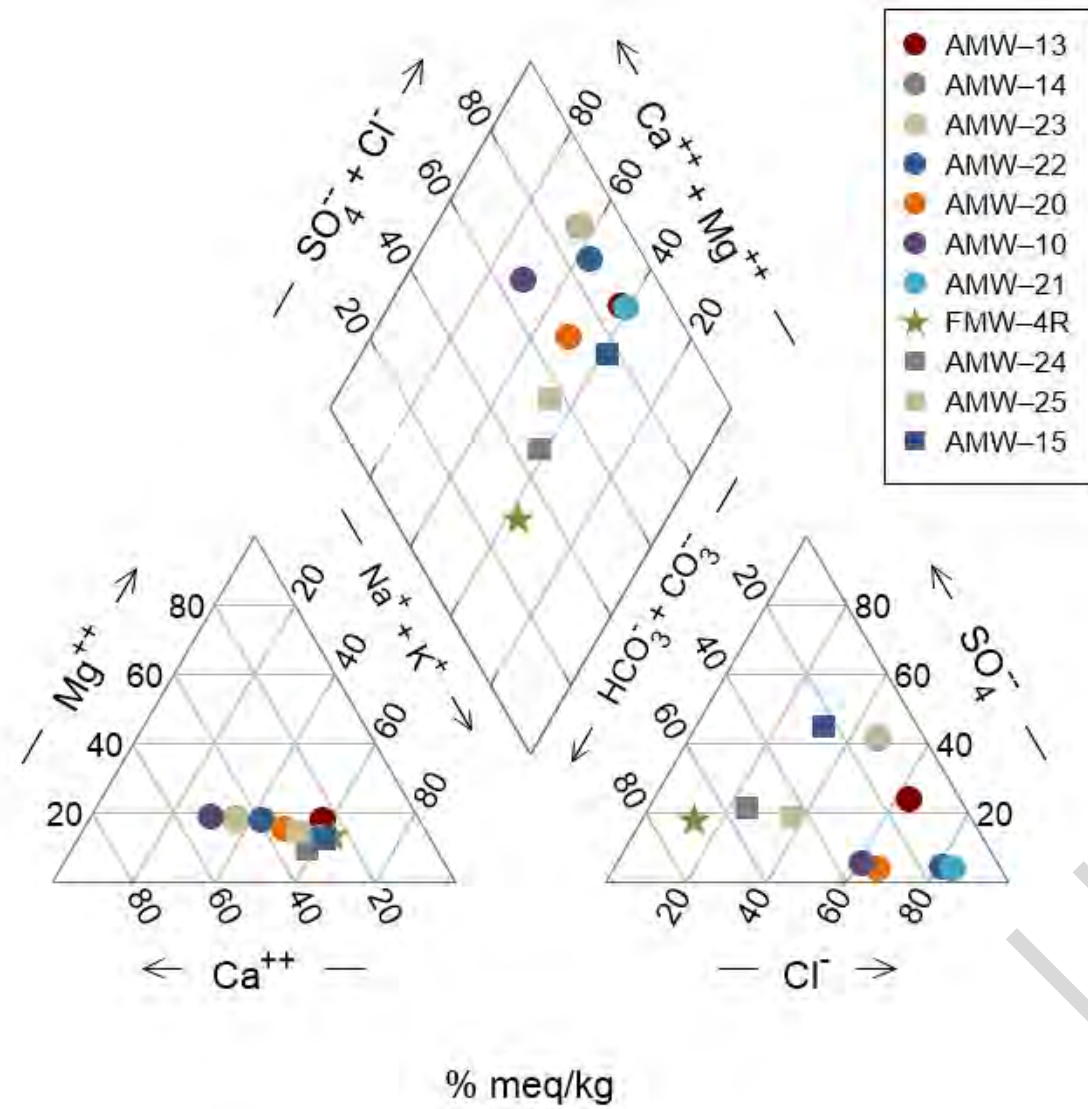
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DESIGNED		AJD
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REVIEWED		WFV
APPROVED		WFV



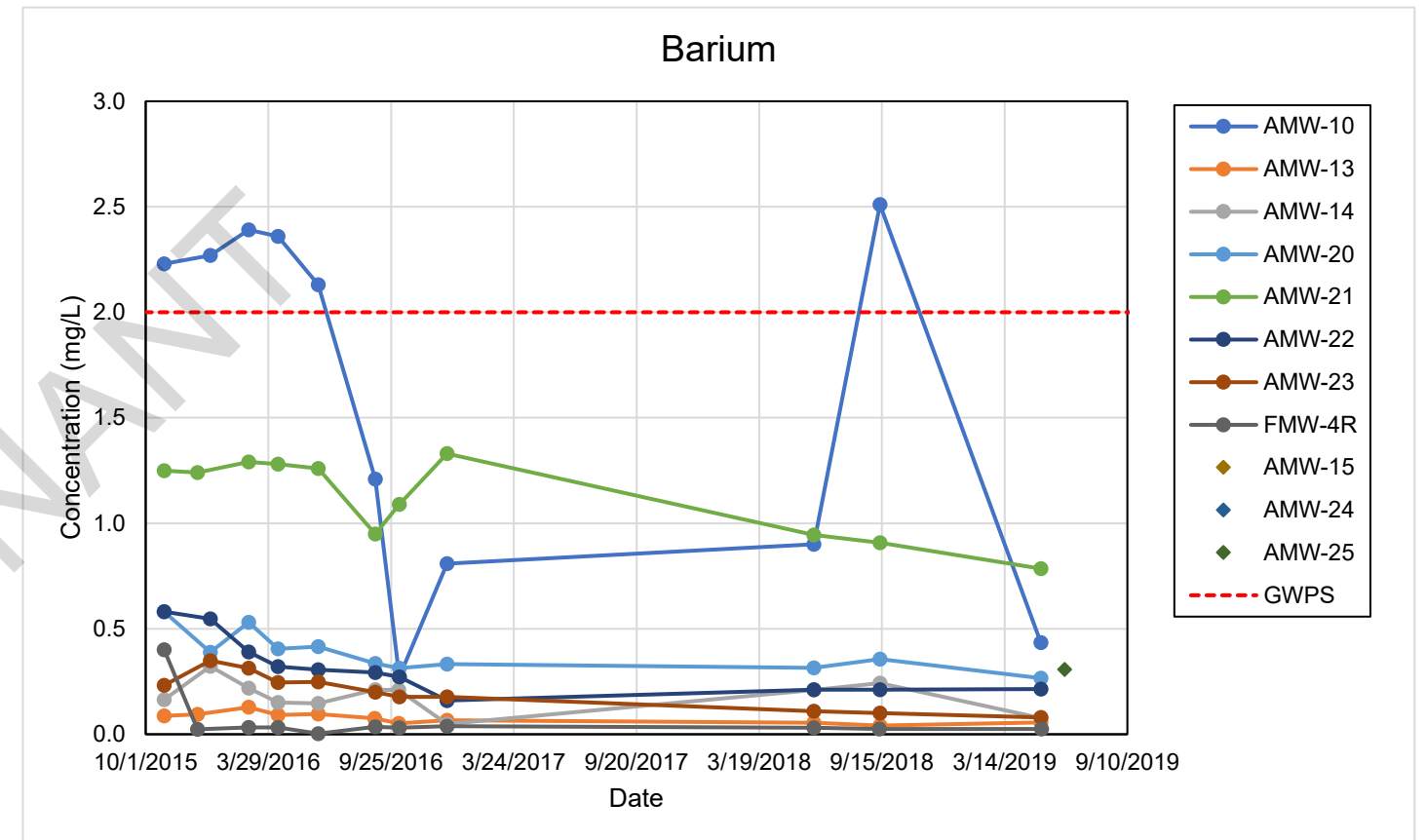
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(a)



(b)



CLIENT
LUMINANT
BIG BROWN SES
ADA II
CONSULTANT



PROJECT
Assessment of Corrective Measures

Geochemical Assessment

TITLE
GROUNDWATER GEOCHEMICAL CHARACTERIZATION (A), AND
HISTORICAL TRENDS OF COBALT (B),
IN GROUNDWATER AT MONITORING WELLS

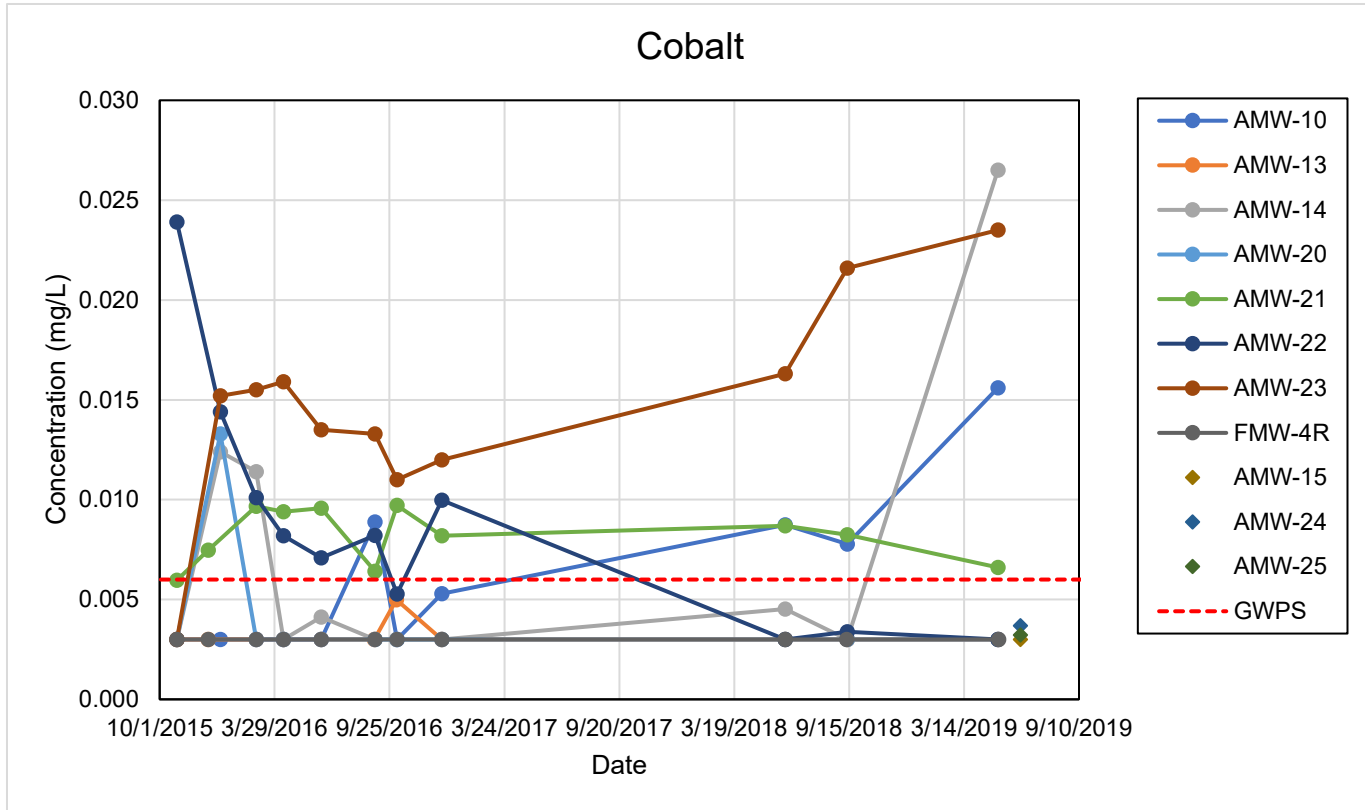
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PHASE
A

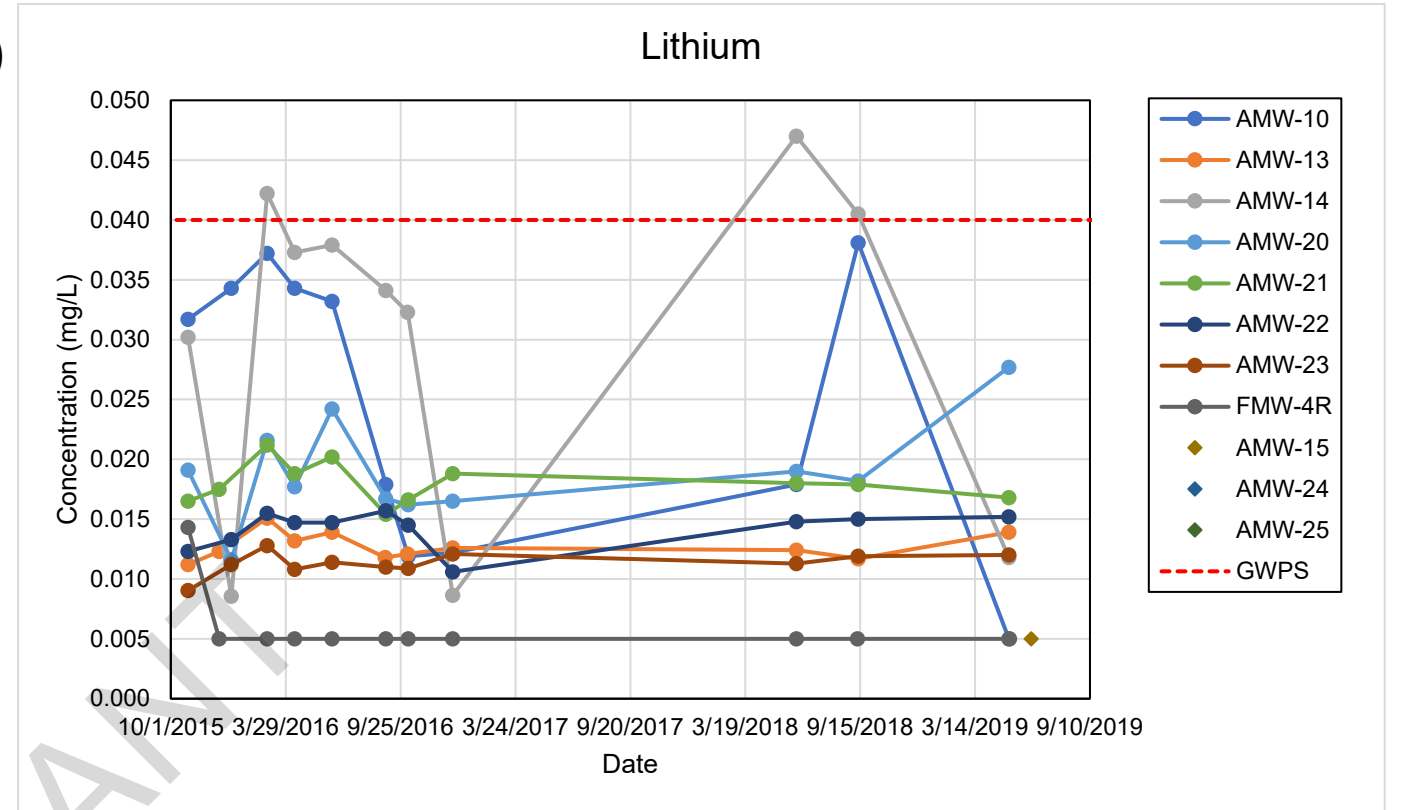
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FIGURE
8a-b

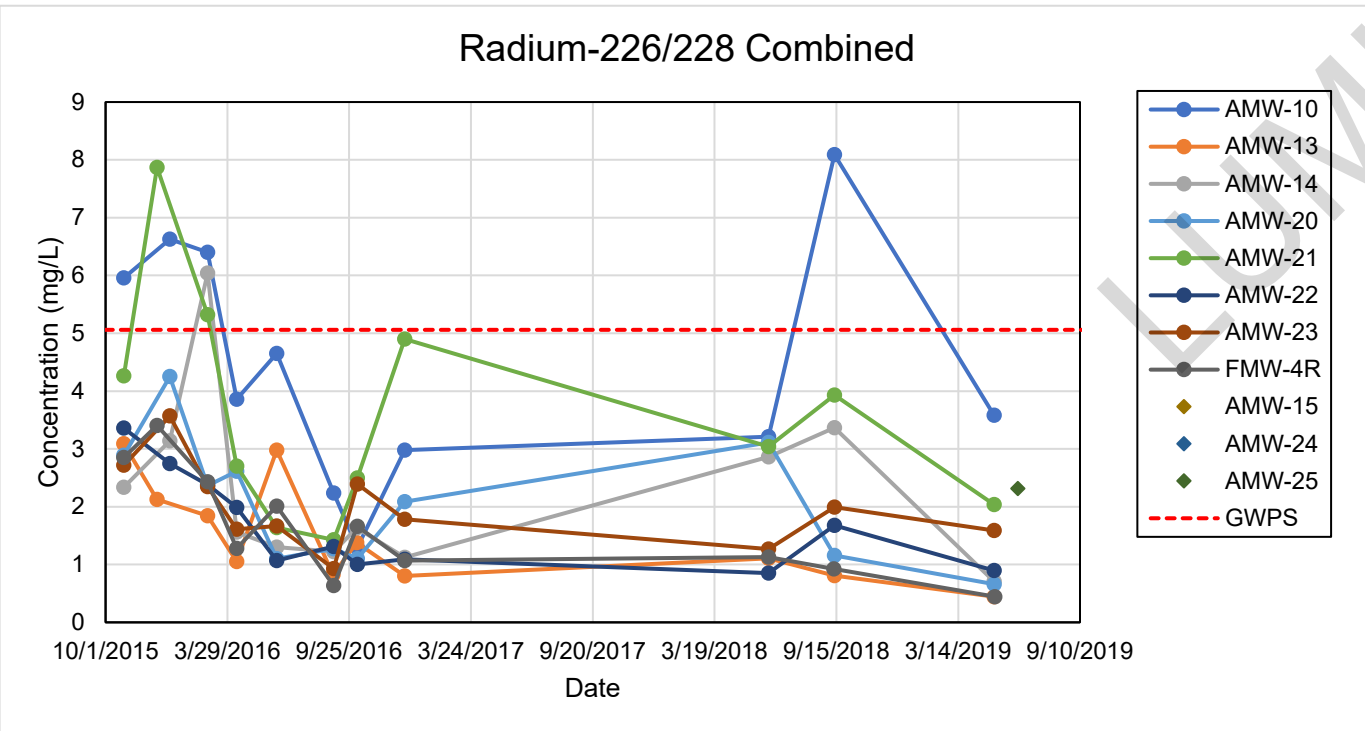
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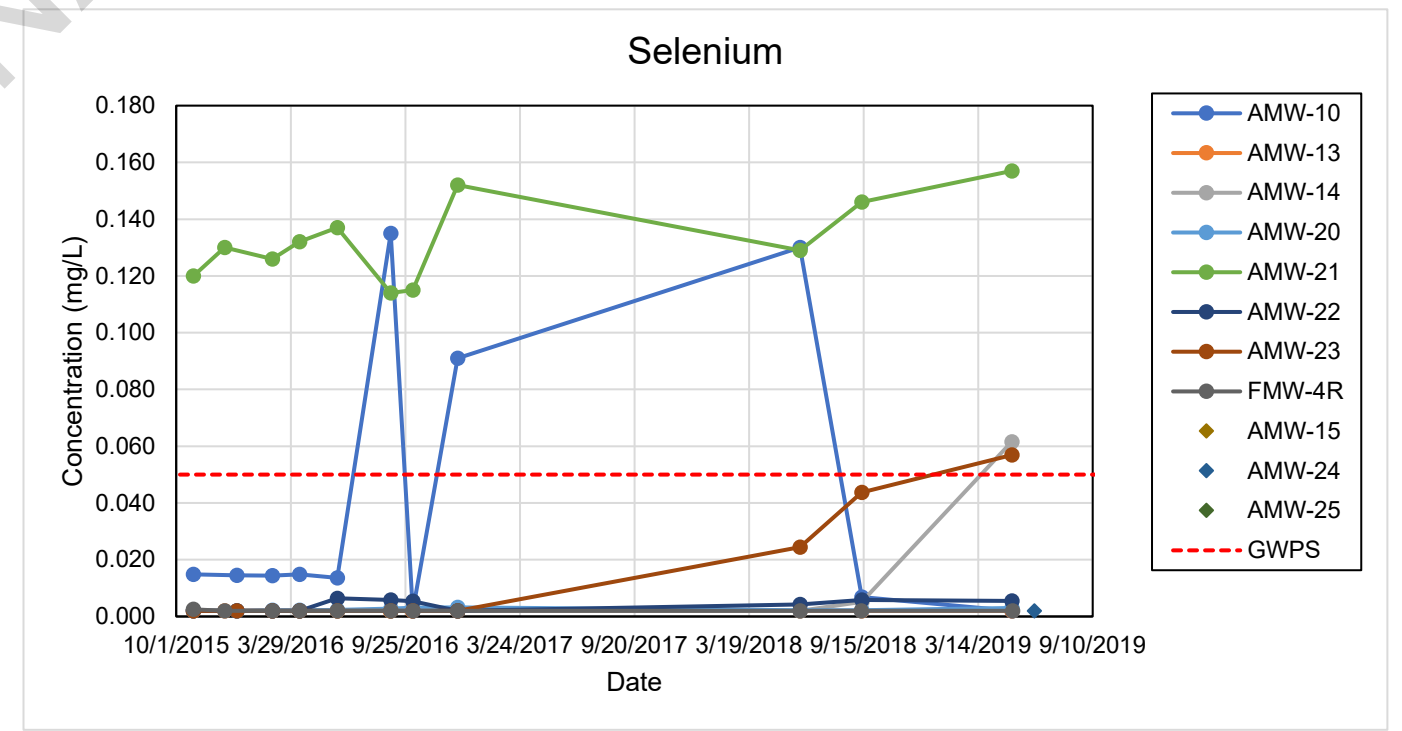
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(e)



(f)



CLIENT
LUMINANT
BIG BROWN SES
ADA II
CONSULTANT

PROJECT
Assessment of Corrective Measures
Geochemical Assessment



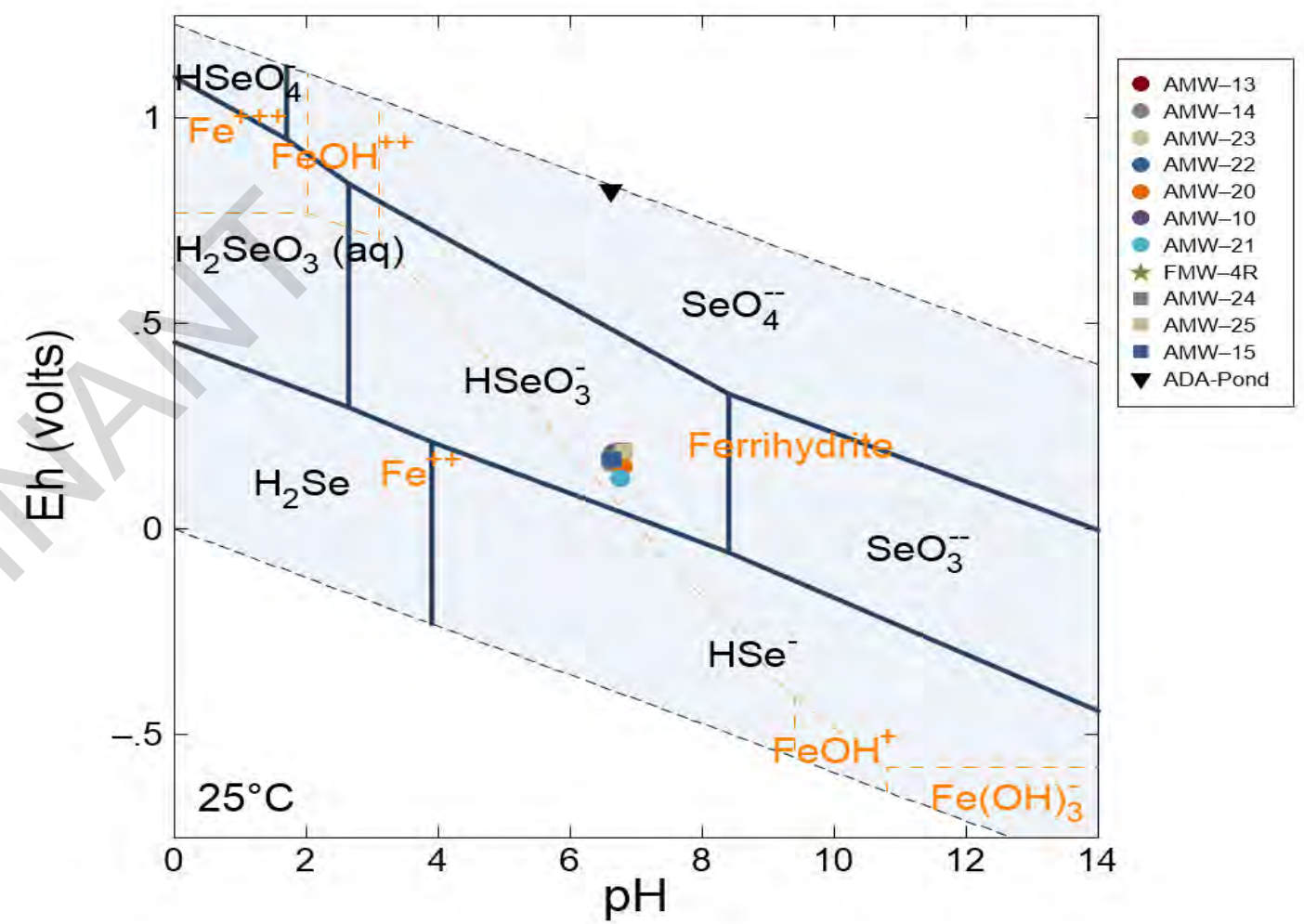
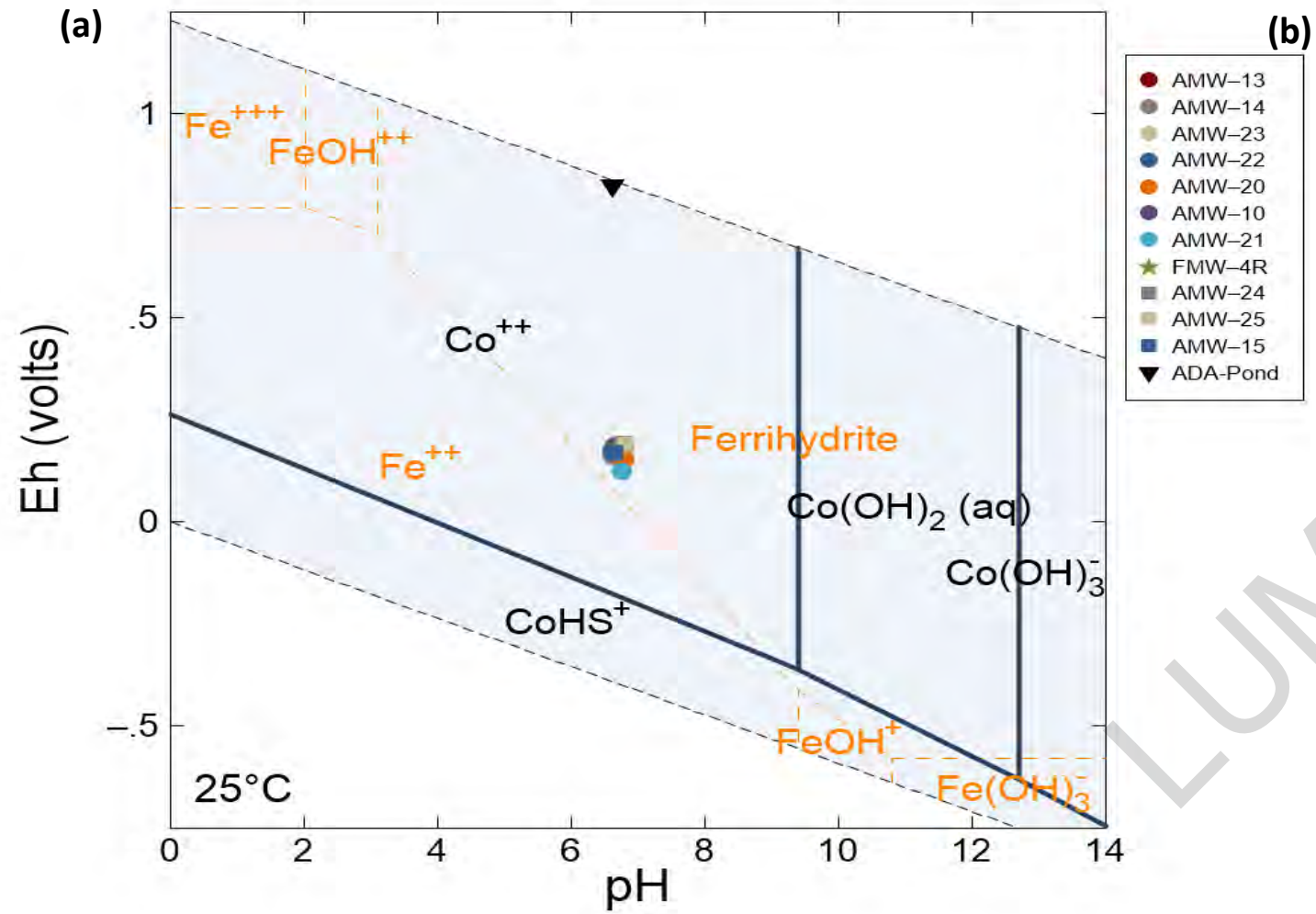
TITLE
HISTORICAL LEVELS OF COBALT (C),
LITHIUM (D), RADIUM 226+228 (E)
AND SELENIUM (F)

PROJECT NO.
19122434

PHASE
A

REV.
1

FIGURE
8c-f



CLIENT
LUMINANT
BIG BROWN SES
ADA II
CONSULTANT



PROJECT
Assessment of Corrective Measures
Geochemical Assessment

TITLE
SPECIATION OF COBALT (A), AND SELENIUM (B)
IN GROUNDWATER AT THE ADA II SITE
(IRON SPECIATION OVERLAID IN ORANGE)

PROJECT NO.
19122434

PHASE
A

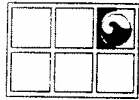
REV.
1

FIGURE
9a-b

APPENDIX A

BORING LOGS

LUMINANT



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well **AMW-10**

Project Big Brown Ash Monitor Wells Owner Texas Utilities
 Location Big Brown Steam Elec. Station, Ash Dispos Area Proj. No. 042480243
 Surface Elev. Total Hole Depth 47.2 ft. Diameter 7.75 in.
 Top of Casing Water Level Initial Static
 Screen: Dia 2 in. Length 10 ft. Type/Size Sch PVC 0.01 in.
 Casing: Dia 2 in. Length 40 ft. Type Sch 40 PVC
 Fill Material Rig/Core Falling F-6
 Drill Co. Andrews & Foster Method Hollow-Stem Auger, CME 3" Sampler
 Driller Don Foster Log By E. Matzner Date 3/20/95 Permit #
 Checked By E.W. Muehlberger License No. 2223

See Site Map
For Boring Location

COMMENTS:

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure)
							Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							
0						SM	0'-1.5' - SANDY SILT - Fill, brown, soft, friable, moist, very fine grained quartz, occasional roots
2						CL	1.5'-7.0' - SANDY SILTY CLAY - Yellowish-brown, red mottling, hard, low plasticity, moist, occasional roots, becomes sandier with depth
4							
6							
8						SM	7.0'-12.5' - CLAYEY SILTY SAND - Tan, gray and orange mottling, medium stiff, low plasticity, friable, slightly moist, very fine to fine-grained quartz, poorly sorted, subangular, trace carbonaceous material
10							
12							
14						CL	12.5'-14.0' - SILTY CLAY - gray, brownish orange mottling, hard, low plasticity, slightly moist, occasional plant fragments, trace carbonaceous material
16						SC	14.0'-15.2' - SILTY CLAYEY SAND - Light gray, reddish-brown mottling, stiff, friable
18							
20						SM	15.2'-22.5' - SILTY SAND - Light gray and tan, soft, friable, dry, very fine-grained quartz, trace mica, trace dark minerals, moderately sorted, subangular, sugary texture
22							
24						ML	22.5'-24.0' - SILT - Light gray, medium stiff, dry, powdery texture
26						CL	24.0'-25.5' - SILTY CLAY - gray, light brown mottling, very hard, dry
28							
30						SM	25.5'-31.5' - SILTY SAND - brownish-yellow and tan, gray mottling, hard, friable, dry, trace carbonaceous material, occasional thin beds of clayey sand, trace white mica



Drilling Log

Monitoring Well **AMW-10**

Project Big Brown Ash Monitor Wells Owner Texas Utilities
 Location Big Brown Steam Elec. Station, Ash Disposal Area Proj. No. 042480243

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description
							(Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30						SM	
32						CL	31.5'-33.0' - SILTY CLAY - brown, gray mottling, very stiff, low plasticity, slightly moist, trace carbonaceous material, trace dark minerals and white mica
34						SM	
36						SC	33.0'-34.5' - SILTY SAND - light brown, gray mottling, medium stiff, low plasticity to friable, moist, trace white mica and dark mineral.
38						SM	34.5'-36.5' - CLAYEY SAND - light brown, gray mottling, medium stiff, low plasticity to friable, moist, trace white mica and dark minerals
40						SM	36.5'-40.0' - SILTY SAND - Brown, medium soft, friable, saturated, fine-grained quartz, moderately sorted, subangular, trace dark minerals and white mica, occasional thin beds of clean sand
42						SP	40.0'-44.0' - SAND - brown, soft, friable, saturated, fine to medium grained quartz, well-sorted, coarser with depth
44							
46						CL	44.0'-47.2' - SANDY SILTY CLAY - brown and gray, yellowish-brown mottling, hard, low plasticity, wet to slightly moist near 47 feet, trace of white mica, dark minerals and carbonaceous material
48							End of Boring at 47.2'
50							
52							
54							
56							
58							
60							
62							
64							
66							
68							
70							



LEIGH ENGINEERING

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 97-1495
 PROJECT NAME TU SERVICES-BBSES
 LOCATION FM 2570, FAIRFIELD, TX
 DRILLING METHOD HSA
 SAMPLING METHOD ST/SS
 GROUND ELEVATION NA
 TOP OF CASING ELEVATION NA
 LOGGED BY K. HENSON /DRILLER N. MOERICKE
 REMARKS SUNNY AND WARM

BORING/WELL NUMBER AMW-13
 DATE DRILLED September 30, 1997
 CASING TYPE/DIAMETER SCH 40 PVC/2-INCH
 SCREEN TYPE/SLOT PRE-PACK SCH 40/0.010
 GRAVEL PACK TYPE 20-40 SAND
 GROUT TYPE BENTONITE
 DEPTH TO WATER/DATE 35.37'/10-1-97
 GROUND WATER ELEVATION/DATE NA
 DRILLING CO. GW MONITORING, INC.

FID (ppm)	BLOW COUNTS	RECOVERY (%)	SAMPLING METHOD	SAMPLE DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
		80	ST		SM		Unconsolidated, very fine-grained, light brown SILTY SAND, fill	2.0	<p>Concrete Grout Bentonite Pellets to 4' 40' PVC Casing Sand Backfill of Annular Space to 33' 10' PVC Screen End Cap</p>
		100	ST		CH		Hard, dry, stiff, brown CLAY, fill	3.0	
		100	ST		SM		Unconsolidated, very fine-grained, tan SILTY SAND, fill	4.0	
		100	ST	5	CL		Very stiff, brown SILTY CLAY, grading to a stiff, brown SANDY CLAY, with trace of roots and organic matter		
		100	ST				- hard, dry, light gray and reddish-brown mottled, stiff SANDY CLAY		
		80	ST					10.0	
		100	ST		SC		Hard, dry, stiff light gray and reddish brown CLAYEY SAND	12.5	
		100	ST		CL		Hard, dry, stiff, gray and reddish-brown SANDY CLAY	13.0	
		100	ST	15	SP		Dry, consolidated, very fine-grained, light gray and reddish brown SAND		
		100	ST				- 3-inch SANDY CLAY stringer, loose		
		100	ST				- more SANDY with some medium-stiff SANDY CLAY stringers (<3 inches)	20.0	
		100	SS		SC		Medium soft, light gray with some reddish brown iron-staining CLAYEY SAND	22.5	
		100	SS		CL		Medium-stiff, reddish brown and gray mottled SILTY CLAY		
		100	ST	25			- more sandy		
		100	ST				- alternating light gray and reddish-brown medium stiff SANDY and SILTY CLAYS	26.5	
		70	ST		SC		Soft, light gray and reddish-brown mottled CLAYEY SAND	27.5	
		100	SS		SP		Unconsolidated, fine-grained, light brown SAND	28.5	
		100	ST	30	SC		Soft, moist, reddish-brown and light gray CLAYEY SAND		
		100	ST				- wet, light brown and gray		
		100	ST				- some root fragments	34.0	
		100	ST	35	SP		Loose, fine-grained, brown SAND, wet	34.5	
		100	ST		SC		Soft, light brown and gray mottled, CLAYEY SAND, with root fragments	37.0	
		90	ST		SP		Loose, fine-grained, light brown SAND, wet	39.0	
		90	ST	40	CL		Medium-stiff, reddish-brown SILTY CLAY	41.5	
		100	ST				- sandy		
		100	ST		SC		Medium-soft, brown CLAYEY SAND, wet	42.5	
		100	ST		SP		Loose, fine-grained, light brown SAND, wet	43.0	
		100	ST		SC		Soft, brown CLAYEY SAND, wet	43.5	
		100	ST	45	SP		Loose, medium-grained, brown SAND, wet	45.5	
					SC		Brown, soft, CLAYEY SAND	46.0	
							BORING TERMINATED AT 46.0 FEET		
				50					

BWC 71495 11/3/97



Log of Boring: AMW-14

BBSES
Confidential Lanfill

Completion Date:	1/20/2012	Drilling Method:	HSA
Drilling Company:	ETTL	Borehole Diameter (in.):	8.25
Driller:	Tommy Cook	Total Depth (ft):	55
Driller's License:	628748	Northing:	No Data
Field Supervisor:	Tim Jennings	Easting:	No Data
Sampling Method:	5' Sample Tube	Ground Elev. (ft AMSL):	No Data

PBW Project No. 1724

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Lithologic Description
0		5.0/5.0	SC	(0.0 - 8.0) Clayey SAND, grayish-brown, moist, soft, medium plasticity.
5		5.0/5.0	CL	(8.0 - 10.3) Sandy CLAY, dark brownish-gray, moist, hard, medium plasticity.
10		5.0/5.0	SC	(10.3 - 12.3) Clayey SAND, brownish-orange, moist, soft, medium plasticity.
15		5.0/5.0	CL	(12.3 - 14.2) Sandy CLAY, gray, orange mottling, moist, firm, medium plasticity.
20		5.0/5.0	SC	(14.2 - 25.0) Clayey SAND, less clay below 15.0', light gray to light brown, dry, very hard to soft, medium plasticity.
25		4.0/5.0		
30		3.5/5.0	SP/SM	(25.0 - 31.7) SAND and silty SAND, sand with silty sand locally, brown with gray locally, moist, soft.
35		3.5/5.0	SC	(31.7 - 35.0) Clayey SAND, brown, moist, firm, medium plasticity.
40		3.0/5.0	SP/SM	(35.0 - 41.6) SAND with silty sand interbeds, moist, soft.
45		2.5/5.0	CL	(41.6 - 44.0) Sandy CLAY, brown, moist, soft, medium plasticity.
47		3.5/5.0	SM	(44.0 - 47.0) Silty SAND, brown, wet, soft.
50		3.5/5.0	CL	(47.0 - 48.1) Sandy CLAY, brown, wet, soft, medium plasticity.
55		4.0/5.0	SM	(48.1 - 52.2) Silty SAND, brown, wet, soft.
		4.0/5.0	CL	(52.2 - 55.0) Sandy CLAY, brown, wet, firm, medium plasticity.

New pump was 56.5'

Cut off 10'

Pump will sit @ 46.5'

PBW

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

Notes:	
<u>Annular Materials</u>	<u>Well Materials</u>
(0.0 - 33.0) Concrete (33.0 - 35.0) Bentonite Chips (35.0 - 54.4) 20/40 Silica Sand	(+2.5 - 39.4) Casing, 2" Sch 40 FJT PVC (39.4 - 55.0) Screen, 2" VPACK Sch 40 FJT PVC, 0.012 slot



Log of Boring: AMW-15

BBSES
Confidential Lanfill

Completion Date:	1/20/2012	Drilling Method:	HSA
Drilling Company:	ETTL	Borehole Diameter (in.):	8.25
Driller:	Tommy Cook	Total Depth (ft):	84
Driller's License:	628748	Northing:	No Data
Field Supervisor:	Tim Jennings	Easting:	No Data
Sampling Method:	5' Sample Tube	Ground Elev. (ft AMSL):	No Data

PBW Project No. 1724

3ft
Riser

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Lithologic Description
0		4.0/4.0	SC	(0.0 - 6.5) Clayey SAND, brown and orange, moist, firm, medium plasticity.
5		5.0/5.0		(6.5 - 11.0) Sandy CLAY, reddish-brown and orange, moist, firm, medium plasticity.
10		4.0/5.0	CL	(11.0 - 19.0) Sandy CLAY, brown with gray and orange banding, moist, firm, medium plasticity.
15		2.5/5.0		(19.0 - 24.0) Clayey SAND, brown with gray banding, moist, soft.
20		2.5/5.0	SC	(24.0 - 31.2) SAND, brown to locally gray, moist, soft.
25		1.5/5.0	SP	(31.2 - 34.0) Sandy CLAY, brown with thin black and gray laminations, moist, firm to hard, medium plasticity.
30		4.0/5.0	CL	(34.0 - 40.3) SAND and clayey SAND, brown, moist, soft.
35		1.5/5.0	SC/SP	(40.3 - 49.1) Silty CLAY, brown, moist, soft to firm, medium plasticity.
40		3.5/5.0	CL	(49.1 - 50.1) SAND, brown, moist, soft.
45		5.0/5.0	SP	(50.1 - 56.8) Sandy CLAY, brown, moist, soft to firm, medium plasticity.
50		3.5/5.0	CL	(56.8 - 58.5) Sandy CLAY, orangish-brown, moist, soft to firm, medium plasticity.
55		5.0/5.0		(58.5 - 64.0) Clayey to silty SAND, orangish-brown, moist (increasing moisture), soft, medium plasticity.
60		3.2/5.0	SC/SM	(64.0 - 79.0) SAND, some thin (< 0.05') sandy clay interbeds locally, brown, moist, soft.
65		1.0/5.0		
70		1.0/5.0	SP	
75		0.0/5.0		
80		2.5/5.0	SP/GP	(79.0 - 84.0) SAND and GRAVEL, wet.

PBW

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

Notes: **Original Pump was 86.5'**
cut off 12'. Pump 74.5'

Annular Materials
(0.0 - 64.0) Concrete
(64.0 - 66.0) Bentonite Chips
(66.0 - 82.6) 20/40 Silica Sand

Well Materials
(+2.5 - 67.0) Casing, 2" Sch 40 FJT PVC
(67.0 - 82.6) Screen, 2" VPACK Sch 40 FJT PVC,
0.012 slot



Log of Boring: AMW-20

BBSES
Confidential Landfill

PBW Project No. 1724

Completion Date:	12/12/2011	Drilling Method:	HSA
Drilling Company:	ETTL	Borehole Diameter (in.):	8.25
Driller:	Tommy Cook	Total Depth (ft):	60
Driller's License:	628748	Northing:	No Data
Field Supervisor:	Roberta McClure	Easting:	No Data
Sampling Method:	5' Sample Tube	Ground Elev. (ft AMSL):	No Data

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Lithologic Description
0		0.0/4.0		
5		5.0/5.0	CL	(0.0 - 9.0) Sandy CLAY, light reddish-brown, yellowish-red mottling, dry, hard, low plasticity.
10		3.5/5.0	SC	(9.0 - 14.0) Clayey SAND, light reddish-gray, less clay with depth, unconsolidated, moist.
15		3.0/5.0	CL	(14.0 - 16.0) Silty CLAY, light gray, reddish-brown mottling, moist, firm, low plasticity.
20		2.0/5.0	CL	(16.0 - 18.0) Clayey SAND, light gray, reddish-brown mottling, unconsolidated, sharp basal contact, moist.
25		3.5/5.0	SC	(18.0 - 19.0) Silty CLAY, light gray, reddish-brown mottling, low plasticity.
30		2.5/5.0		(19.0 - 32.0) Clayey SAND, light gray, reddish-brown mottling, unconsolidated, some sandy clay interbeds, moist.
35		4.0/5.0	CL	
40		3.0/5.0	CL	(32.0 - 45.0) Silty CLAY, light gray, reddish-brown staining, some sandy clay stringers, very moist, soft to slightly firm, medium plasticity.
45		3.5/5.0		
50		3.5/5.0	SM	(45.0 - 54.0) Silty SAND, some clay content from 43.0-49.0', reddish-brown, unconsolidated, moist, saturated at 47.0', soft.
55		5.0/5.0	CH	(54.0 - 57.0) CLAY, dark gray, reddish-brown staining, wet, firm, hard.
60			CL	(57.0 - 59.0) Sandy CLAY, dark gray, reddish-brown staining, very moist, soft, low plasticity.

53

Cut 10' off of New Pump
62.5' - 10' = 52.5'

PBW

Pastor, Behling & Wheeler, LLC
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Round Rock, TX 78664
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Notes:

Annular Materials

(0.0 - 1.0) Concrete
(1.0 - 40.0) Grout
(40.0 - 42.0) Bentonite Chips
(42.0-60.0) 20/40 Silica Sand

Well Materials

(+3.0 - 45.0) Casing, 2" Sch 40 FJT PVC
(45.0 - 60.0) Screen, 2" VPACK Sch 40 FJT PVC, 0.012 slot

Rone Engineering

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 10-16140 BORING/WELL NUMBER FMW-4R
 PROJECT NAME Big Brown SES DATE DRILLED 12/3/10
 LOCATION 850 FM 2570, Fairfield, TX CASING TYPE/DIAMETER PVC / 2"
 DRILLING METHOD HSA SCREEN TYPE/SLOT PVC / 0.10
 SAMPLING METHOD CT GRAVEL PACK TYPE 16/30 Sand
 GROUND ELEVATION Not Determined GROUT TYPE Hydrated Bentonite
 TOP OF CASING ELEVATION Not Determined DEPTH TO WATER/DATE Not Recorded
 LOGGED BY S. Williams /DRILLER R. Garcia GROUND WATER ELEVATION/DATE Not Recorded
 REMARKS Overcast, 60-68 ° F DRILLING CO. West


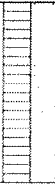
PID (ppm)	LEL (%)	RECOVERY (%)	SAMPLING METHOD	SAMPLE DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
NA		100	CT				FILL: - dark brown sand and gravel	2.0	
					CL		SILTY SANDY CLAY - light brown, slight hydrocarbon odor 1.5-2'	5.0	
NA		60	CT	5	CL		SANDY SILTY CLAY - reddish brown, medium stiff	10.0	
NA		100	CT	10	SC		FINE CLAYEY SAND - light gray, with iron staining	11.5	
					CL		SANDY CLAY - light gray, with iron staining, very stiff	15.0	
NA		30	CT	15	CL		SANDY CLAY - light gray and brown, with iron staining, soft	20.0	
NA		50	CT	20	SC		CLAYEY SAND - light brown, fine	25.0	
NA		20	CT	25				30' of Casing	
NA		60	CT	30				Sand to 23'	
				35				10' of Screen	

BIVC_10-16140.GPJ_12/7/10

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 10-16140 BORING/WELL NUMBER FMW-4R
 PROJECT NAME Big Brown SES DATE DRILLED 12/3/10

continued from previous page

PID (ppm)	LEL (%)	RECOVERY (%)	SAMPLING METHOD	SAMPLE DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
NA		60	CT	40			Bottom of Borehole at 40 Feet 31 ° 49.619 N 096 ° 02.919 W	40.0	

BWC_10-16140.GPJ 12/7/10

Luminant

Log of Boring: AMW-21

Big Brown Steam Electric Station Fairfield, TX	Completion Date:	9/13/2015	Drilling Method:	Sonic
	Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
PBW Project No. 5164A	Driller:	Dwayne Whitehead	Total Depth (ft):	60.5
	Driller's License:	5814M	TOC Elevation (ft. AMSL):	325.389
	Logged By:	Nolan Townsend	Northing:	10656902.126
	Sampling Method:	4"x10' Core barrel	Easting:	3626989.216

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Lithologic Description
0				
5		2.0/10.0	SM	(0 - 11.6) Silty SAND with trace clay, light gray to tan, dry, unconsolidated, very fine grain sand, sharp basal contact
10				
15		3.9/10.0	SC CL	(11.6 - 13.5) Clayey SAND with silt, light gray to tan, moist, slightly to moderately unconsolidated, very fine sand, trace to moderate orange mottling, mostly quartz sand, sharp basal contact
20			SC	(13.5 - 13.9) Sandy CLAY, light gray with moderate orange mottling, slightly moist, firm, low to moderate plasticity, thin sandy interbeds, very fine grain
25		2.3/10.0		(13.9 - 21.8) Clayey, silty SAND, light gray to tan, moist, moderately consolidated, low plasticity, very fine grain, sharp basal contact
30				
35		3.5/10.0	CL	(21.8 - 42.9) Sandy CLAY, light gray with moderate orange mottling, moist, firm, low to moderate plasticity, 33'-33.5' dark gray bands in clay (possibly lignitic), thin sandy interbeds, sand content increases with depth
40				
45		3.8/10.0	SM	(42.9 - 52.5) Silty SAND, brownish yellow with tan, wet, moderately to slightly unconsolidated, trace clay, very fine sand, saturated
50				
55		9.5/10.0	CH	(52.5 - 55.5) CLAY, light gray with abundant orange mottling, moist, hard, moderate to high plasticity, trace sand
			SM	(55.5 - 59.4) Silty SAND, tan/brownish yellow, saturated, moderately unconsolidated, very fine grain
60			CH	(59.4 - 60.5) CLAY with grace sandy lenses, dry to moist, hard, moderate to high plasticity

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
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Notes:

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

Well Materials

(+3.21 - 40.5) Casing, 2" Sch 40 FJT PVC
(40.5 - 60.5) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials

(0'-36") Grout
(36'-38") Bentonite pellets
(38'-60.5') 20/40 sand

Luminant

Log of Boring: AMW-22

Big Brown Steam Electric Station Fairfield, TX	Completion Date:	9/13/2015	Drilling Method:	Sonic
	Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
PBW Project No. 5164A	Driller:	Dwayne Whitehead	Total Depth (ft):	60
	Driller's License:	5814M	TOC Elevation (ft. AMSL):	318.685
	Logged By:	Nolan Townsend	Northing:	10657510.227
	Sampling Method:	4"x10' Core barrel	Easting:	3629150.29

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Lithologic Description
0		2.5/10.0	ML	(0 - 1.3) Sandy SILT, light gray to tan, dry, unconsolidated, powdery, trace roots at top, very fine sand, sharp basal contact
5			CL	(1.3 - 3.5) Sandy CLAY, gray to yellowish brown with moderate red-orange mottling, dry, very hard, low plasticity
10		3.5/10.0	ML	(3.5 - 11.4) Sandy SILT, light gray to brownish yellow, dry, unconsolidated, powdery, very fine sand, sharp basal contact
15			CL	(11.4 - 12) Sandy CLAY, light gray to gray with abundant orange mottling, dry to slightly moist, firm to hard, low plasticity, very fine sand, sand increase and clay decrease with depth, gradational basal contact
20		3.4/10.0	SM/ML	(12 - 21.6) Silty SAND with trace clay, tan to brownish yellow, dry to slightly moist, moderately unconsolidated, low plasticity, becomes powdery after 20', increased silt content
25			CL	(21.6 - 23.4) Sandy CLAY, light gray to gray to yellow brown with moderate to trace orange/red mottling, dry to slightly moist, hard, low plasticity, very fine sand
30		3.7/10.0	SM/ML	(23.4 - 52.5) Silty SAND, brownish yellow, dry to slightly moist near 40', wet at 42.1', unconsolidated, mostly quartz with ~ 10% lithics, trace clay, sharp basal contact
35				
40		3.0/10.0	SM/ML	(23.4 - 52.5) Silty SAND, brownish yellow, dry to slightly moist near 40', wet at 42.1', unconsolidated, mostly quartz with ~ 10% lithics, trace clay, sharp basal contact
45				
50		5.2/10.0	CH	(52.5 - 55.2) Sandy CLAY, gray/yellow brown, moist, hard to very hard, moderate to high plasticity, moderate to abundant orange mottling, very fine sandy interbeds/lenses (very thin)
55				
60				

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

(+2.91 - 35.5) Casing, 2" Sch 40 FJT PVC
 (35.5 - 55.5) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials

(0'-31') Grout
 (31'-33') Bentonite pellets
 (33'-55.5) 20/40 sand

Luminant

Log of Boring: AMW-23

Big Brown Steam Electric Station Fairfield, TX	Completion Date:	9/13/2015	Drilling Method:	Sonic
	Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
PBW Project No. 5164A	Driller:	Dwayne Whitehead	Total Depth (ft):	70
	Driller's License:	5814M	TOC Elevation (ft. AMSL):	320.366
	Logged By:	Nolan Townsend	Northing:	10656924.968
	Sampling Method:	4"x10' Core barrel	Easting:	3629516.245

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Lithologic Description
0				(0 - 2.7) Silty, sandy CLAY, light gray to tan, dry, very hard (indurated), low plasticity, trace sand (very fine grain), small pores visible, sharp basal contact
5		5.1/10.0	CL	(2.7 - 12.5) Sandy CLAY, dark to light gray with trace to moderate orange mottling, dry, very hard, low plasticity, sharp basal contact
10				
15		4.9/10.0	SM	(12.5 - 20) Silty SAND, light gray with moderate orange mottling, dry to slightly moist, slightly unconsolidated, low plasticity, trace clay
20				
25		1.8/10.0	CL	(20 - 30) Silty, sandy CLAY, light gray, dry, very hard, low plasticity, trace to abundant orange mottling, trace roots, very fine sand, hard drilling
30				
35		3.2/10.0	SM	(30 - 42) Silty SAND, light gray to tan, dry to very slightly moist, moist to very moist 41'-42', slightly to moderately unconsolidated, silt content decreasing with depth, very fine sand, mostly quartz sand with <10% lithic fragments
40				
45		3.4/10.0	CH	(42 - 43.4) Sandy CLAY, light gray with abundant orange mottling, moist to very moist, firm to hard, moderate to high plasticity, thin sandy lenses
50			SM	(43.4 - 52.5) Silty SAND with trace clay, yellow brown, very moist to wet, slightly to moderately unconsolidated, very fine to fine sand, wet at 50'
55		4.8/10.0	CH	(52.5 - 54.8) Sandy CLAY, light gray, very moist, firm, moderate to high plasticity, moderate to abundant orange mottling, very fine to fine sand lenses
60			SM	(54.8 - 61.8) Silty SAND with trace clay, yellow brown, very moist, moderately unconsolidated, very fine to fine sand
65		3.1/10.0	CH	(61.8 - 70) Sandy CLAY, light gray with abundant orange mottling/brownish yellow to yellow brown, moist, hard, moderate to high plasticity, thin sandy interbeds of very fine sand
70				

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

(3.64 - 39.5) Casing, 2" Sch 40 FJT PVC
 (39.5 - 59.5) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials

(0'-35') Grout
 (35'-37') Bentonite pellets
 (37'-59.5') 20/40 sand

Luminant

Log of Boring: AMW-24

Big Brown Steam Electric Station Franklin, Texas	Completion Date:	6/4/2019	Drilling Method:	Sonic
	Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6
Golder Project No. 19122434E	Driller:	Rodney Labrosse	Total Depth (ft):	34
	Driller's License:	60059	TOC Elevation (ft. AMSL):	237.42
	Logged By:	Jacob Jarvis	Northing:	3526201
	Sampling Method:	4"x10' Core barrel	Easting:	779336.7

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Lithologic Description
0				
5		10.0/10.0	CH	(0 - 7.5) CLAY, gray, high plasticity, hard, damp
10			SP	(7.5 - 10) SAND, fine grained, tan to light brown, no plasticity, damp, trace fine clay lenses throughout sample
15		10.0/10.0	CH	(10 - 20) CLAY, gray mottled with brown, trace sand from 10'-12', very hard, high plasticity, dry
20			CL	(20 - 24) Sandy CLAY, gray mottled with brown, sand throughout is fine, firm, low plasticity, dry, sharp basal contact
25		10.0/10.0	SW	(24 - 30) SAND, fine grained, saturated, tan to brown, well sorted, soft, no plasticity
30		4.0/4.0		(30 - 32) SAND, coarse grained, trace gravel throughout, gravel is subround, brown, soft, no plasticity
				(32 - 34) SAND, fine grained, wet, tan to brown, well sorted, soft, no plasticity



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.

Well Materials

(+3.50 - 24) Casing, 2" Sch 40 FJT PVC
(24 - 34) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials

(0'-20') Grout
(20'-22') Bentonite pellets
(22'-34') 20/40 sand

Luminant

Log of Boring: AMW-25

Big Brown Steam Electric Station Franklin, Texas	Completion Date:	6/4/2019	Drilling Method:	Sonic
	Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6
Golder Project No. 19122434E	Driller:	Rodney Labrosse	Total Depth (ft):	65
	Driller's License:	60059	TOC Elevation (ft. AMSL):	272.97
	Logged By:	Jacob Jarvis	Northing:	3526394
	Sampling Method:	4"x10' Core barrel	Easting:	779622.9

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Lithologic Description
0				
5		0.0/10.0		
10			CH	(0 - 24) CLAY SPOIL, gray to brown, very hard, hgh plasticity, black and gray coal fragments throughout, ranging from 1-2cm to cobbles
15		10.0/10.0		
20				
25		10.0/10.0		
30			CL	(24 - 36) Sandy CLAY SPOIL, fine to coarse grained, few gravels, coal fragments, brown to black, firm, medium plasticity, dry
35		10.0/10.0		
40			SC	(36 - 39) Clayey SAND SPOIL, fine grained, soft, low plasticity, no coal, tan to black
45			CL	(39 - 40) CLAY SPOIL, coal fragments throughout, crumbly, medium plasticity, firm
50			SC	(40 - 44) Clayey SAND SPOIL, moist, sand is fine grained, tan, soft, clay lense from 42'-43', lense is firm
55		8.0/10.0		
60			CH	(44 - 50) CLAY SPOIL, abundant coal fragments, same as above, firm, high plasticity, dry
65				
			SC	(50 - 56) Clayey SAND SPOIL, tan to light brown, sand is fine grained, soft, low plasticity, damp
		10.0/10.0		
			SP	(56 - 64) SAND SPOIL, fine grained, wet, soft, tan to light brown, clay lenses throughout
		4.0/4.0		



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.

Well Materials

(+3.50 - 55) Casing, 2" Sch 40 FJT PVC
(55 - 65) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials

(0'-50') Grout
(50'-52.5') Bentonite pellets
(52.5'-65') 20/40 sand

Luminant

Log of Boring: ADA-2019-1

Big Brown Steam Electric Station Franklin, TX	Completion Date:	6/3/2019	Drilling Method:	Sonic
	Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6
Golder Project No. 19122434E	Driller:	Rodney Labrosse	Total Depth (ft):	60
	Driller's License:	60059	TOC Elevation (ft. AMSL):	
	Logged By:	Jacob Jarvis	Northing:	3525868
	Sampling Method:	4"x10' Core barrel	Easting:	780197.9

Depth (ft)	Recovery (ft/ft)	USCS	Lithologic Description
0	0.0/5.0	NR	(0 - 5) Post hole dig
5	5.0/5.0	CL	(5 - 15) Sandy CLAY, orange to brown, some gray, firm, low to moderate plasticity, sand is fine, varies in abundance throughout
10	6.0/10.0		
15	6.0/10.0	CH	(15 - 20) CLAY, orange to brown, very hard, dry, high plasticity, some gray throughout
20	6.2/7.0	CL	(20 - 24) Silty CLAY, brown, soft, dry, low plasticity, sharp lower contact
25	0.0/10.0	SW	(24 - 35) SAND, orange to brown, some gray, firm, crumbles when breaks, dry, fine grained, no plasticity, clay lense 29'-30', clay is brown, dry, mod plasticity, firm
30			
35	5.0/5.0	CL	(35 - 37.6) CLAY, powdered, white to gray, dry, very soft, no plasticity
40	6.3/10.0	SW	(37.6 - 44) SAND, fine grained, gray to orange, very soft, dry
45			
50	6.3/10.0	CH	(44 - 50) CLAY, brown, dry, firm to hard, moderate plasticity, drilling is very slow, sample is hard
55	10.0/10.0	CL	(50 - 51) Sandy CLAY, soft, gray to brown, dry, no plasticity, sand is fine
60			
		SP	(51 - 60) SAND, fine grained, gray to brown, saturated at 51', some fine clay lenses, soft to firm, no plasticity



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.

APPENDIX B

**LABORATORY ANALYTICAL
REPORTS**

LUMINANT



June 13, 2019

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

Order No.: 1905066

Dear Will Vienne:

DHL Analytical, Inc. received 7 sample(s) on 5/7/2019 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,

A handwritten signature in red ink, appearing to read 'John DuPont', written over a large, light grey watermark that says 'LUMINANT' diagonally across the page.

John DuPont
General Manager

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



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LUMINANT



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



№ 82709
 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: 5-6-19 PAGE 1 OF 1
 PO #: 19122262-A DHL WORK ORDER #: 1905066
 PROJECT LOCATION OR NAME: LUMINANT-BBSES-ASH LANDFILL
 CLIENT PROJECT #: 19122262-A COLLECTOR: JOHN BEATTON

Authorize 5% surcharge for TRRP Report?
 Yes No

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

PRESERVATION
 HCl HNO₃
 H₂SO₄ 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 2008 DISS. METALS
 PH HEX CHROM
 CHLORIDE TCLP-SVOC ANIONS
 TCAP-METALS VOCC
 RC1 ALKALINITY COD
 TDS FLASHPOINT RCRA 800 PEST HERB
 TSS % MOISTURE DGAS Pb
APPENDIX III & IV
FERROUS & FERRIC IRON
Alk, Ni, Pb, Mn, Mg, K

Field Sample I.D.	DHL Lab #	Date	Time	Matrix	Container Type	# of Containers	HCl	HNO ₃	H ₂ SO ₄	NaOH	ICE	UNPRESERVED	ANALYSES	FIELD NOTES
AMW-13	01	5-6-19	0750	W		7								XXX
AMW-14	02		0855	W		7								XXX
AMW-23	03		0950	W		7								XXX
AMW-22	04		1045	W		7								XXX
AMW-20	05		1145	W		7								XXX
AMW-10	06		1300	W		7								XXX
AMW-21	07		1405	W		7								XXX

RELINQUISHED BY: (Signature) John Beaton DATE/TIME 5-6-19 1815 RECEIVED BY: (Signature) FedEx

RELINQUISHED BY: (Signature) FedEx DATE/TIME 5/7/19 1100 RECEIVED BY: (Signature) [Signature]

RELINQUISHED BY: (Signature) [Signature] DATE/TIME 5/7/19 1115 RECEIVED BY: (Signature) [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: 3.9/2.75 THERM #: 78
 CUSTODY SEALS: BROKEN INTACT NOT USED
 CARRIER: LONE STAR FEDEX UPS OTHER
 COURIER DELIVERY
 HAND DELIVERED

DHL CARRIER # 11 FEB 2019

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

Sample Receipt Checklist

Client Name Golder

Date Received: 5/7/2019

Work Order Number 1905066

Received by EL

Checklist completed by: [Signature] 5/7/2019
Signature Date

Reviewed by: [Initials] 5/7/2019
Initials Date

Carrier name Hand Delivered

- Shipping container/cooler in good condition? Yes [checked] No [] Not Present []
Custody seals intact on shipping container/cooler? Yes [] No [] Not Present [checked]
Custody seals intact on sample bottles? Yes [] No [] Not Present [checked]
Chain of custody present? Yes [checked] No []
Chain of custody signed when relinquished and received? Yes [checked] No []
Chain of custody agrees with sample labels? Yes [checked] No []
Samples in proper container/bottle? Yes [checked] No []
Sample containers intact? Yes [checked] No []
Sufficient sample volume for indicated test? Yes [checked] No []
All samples received within holding time? Yes [checked] No []
Container/Temp Blank temperature in compliance? Yes [checked] No [] 3.7 °C
Water - VOA vials have zero headspace? Yes [checked] No [] No VOA vials submitted []
Water - pH<2 acceptable upon receipt? Yes [checked] No [] NA [] LOT # 11837
Adjusted? no Checked by EL
Water - pH>9 (S) or pH>10 (CN) acceptable upon receipt? Yes [] No [] NA [checked] 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 _____

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Lab Order: 1905066

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 M4500-P E - Orthophosphate 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 M2540C - TDS Analysis
Sub-contract - Radium-228 and Radium-226 analyses by methods E904 and SM 7500 Ra B M.
Analyzed at Pace Analytical.

LOG IN

The samples were received and log-in performed on 5/7/19. A total of 7 samples were received. The samples arrived in good condition and were properly packaged.

METALS ANALYSIS

For Metals analysis performed on 5/9/19 the PDS recovery was below control limits for three analytes. These are flagged accordingly in the QC summary report. The serial dilution was within control limits for these analytes. No further corrective actions were taken.

For Metals analysis performed on 5/9/19 three LCVLs were below control limits for Potassium and/or Sodium. These are flagged accordingly. The associated CCVs were within control limits for these analytes. No further corrective actions were taken.

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Lab Order: 1905066

Work Order Sample Summary

Lab Smp ID	Client Sample ID	Tag Number	Date Collected	Date Recved
1905066-01	AMW-13		05/06/19 07:50 AM	5/7/2019
1905066-02	AMW-14		05/06/19 08:55 AM	5/7/2019
1905066-03	AMW-23		05/06/19 09:50 AM	5/7/2019
1905066-04	AMW-22		05/06/19 10:45 AM	5/7/2019
1905066-05	AMW-20		05/06/19 11:45 AM	5/7/2019
1905066-06	AMW-10		05/06/19 01:00 PM	5/7/2019
1905066-07	AMW-21		05/06/19 02:05 PM	5/7/2019

LUMINANT

Lab Order: 1905066
Client: Golder
Project: Luminant-BBSES-Ash Landfill

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1905066-01A	AMW-13	05/06/19 07:50 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/10/19 04:05 PM	90853
1905066-01B	AMW-13	05/06/19 07:50 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/08/19 08:24 AM	90776
	AMW-13	05/06/19 07:50 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/08/19 08:24 AM	90776
	AMW-13	05/06/19 07:50 AM	Aqueous	SW7470A	Mercury Aq Prep	05/09/19 08:30 AM	90812
1905066-01C	AMW-13	05/06/19 07:50 AM	Aqueous	M2320 B	Alkalinity Preparation	05/07/19 02:06 PM	90772
	AMW-13	05/06/19 07:50 AM	Aqueous	E300	Anion Preparation	05/07/19 01:40 PM	90743
	AMW-13	05/06/19 07:50 AM	Aqueous	E300	Anion Preparation	05/07/19 01:40 PM	90743
	AMW-13	05/06/19 07:50 AM	Aqueous	M4500-P E	Orthophosphate Prep	05/07/19 03:18 PM	90774
	AMW-13	05/06/19 07:50 AM	Aqueous	M2540C	TDS Preparation	05/09/19 10:30 AM	90791
1905066-02A	AMW-14	05/06/19 08:55 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/10/19 04:05 PM	90853
1905066-02B	AMW-14	05/06/19 08:55 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/08/19 08:24 AM	90776
	AMW-14	05/06/19 08:55 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/08/19 08:24 AM	90776
	AMW-14	05/06/19 08:55 AM	Aqueous	SW7470A	Mercury Aq Prep	05/09/19 08:30 AM	90812
1905066-02C	AMW-14	05/06/19 08:55 AM	Aqueous	M2320 B	Alkalinity Preparation	05/07/19 02:06 PM	90772
	AMW-14	05/06/19 08:55 AM	Aqueous	E300	Anion Preparation	05/07/19 01:40 PM	90743
	AMW-14	05/06/19 08:55 AM	Aqueous	E300	Anion Preparation	05/07/19 01:40 PM	90743
	AMW-14	05/06/19 08:55 AM	Aqueous	M4500-P E	Orthophosphate Prep	05/07/19 03:18 PM	90774
	AMW-14	05/06/19 08:55 AM	Aqueous	M2540C	TDS Preparation	05/09/19 10:30 AM	90791
1905066-03A	AMW-23	05/06/19 09:50 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/10/19 04:05 PM	90853
1905066-03B	AMW-23	05/06/19 09:50 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/08/19 08:24 AM	90776
	AMW-23	05/06/19 09:50 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/08/19 08:24 AM	90776
	AMW-23	05/06/19 09:50 AM	Aqueous	SW7470A	Mercury Aq Prep	05/09/19 08:30 AM	90812
1905066-03C	AMW-23	05/06/19 09:50 AM	Aqueous	M2320 B	Alkalinity Preparation	05/07/19 02:06 PM	90772
	AMW-23	05/06/19 09:50 AM	Aqueous	E300	Anion Preparation	05/07/19 01:40 PM	90743
	AMW-23	05/06/19 09:50 AM	Aqueous	E300	Anion Preparation	05/07/19 01:40 PM	90743
	AMW-23	05/06/19 09:50 AM	Aqueous	M4500-P E	Orthophosphate Prep	05/07/19 03:18 PM	90774
	AMW-23	05/06/19 09:50 AM	Aqueous	M2540C	TDS Preparation	05/09/19 10:30 AM	90791
1905066-04A	AMW-22	05/06/19 10:45 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/10/19 04:05 PM	90853

Lab Order: 1905066
 Client: Golder
 Project: Luminant-BBSES-Ash Landfill

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1905066-04B	AMW-22	05/06/19 10:45 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/08/19 08:24 AM	90776
	AMW-22	05/06/19 10:45 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/08/19 08:24 AM	90776
	AMW-22	05/06/19 10:45 AM	Aqueous	SW7470A	Mercury Aq Prep	05/09/19 08:30 AM	90812
1905066-04C	AMW-22	05/06/19 10:45 AM	Aqueous	M2320 B	Alkalinity Preparation	05/07/19 02:06 PM	90772
	AMW-22	05/06/19 10:45 AM	Aqueous	E300	Anion Preparation	05/07/19 01:40 PM	90743
	AMW-22	05/06/19 10:45 AM	Aqueous	E300	Anion Preparation	05/07/19 01:40 PM	90743
	AMW-22	05/06/19 10:45 AM	Aqueous	M4500-P E	Orthophosphate Prep	05/07/19 03:18 PM	90774
	AMW-22	05/06/19 10:45 AM	Aqueous	M2540C	TDS Preparation	05/09/19 10:30 AM	90791
1905066-05A	AMW-20	05/06/19 11:45 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/10/19 04:05 PM	90853
1905066-05B	AMW-20	05/06/19 11:45 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/08/19 08:24 AM	90776
	AMW-20	05/06/19 11:45 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/08/19 08:24 AM	90776
	AMW-20	05/06/19 11:45 AM	Aqueous	SW7470A	Mercury Aq Prep	05/09/19 08:30 AM	90812
1905066-05C	AMW-20	05/06/19 11:45 AM	Aqueous	M2320 B	Alkalinity Preparation	05/07/19 02:06 PM	90772
	AMW-20	05/06/19 11:45 AM	Aqueous	E300	Anion Preparation	05/07/19 01:40 PM	90743
	AMW-20	05/06/19 11:45 AM	Aqueous	E300	Anion Preparation	05/07/19 01:40 PM	90743
	AMW-20	05/06/19 11:45 AM	Aqueous	M4500-P E	Orthophosphate Prep	05/07/19 03:18 PM	90774
	AMW-20	05/06/19 11:45 AM	Aqueous	M2540C	TDS Preparation	05/09/19 10:30 AM	90791
1905066-06A	AMW-10	05/06/19 01:00 PM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/10/19 04:05 PM	90853
1905066-06B	AMW-10	05/06/19 01:00 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/08/19 08:24 AM	90776
	AMW-10	05/06/19 01:00 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/08/19 08:24 AM	90776
	AMW-10	05/06/19 01:00 PM	Aqueous	SW7470A	Mercury Aq Prep	05/09/19 08:30 AM	90812
1905066-06C	AMW-10	05/06/19 01:00 PM	Aqueous	M2320 B	Alkalinity Preparation	05/07/19 02:06 PM	90772
	AMW-10	05/06/19 01:00 PM	Aqueous	E300	Anion Preparation	05/07/19 01:40 PM	90743
	AMW-10	05/06/19 01:00 PM	Aqueous	E300	Anion Preparation	05/07/19 01:40 PM	90743
	AMW-10	05/06/19 01:00 PM	Aqueous	M4500-P E	Orthophosphate Prep	05/07/19 03:18 PM	90774
	AMW-10	05/06/19 01:00 PM	Aqueous	M2540C	TDS Preparation	05/09/19 10:30 AM	90791
1905066-07A	AMW-21	05/06/19 02:05 PM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/10/19 04:05 PM	90853
1905066-07B	AMW-21	05/06/19 02:05 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/08/19 08:24 AM	90776

Lab Order: 1905066
Client: Golder
Project: Luminant-BBSES-Ash Landfill

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1905066-07B	AMW-21	05/06/19 02:05 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/08/19 08:24 AM	90776
	AMW-21	05/06/19 02:05 PM	Aqueous	SW7470A	Mercury Aq Prep	05/09/19 08:30 AM	90812
1905066-07C	AMW-21	05/06/19 02:05 PM	Aqueous	M2320 B	Alkalinity Preparation	05/07/19 02:06 PM	90772
	AMW-21	05/06/19 02:05 PM	Aqueous	E300	Anion Preparation	05/07/19 01:40 PM	90743
	AMW-21	05/06/19 02:05 PM	Aqueous	E300	Anion Preparation	05/07/19 01:40 PM	90743
	AMW-21	05/06/19 02:05 PM	Aqueous	M4500-P E	Orthophosphate Prep	05/07/19 03:18 PM	90774
	AMW-21	05/06/19 02:05 PM	Aqueous	M2540C	TDS Preparation	05/09/19 10:30 AM	90791

LUMINANT

Lab Order: 1905066
 Client: Golder
 Project: Luminant-BBSES-Ash Landfill

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1905066-01A	AMW-13	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	90853	1	05/16/19	UV/VIS_2_190516A
	AMW-13	Aqueous	M3500-Fe D	Ferrous Iron	90853	1	05/10/19 04:46 PM	UV/VIS_2_190510A
1905066-01B	AMW-13	Aqueous	SW7470A	Mercury Total: Aqueous	90812	1	05/10/19 10:08 AM	CETAC2_HG_190510A
	AMW-13	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90776	10	05/09/19 02:34 PM	ICP-MS4_190509A
	AMW-13	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90776	1	05/09/19 12:10 PM	ICP-MS5_190509A
1905066-01C	AMW-13	Aqueous	M2320 B	Alkalinity	90772	1	05/08/19 11:20 AM	TITRATOR_190508A
	AMW-13	Aqueous	E300	Anions by IC method - Water	90743	1	05/08/19 12:04 AM	IC2_190507A
	AMW-13	Aqueous	E300	Anions by IC method - Water	90743	10	05/07/19 07:48 PM	IC2_190507A
	AMW-13	Aqueous	M4500-P E	Orthophosphate	90774	1	05/07/19 03:44 PM	UV/VIS_2_190507E
	AMW-13	Aqueous	M2540C	Total Dissolved Solids	90791	1	05/09/19 11:15 AM	WC_190509C
1905066-02A	AMW-14	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	90853	1	05/16/19	UV/VIS_2_190516A
	AMW-14	Aqueous	M3500-Fe D	Ferrous Iron	90853	1	05/10/19 04:47 PM	UV/VIS_2_190510A
1905066-02B	AMW-14	Aqueous	SW7470A	Mercury Total: Aqueous	90812	1	05/10/19 10:10 AM	CETAC2_HG_190510A
	AMW-14	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90776	10	05/09/19 02:36 PM	ICP-MS4_190509A
	AMW-14	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90776	1	05/09/19 12:12 PM	ICP-MS5_190509A
1905066-02C	AMW-14	Aqueous	M2320 B	Alkalinity	90772	1	05/08/19 11:26 AM	TITRATOR_190508A
	AMW-14	Aqueous	E300	Anions by IC method - Water	90743	100	05/07/19 08:04 PM	IC2_190507A
	AMW-14	Aqueous	E300	Anions by IC method - Water	90743	1	05/07/19 10:44 PM	IC2_190507A
	AMW-14	Aqueous	M4500-P E	Orthophosphate	90774	1	05/07/19 03:45 PM	UV/VIS_2_190507E
	AMW-14	Aqueous	M2540C	Total Dissolved Solids	90791	1	05/09/19 11:15 AM	WC_190509C
1905066-03A	AMW-23	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	90853	1	05/16/19	UV/VIS_2_190516A
	AMW-23	Aqueous	M3500-Fe D	Ferrous Iron	90853	1	05/10/19 04:47 PM	UV/VIS_2_190510A
1905066-03B	AMW-23	Aqueous	SW7470A	Mercury Total: Aqueous	90812	1	05/10/19 10:13 AM	CETAC2_HG_190510A
	AMW-23	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90776	10	05/09/19 02:38 PM	ICP-MS4_190509A
	AMW-23	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90776	1	05/09/19 12:14 PM	ICP-MS5_190509A
1905066-03C	AMW-23	Aqueous	M2320 B	Alkalinity	90772	1	05/08/19 11:32 AM	TITRATOR_190508A

Lab Order: 1905066
Client: Golder
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1905066-03C	AMW-23	Aqueous	E300	Anions by IC method - Water	90743	10	05/07/19 08:20 PM	IC2_190507A
	AMW-23	Aqueous	E300	Anions by IC method - Water	90743	1	05/08/19 12:20 AM	IC2_190507A
	AMW-23	Aqueous	M4500-P E	Orthophosphate	90774	1	05/07/19 03:47 PM	UV/VIS_2_190507E
	AMW-23	Aqueous	M2540C	Total Dissolved Solids	90791	1	05/09/19 11:15 AM	WC_190509C
1905066-04A	AMW-22	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	90853	1	05/16/19	UV/VIS_2_190516A
	AMW-22	Aqueous	M3500-Fe D	Ferrous Iron	90853	1	05/10/19 04:48 PM	UV/VIS_2_190510A
1905066-04B	AMW-22	Aqueous	SW7470A	Mercury Total: Aqueous	90812	1	05/10/19 10:15 AM	CETAC2_HG_190510A
	AMW-22	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90776	10	05/09/19 02:40 PM	ICP-MS4_190509A
	AMW-22	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90776	1	05/09/19 12:16 PM	ICP-MS5_190509A
1905066-04C	AMW-22	Aqueous	M2320 B	Alkalinity	90772	1	05/08/19 11:38 AM	TITRATOR_190508A
	AMW-22	Aqueous	E300	Anions by IC method - Water	90743	10	05/07/19 08:36 PM	IC2_190507A
	AMW-22	Aqueous	E300	Anions by IC method - Water	90743	1	05/07/19 11:00 PM	IC2_190507A
	AMW-22	Aqueous	M4500-P E	Orthophosphate	90774	1	05/07/19 03:47 PM	UV/VIS_2_190507E
	AMW-22	Aqueous	M2540C	Total Dissolved Solids	90791	1	05/09/19 11:15 AM	WC_190509C
1905066-05A	AMW-20	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	90853	1	05/16/19	UV/VIS_2_190516A
	AMW-20	Aqueous	M3500-Fe D	Ferrous Iron	90853	1	05/10/19 04:48 PM	UV/VIS_2_190510A
1905066-05B	AMW-20	Aqueous	SW7470A	Mercury Total: Aqueous	90812	1	05/10/19 10:17 AM	CETAC2_HG_190510A
	AMW-20	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90776	10	05/09/19 02:42 PM	ICP-MS4_190509A
	AMW-20	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90776	1	05/09/19 12:19 PM	ICP-MS5_190509A
1905066-05C	AMW-20	Aqueous	M2320 B	Alkalinity	90772	1	05/08/19 11:44 AM	TITRATOR_190508A
	AMW-20	Aqueous	E300	Anions by IC method - Water	90743	10	05/07/19 08:52 PM	IC2_190507A
	AMW-20	Aqueous	E300	Anions by IC method - Water	90743	1	05/07/19 11:16 PM	IC2_190507A
	AMW-20	Aqueous	M4500-P E	Orthophosphate	90774	1	05/07/19 03:47 PM	UV/VIS_2_190507E
	AMW-20	Aqueous	M2540C	Total Dissolved Solids	90791	1	05/09/19 11:15 AM	WC_190509C
1905066-06A	AMW-10	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	90853	1	05/16/19	UV/VIS_2_190516A
	AMW-10	Aqueous	M3500-Fe D	Ferrous Iron	90853	1	05/10/19 04:48 PM	UV/VIS_2_190510A

Lab Order: 1905066
 Client: Golder
 Project: Luminant-BBSES-Ash Landfill

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1905066-06B	AMW-10	Aqueous	SW7470A	Mercury Total: Aqueous	90812	1	05/10/19 10:19 AM	CETAC2_HG_190510 A
	AMW-10	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90776	10	05/09/19 02:44 PM	ICP-MS4_190509A
	AMW-10	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90776	1	05/09/19 12:21 PM	ICP-MS5_190509A
1905066-06C	AMW-10	Aqueous	M2320 B	Alkalinity	90772	1	05/08/19 12:19 PM	TITRATOR_190508A
	AMW-10	Aqueous	E300	Anions by IC method - Water	90743	100	05/07/19 09:08 PM	IC2_190507A
	AMW-10	Aqueous	E300	Anions by IC method - Water	90743	1	05/07/19 11:32 PM	IC2_190507A
	AMW-10	Aqueous	M4500-P E	Orthophosphate	90774	1	05/07/19 03:47 PM	UV/VIS_2_190507E
	AMW-10	Aqueous	M2540C	Total Dissolved Solids	90791	1	05/09/19 11:15 AM	WC_190509C
1905066-07A	AMW-21	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	90853	1	05/16/19	UV/VIS_2_190516A
	AMW-21	Aqueous	M3500-Fe D	Ferrous Iron	90853	1	05/10/19 04:48 PM	UV/VIS_2_190510A
1905066-07B	AMW-21	Aqueous	SW7470A	Mercury Total: Aqueous	90812	1	05/10/19 10:22 AM	CETAC2_HG_190510 A
	AMW-21	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90776	10	05/09/19 02:46 PM	ICP-MS4_190509A
	AMW-21	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90776	1	05/09/19 12:23 PM	ICP-MS5_190509A
1905066-07C	AMW-21	Aqueous	M2320 B	Alkalinity	90772	1	05/08/19 12:25 PM	TITRATOR_190508A
	AMW-21	Aqueous	E300	Anions by IC method - Water	90743	100	05/07/19 09:24 PM	IC2_190507A
	AMW-21	Aqueous	E300	Anions by IC method - Water	90743	1	05/07/19 11:48 PM	IC2_190507A
	AMW-21	Aqueous	M4500-P E	Orthophosphate	90774	1	05/07/19 03:48 PM	UV/VIS_2_190507E
	AMW-21	Aqueous	M2540C	Total Dissolved Solids	90791	1	05/09/19 11:15 AM	WC_190509C

DHL Analytical, Inc.

Date: 13-Jun-19

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Project No: 19122262-A
Lab Order: 1905066

Client Sample ID: AMW-13
Lab ID: 1905066-01
Collection Date: 05/06/19 07:50 AM
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	05/09/19 12:10 PM
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:10 PM
Barium	0.0566	0.00300	0.0100		mg/L	1	05/09/19 12:10 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/09/19 12:10 PM
Boron	0.0305	0.0100	0.0300		mg/L	1	05/09/19 12:10 PM
Cadmium	0.000354	0.000300	0.00100	J	mg/L	1	05/09/19 12:10 PM
Calcium	44.5	1.00	3.00		mg/L	10	05/09/19 02:34 PM
Chromium	0.00931	0.00200	0.00500		mg/L	1	05/09/19 12:10 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	05/09/19 12:10 PM
Iron	0.418	0.0300	0.100		mg/L	1	05/09/19 12:10 PM
Lead	0.000703	0.000300	0.00100	J	mg/L	1	05/09/19 12:10 PM
Lithium	0.0139	0.00500	0.0100		mg/L	1	05/09/19 12:10 PM
Magnesium	19.5	0.100	0.300		mg/L	1	05/09/19 12:10 PM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:10 PM
Potassium	4.79	0.100	0.300		mg/L	1	05/09/19 12:10 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:10 PM
Sodium	120	1.00	3.00		mg/L	10	05/09/19 02:34 PM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/09/19 12:10 PM
MERCURY TOTAL: AQUEOUS		SW7470A			Analyst: BM		
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/10/19 10:08 AM
ANIONS BY IC METHOD - WATER		E300			Analyst: JL		
Chloride	212	3.00	10.0		mg/L	10	05/07/19 07:48 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	05/08/19 12:04 AM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	05/08/19 12:04 AM
Sulfate	108	1.00	3.00		mg/L	1	05/08/19 12:04 AM
ALKALINITY		M2320 B			Analyst: CC		
Alkalinity, Bicarbonate (As CaCO3)	59.9	10.0	20.0		mg/L @ pH 4.49	1	05/08/19 11:20 AM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.49	1	05/08/19 11:20 AM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.49	1	05/08/19 11:20 AM
Alkalinity, Total (As CaCO3)	59.9	20.0	20.0		mg/L @ pH 4.49	1	05/08/19 11:20 AM
FERRIC IRON (CALCULATED)		M3500-FE D			Analyst: CAC		
Iron, Ferric	0.418	0.0500	0.100	N	mg/L	1	05/16/19
FERROUS IRON		M3500-FE D			Analyst: BTJ		
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/10/19 04:46 PM

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: 13-Jun-19

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Project No: 19122262-A
Lab Order: 1905066

Client Sample ID: AMW-13
Lab ID: 1905066-01
Collection Date: 05/06/19 07:50 AM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE							
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	Analyst: BTJ 05/07/19 03:44 PM
TOTAL DISSOLVED SOLIDS							
Total Dissolved Solids (Residue, Filterable)	594	10.0	10.0		mg/L	1	Analyst: JS 05/09/19 11:15 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: 13-Jun-19

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Project No: 19122262-A
Lab Order: 1905066

Client Sample ID: AMW-14
Lab ID: 1905066-02
Collection Date: 05/06/19 08:55 AM
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	05/09/19 12:12 PM
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:12 PM
Barium	0.0774	0.00300	0.0100		mg/L	1	05/09/19 12:12 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/09/19 12:12 PM
Boron	2.79	0.100	0.300		mg/L	10	05/09/19 02:36 PM
Cadmium	0.000323	0.000300	0.00100	J	mg/L	1	05/09/19 12:12 PM
Calcium	147	1.00	3.00		mg/L	10	05/09/19 02:36 PM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:12 PM
Cobalt	0.0265	0.00300	0.00500		mg/L	1	05/09/19 12:12 PM
Iron	0.450	0.0300	0.100		mg/L	1	05/09/19 12:12 PM
Lead	0.000783	0.000300	0.00100	J	mg/L	1	05/09/19 12:12 PM
Lithium	0.0118	0.00500	0.0100		mg/L	1	05/09/19 12:12 PM
Magnesium	35.0	1.00	3.00		mg/L	10	05/09/19 02:36 PM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:12 PM
Potassium	5.81	0.100	0.300		mg/L	1	05/09/19 12:12 PM
Selenium	0.0616	0.00200	0.00500		mg/L	1	05/09/19 12:12 PM
Sodium	131	1.00	3.00		mg/L	10	05/09/19 02:36 PM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/09/19 12:12 PM
MERCURY TOTAL: AQUEOUS		SW7470A			Analyst: BM		
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/10/19 10:10 AM
ANIONS BY IC METHOD - WATER		E300			Analyst: JL		
Chloride	270	30.0	100		mg/L	100	05/07/19 08:04 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	05/07/19 10:44 PM
Nitrate-N	1.82	0.100	0.500		mg/L	1	05/07/19 10:44 PM
Sulfate	320	100	300		mg/L	100	05/07/19 08:04 PM
ALKALINITY		M2320 B			Analyst: CC		
Alkalinity, Bicarbonate (As CaCO3)	93.4	10.0	20.0		mg/L @ pH 4.5	1	05/08/19 11:26 AM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.5	1	05/08/19 11:26 AM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.5	1	05/08/19 11:26 AM
Alkalinity, Total (As CaCO3)	93.4	20.0	20.0		mg/L @ pH 4.5	1	05/08/19 11:26 AM
FERRIC IRON (CALCULATED)		M3500-FE D			Analyst: CAC		
Iron, Ferric	0.450	0.0500	0.100	N	mg/L	1	05/16/19
FERROUS IRON		M3500-FE D			Analyst: BTJ		
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/10/19 04:47 PM

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: 13-Jun-19

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Project No: 19122262-A
Lab Order: 1905066

Client Sample ID: AMW-14
Lab ID: 1905066-02
Collection Date: 05/06/19 08:55 AM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE							
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	Analyst: BTJ 05/07/19 03:45 PM
TOTAL DISSOLVED SOLIDS							
Total Dissolved Solids (Residue, Filterable)	1090	50.0	50.0		mg/L	1	Analyst: JS 05/09/19 11:15 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
 Project: Luminant-BBSES-Ash Landfill
 Project No: 19122262-A
 Lab Order: 1905066

Client Sample ID: AMW-23
 Lab ID: 1905066-03
 Collection Date: 05/06/19 09:50 AM
 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	05/09/19 12:14 PM
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:14 PM
Barium	0.0797	0.00300	0.0100		mg/L	1	05/09/19 12:14 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/09/19 12:14 PM
Boron	2.66	0.100	0.300		mg/L	10	05/09/19 02:38 PM
Cadmium	0.000430	0.000300	0.00100	J	mg/L	1	05/09/19 12:14 PM
Calcium	146	1.00	3.00		mg/L	10	05/09/19 02:38 PM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:14 PM
Cobalt	0.0235	0.00300	0.00500		mg/L	1	05/09/19 12:14 PM
Iron	0.382	0.0300	0.100		mg/L	1	05/09/19 12:14 PM
Lead	0.00103	0.000300	0.00100		mg/L	1	05/09/19 12:14 PM
Lithium	0.0120	0.00500	0.0100		mg/L	1	05/09/19 12:14 PM
Magnesium	34.6	1.00	3.00		mg/L	10	05/09/19 02:38 PM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:14 PM
Potassium	5.83	0.100	0.300		mg/L	1	05/09/19 12:14 PM
Selenium	0.0569	0.00200	0.00500		mg/L	1	05/09/19 12:14 PM
Sodium	131	1.00	3.00		mg/L	10	05/09/19 02:38 PM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/09/19 12:14 PM
MERCURY TOTAL: AQUEOUS		SW7470A		Analyst: BM			
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/10/19 10:13 AM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	272	3.00	10.0		mg/L	10	05/07/19 08:20 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	05/08/19 12:20 AM
Nitrate-N	1.87	0.100	0.500		mg/L	1	05/08/19 12:20 AM
Sulfate	329	10.0	30.0		mg/L	10	05/07/19 08:20 PM
ALKALINITY		M2320 B		Analyst: CC			
Alkalinity, Bicarbonate (As CaCO3)	92.2	10.0	20.0		mg/L @ pH 4.5	1	05/08/19 11:32 AM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.5	1	05/08/19 11:32 AM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.5	1	05/08/19 11:32 AM
Alkalinity, Total (As CaCO3)	92.2	20.0	20.0		mg/L @ pH 4.5	1	05/08/19 11:32 AM
FERRIC IRON (CALCULATED)		M3500-FE D		Analyst: CAC			
Iron, Ferric	0.382	0.0500	0.100	N	mg/L	1	05/16/19
FERROUS IRON		M3500-FE D		Analyst: BTJ			
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/10/19 04:47 PM

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: 13-Jun-19

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Project No: 19122262-A
Lab Order: 1905066

Client Sample ID: AMW-23
Lab ID: 1905066-03
Collection Date: 05/06/19 09:50 AM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE							Analyst: BTJ
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	05/07/19 03:47 PM
TOTAL DISSOLVED SOLIDS							Analyst: JS
Total Dissolved Solids (Residue, Filterable)	1110	50.0	50.0		mg/L	1	05/09/19 11:15 AM

LUMINANT

Qualifiers:

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

DHL Analytical, Inc.

Date: 13-Jun-19

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Project No: 19122262-A
Lab Order: 1905066

Client Sample ID: AMW-22
Lab ID: 1905066-04
Collection Date: 05/06/19 10:45 AM
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	05/09/19 12:16 PM
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:16 PM
Barium	0.215	0.00300	0.0100		mg/L	1	05/09/19 12:16 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/09/19 12:16 PM
Boron	0.136	0.0100	0.0300		mg/L	1	05/09/19 12:16 PM
Cadmium	<0.000300	0.000300	0.00100		mg/L	1	05/09/19 12:16 PM
Calcium	90.7	1.00	3.00		mg/L	10	05/09/19 02:40 PM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:16 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	05/09/19 12:16 PM
Iron	0.212	0.0300	0.100		mg/L	1	05/09/19 12:16 PM
Lead	<0.000300	0.000300	0.00100		mg/L	1	05/09/19 12:16 PM
Lithium	0.0152	0.00500	0.0100		mg/L	1	05/09/19 12:16 PM
Magnesium	24.8	0.100	0.300		mg/L	1	05/09/19 12:16 PM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:16 PM
Potassium	5.69	0.100	0.300		mg/L	1	05/09/19 12:16 PM
Selenium	0.00551	0.00200	0.00500		mg/L	1	05/09/19 12:16 PM
Sodium	112	1.00	3.00		mg/L	10	05/09/19 02:40 PM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/09/19 12:16 PM
MERCURY TOTAL: AQUEOUS		SW7470A		Analyst: BM			
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/10/19 10:15 AM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	357	3.00	10.0		mg/L	10	05/07/19 08:36 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	05/07/19 11:00 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	05/07/19 11:00 PM
Sulfate	23.8	1.00	3.00		mg/L	1	05/07/19 11:00 PM
ALKALINITY		M2320 B		Analyst: CC			
Alkalinity, Bicarbonate (As CaCO3)	86.0	10.0	20.0		mg/L @ pH 4.49	1	05/08/19 11:38 AM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.49	1	05/08/19 11:38 AM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.49	1	05/08/19 11:38 AM
Alkalinity, Total (As CaCO3)	86.0	20.0	20.0		mg/L @ pH 4.49	1	05/08/19 11:38 AM
FERRIC IRON (CALCULATED)		M3500-FE D		Analyst: CAC			
Iron, Ferric	0.212	0.0500	0.100	N	mg/L	1	05/16/19
FERROUS IRON		M3500-FE D		Analyst: BTJ			
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/10/19 04:48 PM

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: 13-Jun-19

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Project No: 19122262-A
Lab Order: 1905066

Client Sample ID: AMW-22
Lab ID: 1905066-04
Collection Date: 05/06/19 10:45 AM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE							
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	Analyst: BTJ 05/07/19 03:47 PM
TOTAL DISSOLVED SOLIDS							
Total Dissolved Solids (Residue, Filterable)	700	10.0	10.0		mg/L	1	Analyst: JS 05/09/19 11:15 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: 13-Jun-19

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Project No: 19122262-A
Lab Order: 1905066

Client Sample ID: AMW-20
Lab ID: 1905066-05
Collection Date: 05/06/19 11:45 AM
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	05/09/19 12:19 PM
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:19 PM
Barium	0.266	0.00300	0.0100		mg/L	1	05/09/19 12:19 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/09/19 12:19 PM
Boron	0.107	0.0100	0.0300		mg/L	1	05/09/19 12:19 PM
Cadmium	<0.000300	0.000300	0.00100		mg/L	1	05/09/19 12:19 PM
Calcium	50.5	1.00	3.00		mg/L	10	05/09/19 02:42 PM
Chromium	0.0120	0.00200	0.00500		mg/L	1	05/09/19 12:19 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	05/09/19 12:19 PM
Iron	1.23	0.0300	0.100		mg/L	1	05/09/19 12:19 PM
Lead	0.000852	0.000300	0.00100	J	mg/L	1	05/09/19 12:19 PM
Lithium	0.0277	0.00500	0.0100		mg/L	1	05/09/19 12:19 PM
Magnesium	13.2	0.100	0.300		mg/L	1	05/09/19 12:19 PM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:19 PM
Potassium	8.72	0.100	0.300		mg/L	1	05/09/19 12:19 PM
Selenium	0.00298	0.00200	0.00500	J	mg/L	1	05/09/19 12:19 PM
Sodium	77.2	1.00	3.00		mg/L	10	05/09/19 02:42 PM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/09/19 12:19 PM
MERCURY TOTAL: AQUEOUS		SW7470A		Analyst: BM			
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/10/19 10:17 AM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	175	3.00	10.0		mg/L	10	05/07/19 08:52 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	05/07/19 11:16 PM
Nitrate-N	0.827	0.100	0.500		mg/L	1	05/07/19 11:16 PM
Sulfate	13.9	1.00	3.00		mg/L	1	05/07/19 11:16 PM
ALKALINITY		M2320 B		Analyst: CC			
Alkalinity, Bicarbonate (As CaCO3)	113	10.0	20.0		mg/L @ pH 4.51	1	05/08/19 11:44 AM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.51	1	05/08/19 11:44 AM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.51	1	05/08/19 11:44 AM
Alkalinity, Total (As CaCO3)	113	20.0	20.0		mg/L @ pH 4.51	1	05/08/19 11:44 AM
FERRIC IRON (CALCULATED)		M3500-FE D		Analyst: CAC			
Iron, Ferric	1.23	0.0500	0.100	N	mg/L	1	05/16/19
FERROUS IRON		M3500-FE D		Analyst: BTJ			
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/10/19 04:48 PM

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: 13-Jun-19

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Project No: 19122262-A
Lab Order: 1905066

Client Sample ID: AMW-20
Lab ID: 1905066-05
Collection Date: 05/06/19 11:45 AM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE							Analyst: BTJ
Phosphorus, Total Orthophosphate (As P)	0.0360	0.0300	0.100	J	mg/L	1	05/07/19 03:47 PM
TOTAL DISSOLVED SOLIDS							Analyst: JS
Total Dissolved Solids (Residue, Filterable)	440	10.0	10.0		mg/L	1	05/09/19 11:15 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: 13-Jun-19

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Project No: 19122262-A
Lab Order: 1905066

Client Sample ID: AMW-10
Lab ID: 1905066-06
Collection Date: 05/06/19 01:00 PM
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	05/09/19 12:21 PM
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:21 PM
Barium	0.435	0.00300	0.0100		mg/L	1	05/09/19 12:21 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/09/19 12:21 PM
Boron	0.519	0.0100	0.0300		mg/L	1	05/09/19 12:21 PM
Cadmium	0.000500	0.000300	0.00100	J	mg/L	1	05/09/19 12:21 PM
Calcium	69.6	1.00	3.00		mg/L	10	05/09/19 02:44 PM
Chromium	0.0616	0.00200	0.00500		mg/L	1	05/09/19 12:21 PM
Cobalt	0.0156	0.00300	0.00500		mg/L	1	05/09/19 12:21 PM
Iron	0.615	0.0300	0.100		mg/L	1	05/09/19 12:21 PM
Lead	0.000459	0.000300	0.00100	J	mg/L	1	05/09/19 12:21 PM
Lithium	<0.00500	0.00500	0.0100		mg/L	1	05/09/19 12:21 PM
Magnesium	15.2	0.100	0.300		mg/L	1	05/09/19 12:21 PM
Molybdenum	0.00504	0.00200	0.00500		mg/L	1	05/09/19 12:21 PM
Potassium	4.48	0.100	0.300		mg/L	1	05/09/19 12:21 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:21 PM
Sodium	44.1	1.00	3.00		mg/L	10	05/09/19 02:44 PM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/09/19 12:21 PM
MERCURY TOTAL: AQUEOUS		SW7470A			Analyst: BM		
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/10/19 10:19 AM
ANIONS BY IC METHOD - WATER		E300			Analyst: JL		
Chloride	157	30.0	100		mg/L	100	05/07/19 09:08 PM
Fluoride	0.134	0.100	0.400	J	mg/L	1	05/07/19 11:32 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	05/07/19 11:32 PM
Sulfate	17.4	1.00	3.00		mg/L	1	05/07/19 11:32 PM
ALKALINITY		M2320 B			Analyst: CC		
Alkalinity, Bicarbonate (As CaCO3)	121	10.0	20.0		mg/L @ pH 4.51	1	05/08/19 12:19 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.51	1	05/08/19 12:19 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.51	1	05/08/19 12:19 PM
Alkalinity, Total (As CaCO3)	121	20.0	20.0		mg/L @ pH 4.51	1	05/08/19 12:19 PM
FERRIC IRON (CALCULATED)		M3500-FE D			Analyst: CAC		
Iron, Ferric	0.615	0.0500	0.100	N	mg/L	1	05/16/19
FERROUS IRON		M3500-FE D			Analyst: BTJ		
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/10/19 04:48 PM

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: 13-Jun-19

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Project No: 19122262-A
Lab Order: 1905066

Client Sample ID: AMW-10
Lab ID: 1905066-06
Collection Date: 05/06/19 01:00 PM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE							Analyst: BTJ
Phosphorus, Total Orthophosphate (As P)	0.0860	0.0300	0.100	J	mg/L	1	05/07/19 03:47 PM
TOTAL DISSOLVED SOLIDS							Analyst: JS
Total Dissolved Solids (Residue, Filterable)	418	10.0	10.0		mg/L	1	05/09/19 11:15 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
 Project: Luminant-BBSES-Ash Landfill
 Project No: 19122262-A
 Lab Order: 1905066

Client Sample ID: AMW-21
 Lab ID: 1905066-07
 Collection Date: 05/06/19 02:05 PM
 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	05/09/19 12:23 PM
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:23 PM
Barium	0.785	0.00300	0.0100		mg/L	1	05/09/19 12:23 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/09/19 12:23 PM
Boron	0.0762	0.0100	0.0300		mg/L	1	05/09/19 12:23 PM
Cadmium	0.000317	0.000300	0.00100	J	mg/L	1	05/09/19 12:23 PM
Calcium	82.5	1.00	3.00		mg/L	10	05/09/19 02:46 PM
Chromium	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:23 PM
Cobalt	0.00660	0.00300	0.00500		mg/L	1	05/09/19 12:23 PM
Iron	0.466	0.0300	0.100		mg/L	1	05/09/19 12:23 PM
Lead	<0.000300	0.000300	0.00100		mg/L	1	05/09/19 12:23 PM
Lithium	0.0168	0.00500	0.0100		mg/L	1	05/09/19 12:23 PM
Magnesium	22.5	0.100	0.300		mg/L	1	05/09/19 12:23 PM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/09/19 12:23 PM
Potassium	4.58	0.100	0.300		mg/L	1	05/09/19 12:23 PM
Selenium	0.157	0.00200	0.00500		mg/L	1	05/09/19 12:23 PM
Sodium	202	1.00	3.00		mg/L	10	05/09/19 02:46 PM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/09/19 12:23 PM
MERCURY TOTAL: AQUEOUS		SW7470A		Analyst: BM			
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/10/19 10:22 AM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	428	30.0	100		mg/L	100	05/07/19 09:24 PM
Fluoride	0.102	0.100	0.400	J	mg/L	1	05/07/19 11:48 PM
Nitrate-N	0.905	0.100	0.500		mg/L	1	05/07/19 11:48 PM
Sulfate	25.8	1.00	3.00		mg/L	1	05/07/19 11:48 PM
ALKALINITY		M2320 B		Analyst: CC			
Alkalinity, Bicarbonate (As CaCO3)	83.0	10.0	20.0		mg/L @ pH 4.51	1	05/08/19 12:25 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.51	1	05/08/19 12:25 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.51	1	05/08/19 12:25 PM
Alkalinity, Total (As CaCO3)	83.0	20.0	20.0		mg/L @ pH 4.51	1	05/08/19 12:25 PM
FERRIC IRON (CALCULATED)		M3500-FE D		Analyst: CAC			
Iron, Ferric	0.415	0.0500	0.100	N	mg/L	1	05/16/19
FERROUS IRON		M3500-FE D		Analyst: BTJ			
Iron, Ferrous	0.0510	0.0500	0.100	JN	mg/L	1	05/10/19 04:48 PM

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: 13-Jun-19

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Project No: 19122262-A
Lab Order: 1905066

Client Sample ID: AMW-21
Lab ID: 1905066-07
Collection Date: 05/06/19 02:05 PM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE							Analyst: BTJ
Phosphorus, Total Orthophosphate (As P)	0.0610	0.0300	0.100	J	mg/L	1	05/07/19 03:48 PM
TOTAL DISSOLVED SOLIDS							Analyst: JS
Total Dissolved Solids (Residue, Filterable)	865	50.0	50.0		mg/L	1	05/09/19 11:15 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: 1905066

ANALYTICAL QC SUMMARY REPORT

Project: Luminant-BBSES-Ash Landfill

RunID: CETAC2_HG_190510A

The QC data in batch 90812 applies to the following samples: 1905066-01B, 1905066-02B, 1905066-03B, 1905066-04B, 1905066-05B, 1905066-06B, 1905066-07B

Sample ID	MB-90812	Batch ID:	90812	TestNo:	SW7470A	Units:	mg/L
SampType:	MBLK	Run ID:	CETAC2_HG_190510A	Analysis Date:	5/10/2019 9:43:41 AM	Prep Date:	5/9/2019

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

Sample ID	LCS-90812	Batch ID:	90812	TestNo:	SW7470A	Units:	mg/L
SampType:	LCS	Run ID:	CETAC2_HG_190510A	Analysis Date:	5/10/2019 9:48:13 AM	Prep Date:	5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.00199	0.000200	0.00200	0	99.5	85	115			

Sample ID	LCSD-90812	Batch ID:	90812	TestNo:	SW7470A	Units:	mg/L
SampType:	LCSD	Run ID:	CETAC2_HG_190510A	Analysis Date:	5/10/2019 9:50:29 AM	Prep Date:	5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.00201	0.000200	0.00200	0	101	85	115	1.00	15	

Sample ID	1905047-01A MS	Batch ID:	90812	TestNo:	SW7470A	Units:	mg/L
SampType:	MS	Run ID:	CETAC2_HG_190510A	Analysis Date:	5/10/2019 9:57:17 AM	Prep Date:	5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0102	0.00100	0.0100	0	102	80	120			

Sample ID	1905047-01A MSD	Batch ID:	90812	TestNo:	SW7470A	Units:	mg/L
SampType:	MSD	Run ID:	CETAC2_HG_190510A	Analysis Date:	5/10/2019 9:59:32 AM	Prep Date:	5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0102	0.00100	0.0100	0	102	80	120	0.491	15	

Sample ID	1905047-01A SD	Batch ID:	90812	TestNo:	SW7470A	Units:	mg/L
SampType:	SD	Run ID:	CETAC2_HG_190510A	Analysis Date:	5/10/2019 10:01:48 AM	Prep Date:	5/9/2019

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

Sample ID	1905047-01A PDS	Batch ID:	90812	TestNo:	SW7470A	Units:	mg/L
SampType:	PDS	Run ID:	CETAC2_HG_190510A	Analysis Date:	5/10/2019 10:04:05 AM	Prep Date:	5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0122	0.00100	0.0125	0	97.6	85	115			

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

CLIENT: Golder
Work Order: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: CETAC2_HG_190510A

Sample ID ICV-190510	Batch ID: R103964	TestNo: SW7470A	Units: mg/L							
SampType: ICV	Run ID: CETAC2_HG_190510A	Analysis Date: 5/10/2019 9:39:07 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.00420	0.000200	0.00400	0	105	90	110			

Sample ID CCV1-190510	Batch ID: R103964	TestNo: SW7470A	Units: mg/L							
SampType: CCV	Run ID: CETAC2_HG_190510A	Analysis Date: 5/10/2019 10:24:30 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.00193	0.000200	0.00200	0	96.5	90	110			

LUMINANT

Qualifiers:	<p>B Analyte detected in the associated Method Blank</p> <p>J Analyte detected between MDL and RL</p> <p>ND Not Detected at the Method Detection Limit</p> <p>RL Reporting Limit</p> <p>J Analyte detected between SDL and RL</p>	<p>DF Dilution Factor</p> <p>MDL Method Detection Limit</p> <p>R RPD outside accepted control limits</p> <p>S Spike Recovery outside control limits</p> <p>N Parameter not NELAP certified</p>
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CLIENT: Golder
Work Order: 1905066

ANALYTICAL QC SUMMARY REPORT

Project: Luminant-BBSES-Ash Landfill

RunID: ICP-MS4_190509A

Sample ID ICV-190509	Batch ID: R103947	TestNo: SW6020A	Units: mg/L							
SampType: ICV	Run ID: ICP-MS4_190509A	Analysis Date: 5/9/2019 10:24:00 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.108	0.0300	0.100	0	108	90	110			
Calcium	2.53	0.300	2.50	0	101	90	110			
Magnesium	2.48	0.300	2.50	0	99.1	90	110			
Sodium	2.56	0.300	2.50	0	102	90	110			

Sample ID LCVL-190509	Batch ID: R103947	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_190509A	Analysis Date: 5/9/2019 10:38:00 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.0195	0.0300	0.0200	0	97.3	70	130			
Calcium	0.0936	0.300	0.100	0	93.6	70	130			
Magnesium	0.0979	0.300	0.100	0	97.9	70	130			
Sodium	0.0984	0.300	0.100	0	98.4	70	130			

Sample ID CCV4-190509	Batch ID: R103947	TestNo: SW6020A	Units: mg/L							
SampType: CCV	Run ID: ICP-MS4_190509A	Analysis Date: 5/9/2019 1:44:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.208	0.0300	0.200	0	104	90	110			
Calcium	4.79	0.300	5.00	0	95.8	90	110			
Magnesium	5.10	0.300	5.00	0	102	90	110			
Sodium	5.15	0.300	5.00	0	103	90	110			

Sample ID LCVL4-190509	Batch ID: R103947	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_190509A	Analysis Date: 5/9/2019 1:58:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.0206	0.0300	0.0200	0	103	70	130			
Calcium	0.0975	0.300	0.100	0	97.5	70	130			
Magnesium	0.0986	0.300	0.100	0	98.6	70	130			
Sodium	0.101	0.300	0.100	0	101	70	130			

Sample ID CCV5-190509	Batch ID: R103947	TestNo: SW6020A	Units: mg/L							
SampType: CCV	Run ID: ICP-MS4_190509A	Analysis Date: 5/9/2019 2:50:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.199	0.0300	0.200	0	99.5	90	110			
Calcium	4.80	0.300	5.00	0	96.0	90	110			
Magnesium	5.11	0.300	5.00	0	102	90	110			
Sodium	5.15	0.300	5.00	0	103	90	110			

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: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190509A

Sample ID	LCVL5-190509	Batch ID:	R103947	TestNo:	SW6020A	Units:	mg/L		
SampType:	LCVL	Run ID:	ICP-MS4_190509A	Analysis Date:	5/9/2019 3:01:00 PM	Prep Date:			

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.0225	0.0300	0.0200	0	112	70	130			
Calcium	0.0912	0.300	0.100	0	91.2	70	130			
Magnesium	0.100	0.300	0.100	0	100	70	130			
Sodium	0.101	0.300	0.100	0	101	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: 1905066

ANALYTICAL QC SUMMARY REPORT

Project: Luminant-BBSES-Ash Landfill

RunID: ICP-MS5_190509A

The QC data in batch 90776 applies to the following samples: 1905066-01B, 1905066-02B, 1905066-03B, 1905066-04B, 1905066-05B, 1905066-06B, 1905066-07B

Sample ID: MB-90776	Batch ID: 90776	TestNo: SW6020A	Units: mg/L
SampType: MBLK	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 11:11:00 AM	Prep Date: 5/8/2019

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-90776	Batch ID: 90776	TestNo: SW6020A	Units: mg/L
SampType: LCS	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 11:13:00 AM	Prep Date: 5/8/2019

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	0.204	0.00500	0.200	0	102	80	120			
Barium	0.203	0.0100	0.200	0	101	80	120			
Beryllium	0.199	0.00100	0.200	0	99.6	80	120			
Boron	0.201	0.0300	0.200	0	101	80	120			
Cadmium	0.201	0.00100	0.200	0	100	80	120			
Calcium	5.06	0.300	5.00	0	101	80	120			
Chromium	0.197	0.00500	0.200	0	98.3	80	120			
Cobalt	0.202	0.00500	0.200	0	101	80	120			
Iron	5.08	0.100	5.00	0	102	80	120			
Lead	0.194	0.00100	0.200	0	96.8	80	120			
Lithium	0.206	0.0100	0.200	0	103	80	120			
Magnesium	4.98	0.300	5.00	0	99.7	80	120			
Molybdenum	0.199	0.00500	0.200	0	99.6	80	120			
Potassium	4.88	0.300	5.00	0	97.7	80	120			
Selenium	0.206	0.00500	0.200	0	103	80	120			

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

CLIENT: Golder
Work Order: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190509A

Sample ID LCS-90776	Batch ID: 90776	TestNo: SW6020A	Units: mg/L							
SampType: LCS	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 11:13:00 AM	Prep Date: 5/8/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	4.92	0.300	5.00	0	98.4	80	120			
Thallium	0.194	0.00150	0.200	0	96.9	80	120			

Sample ID LCSD-90776	Batch ID: 90776	TestNo: SW6020A	Units: mg/L							
SampType: LCSD	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 11:16:00 AM	Prep Date: 5/8/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.202	0.00250	0.200	0	101	80	120	0.009	15	
Arsenic	0.205	0.00500	0.200	0	102	80	120	0.431	15	
Barium	0.203	0.0100	0.200	0	101	80	120	0.068	15	
Beryllium	0.196	0.00100	0.200	0	98.2	80	120	1.45	15	
Boron	0.203	0.0300	0.200	0	101	80	120	0.689	15	
Cadmium	0.202	0.00100	0.200	0	101	80	120	0.496	15	
Calcium	5.10	0.300	5.00	0	102	80	120	0.836	15	
Chromium	0.199	0.00500	0.200	0	99.3	80	120	0.973	15	
Cobalt	0.204	0.00500	0.200	0	102	80	120	0.623	15	
Iron	5.11	0.100	5.00	0	102	80	120	0.677	15	
Lead	0.194	0.00100	0.200	0	97.0	80	120	0.172	15	
Lithium	0.204	0.0100	0.200	0	102	80	120	0.708	15	
Magnesium	4.97	0.300	5.00	0	99.5	80	120	0.170	15	
Molybdenum	0.199	0.00500	0.200	0	99.7	80	120	0.110	15	
Potassium	4.87	0.300	5.00	0	97.4	80	120	0.313	15	
Selenium	0.206	0.00500	0.200	0	103	80	120	0.064	15	
Sodium	4.91	0.300	5.00	0	98.3	80	120	0.120	15	
Thallium	0.194	0.00150	0.200	0	97.1	80	120	0.237	15	

Sample ID 1905052-06A SD	Batch ID: 90776	TestNo: SW6020A	Units: mg/L							
SampType: SD	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 11:22:00 AM	Prep Date: 5/8/2019							
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	0.177	0.0500	0	0.178				0.325	10	
Beryllium	<0.00150	0.00500	0	0				0	10	
Boron	0.211	0.150	0	0.191				9.56	10	
Cadmium	<0.00150	0.00500	0	0				0	10	
Calcium	40.4	1.50	0	40.6				0.586	10	
Chromium	<0.0100	0.0250	0	0.00416				0	10	
Cobalt	<0.0150	0.0250	0	0.0140				0	10	
Iron	2.43	0.500	0	2.49				2.43	10	
Lead	<0.00150	0.00500	0	0				0	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

CLIENT: Golder
Work Order: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190509A

Sample ID 1905052-06A SD	Batch ID: 90776	TestNo: SW6020A	Units: mg/L
SampType: SD	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 11:22:00 AM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lithium	0.0915	0.0500	0	0.0901				1.51	10	
Magnesium	34.6	1.50	0	35.0				1.17	10	
Molybdenum	<0.0100	0.0250	0	0				0	10	
Potassium	7.22	1.50	0	7.41				2.67	10	
Selenium	<0.0100	0.0250	0	0				0	10	
Sodium	50.1	1.50	0	49.2				1.94	10	
Thallium	<0.00250	0.00750	0	0				0	10	

Sample ID 1905052-06A PDS	Batch ID: 90776	TestNo: SW6020A	Units: mg/L
SampType: PDS	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 11:45:00 AM	Prep Date: 5/8/2019

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	0.191	0.00500	0.200	0	95.5	80	120			
Barium	0.367	0.0100	0.200	0.178	94.5	80	120			
Beryllium	0.187	0.00100	0.200	0	93.7	80	120			
Boron	0.382	0.0300	0.200	0.191	95.1	80	120			
Cadmium	0.200	0.00100	0.200	0	100	80	120			
Calcium	43.0	0.300	5.00	40.6	48.5	80	120			S
Chromium	0.204	0.00500	0.200	0.00416	100	80	120			
Cobalt	0.200	0.00500	0.200	0.0140	93.1	80	120			
Iron	7.40	0.100	5.00	2.49	98.3	80	120			
Lead	0.189	0.00100	0.200	0	94.5	80	120			
Lithium	0.285	0.0100	0.200	0.0901	97.2	80	120			
Magnesium	37.1	0.300	5.00	35.0	40.9	80	120			S
Molybdenum	0.187	0.00500	0.200	0	93.4	80	120			
Potassium	11.5	0.300	5.00	7.41	82.6	80	120			
Selenium	0.185	0.00500	0.200	0	92.4	80	120			
Sodium	51.1	0.300	5.00	49.2	38.8	80	120			S
Thallium	0.191	0.00150	0.200	0	95.5	80	120			

Sample ID 1905052-06A MS	Batch ID: 90776	TestNo: SW6020A	Units: mg/L
SampType: MS	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 11:47:00 AM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.203	0.00250	0.200	0	101	80	120			
Arsenic	0.197	0.00500	0.200	0	98.5	80	120			
Barium	0.380	0.0100	0.200	0.178	101	80	120			
Beryllium	0.192	0.00100	0.200	0	96.0	80	120			
Boron	0.401	0.0300	0.200	0.191	105	80	120			
Cadmium	0.200	0.00100	0.200	0	99.9	80	120			

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: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190509A

Sample ID: 1905052-06A MS	Batch ID: 90776	TestNo: SW6020A	Units: mg/L
SampType: MS	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 11:47:00 AM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	45.4	0.300	5.00	40.6	95.8	80	120			
Chromium	0.203	0.00500	0.200	0.00416	99.2	80	120			
Cobalt	0.205	0.00500	0.200	0.0140	95.2	80	120			
Iron	7.55	0.100	5.00	2.49	101	80	120			
Lead	0.191	0.00100	0.200	0	95.7	80	120			
Lithium	0.289	0.0100	0.200	0.0901	99.4	80	120			
Magnesium	39.5	0.300	5.00	35.0	89.4	80	120			
Molybdenum	0.200	0.00500	0.200	0	100	80	120			
Potassium	12.1	0.300	5.00	7.41	94.2	80	120			
Selenium	0.188	0.00500	0.200	0	94.1	80	120			
Sodium	53.9	0.300	5.00	49.2	94.2	80	120			
Thallium	0.192	0.00150	0.200	0	96.2	80	120			

Sample ID: 1905052-06A MSD	Batch ID: 90776	TestNo: SW6020A	Units: mg/L
SampType: MSD	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 11:49:00 AM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.206	0.00250	0.200	0	103	80	120	1.35	15	
Arsenic	0.199	0.00500	0.200	0	99.4	80	120	0.892	15	
Barium	0.382	0.0100	0.200	0.178	102	80	120	0.477	15	
Beryllium	0.196	0.00100	0.200	0	98.0	80	120	2.13	15	
Boron	0.415	0.0300	0.200	0.191	112	80	120	3.26	15	
Cadmium	0.201	0.00100	0.200	0	101	80	120	0.726	15	
Calcium	45.4	0.300	5.00	40.6	95.2	80	120	0.064	15	
Chromium	0.203	0.00500	0.200	0.00416	99.3	80	120	0.133	15	
Cobalt	0.205	0.00500	0.200	0.0140	95.6	80	120	0.334	15	
Iron	7.60	0.100	5.00	2.49	102	80	120	0.730	15	
Lead	0.196	0.00100	0.200	0	97.9	80	120	2.33	15	
Lithium	0.292	0.0100	0.200	0.0901	101	80	120	1.18	15	
Magnesium	39.3	0.300	5.00	35.0	85.1	80	120	0.539	15	
Molybdenum	0.203	0.00500	0.200	0	101	80	120	1.07	15	
Potassium	12.1	0.300	5.00	7.41	93.3	80	120	0.369	15	
Selenium	0.190	0.00500	0.200	0	95.0	80	120	0.930	15	
Sodium	53.8	0.300	5.00	49.2	92.0	80	120	0.206	15	
Thallium	0.198	0.00150	0.200	0	99.0	80	120	2.85	15	

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: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190509A

Sample ID ICV-190509	Batch ID: R103935	TestNo: SW6020A	Units: mg/L
SampType: ICV	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 11:00:00 AM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.100	0.00250	0.100	0	100	90	110			
Arsenic	0.0998	0.00500	0.100	0	99.8	90	110			
Barium	0.0991	0.0100	0.100	0	99.1	90	110			
Beryllium	0.0978	0.00100	0.100	0	97.8	90	110			
Boron	0.101	0.0300	0.100	0	101	90	110			
Cadmium	0.100	0.00100	0.100	0	100	90	110			
Calcium	2.59	0.300	2.50	0	103	90	110			
Chromium	0.100	0.00500	0.100	0	100	90	110			
Cobalt	0.100	0.00500	0.100	0	100	90	110			
Iron	2.58	0.100	2.50	0	103	90	110			
Lead	0.0959	0.00100	0.100	0	95.9	90	110			
Lithium	0.103	0.0100	0.100	0	103	90	110			
Magnesium	2.42	0.300	2.50	0	96.8	90	110			
Molybdenum	0.0936	0.00500	0.100	0	93.6	90	110			
Potassium	2.40	0.300	2.50	0	96.2	90	110			
Selenium	0.0978	0.00500	0.100	0	97.8	90	110			
Sodium	2.46	0.300	2.50	0	98.5	90	110			
Thallium	0.0956	0.00150	0.100	0	95.6	90	110			

Sample ID LCVL-190509	Batch ID: R103935	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 11:04:00 AM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.00199	0.00250	0.00200	0	99.2	70	130			
Arsenic	0.00480	0.00500	0.00500	0	95.9	70	130			
Barium	0.00502	0.0100	0.00500	0	100	70	130			
Beryllium	0.000958	0.00100	0.00100	0	95.8	70	130			
Boron	0.0189	0.0300	0.0200	0	94.6	70	130			
Cadmium	0.00102	0.00100	0.00100	0	102	70	130			
Calcium	0.0944	0.300	0.100	0	94.4	70	130			
Chromium	0.00476	0.00500	0.00500	0	95.2	70	130			
Cobalt	0.00478	0.00500	0.00500	0	95.5	70	130			
Iron	0.0968	0.100	0.100	0	96.8	70	130			
Lead	0.000952	0.00100	0.00100	0	95.2	70	130			
Lithium	0.00990	0.0100	0.0100	0	99.0	70	130			
Magnesium	0.0951	0.300	0.100	0	95.1	70	130			
Molybdenum	0.00479	0.00500	0.00500	0	95.8	70	130			
Potassium	0.0532	0.300	0.100	0	53.2	70	130			S
Selenium	0.00434	0.00500	0.00500	0	86.8	70	130			
Sodium	0.0628	0.300	0.100	0	62.8	70	130			S
Thallium	0.000953	0.00150	0.00100	0	95.3	70	130			

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: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190509A

Sample ID: CCV1-190509	Batch ID: R103935	TestNo: SW6020A	Units: mg/L
SampType: CCV	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 11:51:00 AM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.201	0.00250	0.200	0	101	90	110			
Arsenic	0.204	0.00500	0.200	0	102	90	110			
Barium	0.202	0.0100	0.200	0	101	90	110			
Beryllium	0.196	0.00100	0.200	0	97.9	90	110			
Boron	0.217	0.0300	0.200	0	109	90	110			
Cadmium	0.200	0.00100	0.200	0	100	90	110			
Calcium	4.97	0.300	5.00	0	99.5	90	110			
Chromium	0.198	0.00500	0.200	0	98.8	90	110			
Cobalt	0.202	0.00500	0.200	0	101	90	110			
Iron	5.10	0.100	5.00	0	102	90	110			
Lead	0.194	0.00100	0.200	0	97.0	90	110			
Lithium	0.204	0.0100	0.200	0	102	90	110			
Magnesium	4.94	0.300	5.00	0	98.8	90	110			
Molybdenum	0.197	0.00500	0.200	0	98.5	90	110			
Potassium	4.77	0.300	5.00	0	95.4	90	110			
Selenium	0.202	0.00500	0.200	0	101	90	110			
Sodium	4.89	0.300	5.00	0	97.7	90	110			
Thallium	0.194	0.00150	0.200	0	97.0	90	110			

Sample ID: LCVL1-190509	Batch ID: R103935	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 12:05:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.00207	0.00250	0.00200	0	104	70	130			
Arsenic	0.00448	0.00500	0.00500	0	89.6	70	130			
Barium	0.00479	0.0100	0.00500	0	95.8	70	130			
Beryllium	0.000961	0.00100	0.00100	0	96.1	70	130			
Boron	0.0200	0.0300	0.0200	0	100	70	130			
Cadmium	0.000978	0.00100	0.00100	0	97.8	70	130			
Calcium	0.0993	0.300	0.100	0	99.3	70	130			
Chromium	0.00475	0.00500	0.00500	0	95.0	70	130			
Cobalt	0.00476	0.00500	0.00500	0	95.1	70	130			
Iron	0.0982	0.100	0.100	0	98.2	70	130			
Lead	0.000895	0.00100	0.00100	0	89.5	70	130			
Lithium	0.0101	0.0100	0.0100	0	101	70	130			
Magnesium	0.0973	0.300	0.100	0	97.3	70	130			
Molybdenum	0.00469	0.00500	0.00500	0	93.8	70	130			
Potassium	0.0541	0.300	0.100	0	54.1	70	130			S
Selenium	0.00430	0.00500	0.00500	0	85.9	70	130			
Sodium	0.0510	0.300	0.100	0	51.0	70	130			S
Thallium	0.000980	0.00150	0.00100	0	98.0	70	130			

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: 1905066
 Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190509A

Sample ID: CCV2-190509	Batch ID: R103935	TestNo: SW6020A	Units: mg/L
SampType: CCV	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 12:39:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.202	0.00250	0.200	0	101	90	110			
Arsenic	0.202	0.00500	0.200	0	101	90	110			
Barium	0.202	0.0100	0.200	0	101	90	110			
Beryllium	0.199	0.00100	0.200	0	99.7	90	110			
Boron	0.208	0.0300	0.200	0	104	90	110			
Cadmium	0.201	0.00100	0.200	0	100	90	110			
Chromium	0.199	0.00500	0.200	0	99.7	90	110			
Cobalt	0.201	0.00500	0.200	0	100	90	110			
Iron	5.11	0.100	5.00	0	102	90	110			
Lead	0.193	0.00100	0.200	0	96.7	90	110			
Lithium	0.209	0.0100	0.200	0	105	90	110			
Magnesium	5.04	0.300	5.00	0	101	90	110			
Molybdenum	0.199	0.00500	0.200	0	99.3	90	110			
Potassium	4.84	0.300	5.00	0	96.7	90	110			
Selenium	0.201	0.00500	0.200	0	100	90	110			
Thallium	0.193	0.00150	0.200	0	96.5	90	110			

Sample ID: LCVL2-190509	Batch ID: R103935	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS5_190509A	Analysis Date: 5/9/2019 12:51:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.00204	0.00250	0.00200	0	102	70	130			
Arsenic	0.00476	0.00500	0.00500	0	95.3	70	130			
Barium	0.00511	0.0100	0.00500	0	102	70	130			
Beryllium	0.000937	0.00100	0.00100	0	93.7	70	130			
Boron	0.0190	0.0300	0.0200	0	95.1	70	130			
Cadmium	0.000969	0.00100	0.00100	0	96.9	70	130			
Chromium	0.00469	0.00500	0.00500	0	93.7	70	130			
Cobalt	0.00475	0.00500	0.00500	0	95.0	70	130			
Iron	0.0977	0.100	0.100	0	97.7	70	130			
Lead	0.000872	0.00100	0.00100	0	87.2	70	130			
Lithium	0.00990	0.0100	0.0100	0	99.0	70	130			
Magnesium	0.0964	0.300	0.100	0	96.4	70	130			
Molybdenum	0.00482	0.00500	0.00500	0	96.5	70	130			
Potassium	0.0495	0.300	0.100	0	49.5	70	130			
Selenium	0.00439	0.00500	0.00500	0	87.9	70	130			
Thallium	0.000935	0.00150	0.00100	0	93.5	70	130			

S

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: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190507A

The QC data in batch 90743 applies to the following samples: 1905066-01C, 1905066-02C, 1905066-03C, 1905066-04C, 1905066-05C, 1905066-06C, 1905066-07C

Sample ID: MB-90743	Batch ID: 90743	TestNo: E300	Units: mg/L
SampType: MBLK	Run ID: IC2_190507A	Analysis Date: 5/7/2019 10:27:58 AM	Prep Date: 5/7/2019

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-90743	Batch ID: 90743	TestNo: E300	Units: mg/L
SampType: LCS	Run ID: IC2_190507A	Analysis Date: 5/7/2019 10:43:59 AM	Prep Date: 5/7/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	9.74	1.00	10.00	0	97.4	90	110			
Fluoride	3.84	0.400	4.000	0	95.9	90	110			
Nitrate-N	4.89	0.500	5.000	0	97.8	90	110			
Sulfate	29.2	3.00	30.00	0	97.2	90	110			

Sample ID: LCSD-90743	Batch ID: 90743	TestNo: E300	Units: mg/L
SampType: LCSD	Run ID: IC2_190507A	Analysis Date: 5/7/2019 10:59:59 AM	Prep Date: 5/7/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	9.75	1.00	10.00	0	97.5	90	110	0.065	20	
Fluoride	3.86	0.400	4.000	0	96.6	90	110	0.749	20	
Nitrate-N	4.92	0.500	5.000	0	98.3	90	110	0.498	20	
Sulfate	29.3	3.00	30.00	0	97.8	90	110	0.586	20	

Sample ID: 1905054-20BMS	Batch ID: 90743	TestNo: E300	Units: mg/L
SampType: MS	Run ID: IC2_190507A	Analysis Date: 5/7/2019 1:33:42 PM	Prep Date: 5/7/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	261	10.0	200.0	60.04	101	90	110			
Fluoride	202	4.00	200.0	0	101	90	110			
Nitrate-N	43.5	5.00	45.16	0	96.3	90	110			
Sulfate	316	30.0	200.0	122.5	96.7	90	110			

Sample ID: 1905054-20BMSD	Batch ID: 90743	TestNo: E300	Units: mg/L
SampType: MSD	Run ID: IC2_190507A	Analysis Date: 5/7/2019 1:49:42 PM	Prep Date: 5/7/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	261	10.0	200.0	60.04	101	90	110	0.041	20	
Fluoride	203	4.00	200.0	0	101	90	110	0.539	20	
Nitrate-N	43.9	5.00	45.16	0	97.1	90	110	0.837	20	

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: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190507A

Sample ID: 1905054-20BMSD	Batch ID: 90743	TestNo: E300	Units: mg/L							
SampType: MSD	Run ID: IC2_190507A	Analysis Date: 5/7/2019 1:49:42 PM	Prep Date: 5/7/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	316	30.0	200.0	122.5	96.6	90	110	0.088	20	

Sample ID: 1905054-21BMS	Batch ID: 90743	TestNo: E300	Units: mg/L							
SampType: MS	Run ID: IC2_190507A	Analysis Date: 5/7/2019 2:21:42 PM	Prep Date: 5/7/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	211	10.0	200.0	9.616	101	90	110			
Fluoride	203	4.00	200.0	0	101	90	110			
Nitrate-N	43.7	5.00	45.16	0	96.7	90	110			
Sulfate	201	30.0	200.0	0	101	90	110			

Sample ID: 1905054-21BMSD	Batch ID: 90743	TestNo: E300	Units: mg/L							
SampType: MSD	Run ID: IC2_190507A	Analysis Date: 5/7/2019 2:37:42 PM	Prep Date: 5/7/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	213	10.0	200.0	9.616	102	90	110	0.814	20	
Fluoride	205	4.00	200.0	0	103	90	110	1.14	20	
Nitrate-N	44.7	5.00	45.16	0	99.0	90	110	2.40	20	
Sulfate	201	30.0	200.0	0	100	90	110	0.148	20	

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: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190507A

Sample ID ICV-190507	Batch ID: R103907	TestNo: E300	Units: mg/L							
SampType: ICV	Run ID: IC2_190507A	Analysis Date: 5/7/2019 9:55:59 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	24.9	1.00	25.00	0	99.5	90	110			
Fluoride	9.83	0.400	10.00	0	98.3	90	110			
Nitrate-N	12.5	0.500	12.50	0	100	90	110			
Sulfate	74.5	3.00	75.00	0	99.3	90	110			

Sample ID CCV1-190507	Batch ID: R103907	TestNo: E300	Units: mg/L							
SampType: CCV	Run ID: IC2_190507A	Analysis Date: 5/7/2019 5:08:49 PM	Prep Date:							
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	4.01	0.400	4.000	0	100	90	110			
Nitrate-N	5.07	0.500	5.000	0	101	90	110			
Sulfate	29.9	3.00	30.00	0	99.7	90	110			

Sample ID CCV2-190507	Batch ID: R103907	TestNo: E300	Units: mg/L							
SampType: CCV	Run ID: IC2_190507A	Analysis Date: 5/7/2019 7:16:49 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.1	1.00	10.00	0	101	90	110			
Sulfate	30.2	3.00	30.00	0	101	90	110			

Sample ID CCV3-190507	Batch ID: R103907	TestNo: E300	Units: mg/L							
SampType: CCV	Run ID: IC2_190507A	Analysis Date: 5/7/2019 10:12:49 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.1	1.00	10.00	0	101	90	110			
Fluoride	4.06	0.400	4.000	0	101	90	110			
Nitrate-N	5.01	0.500	5.000	0	100	90	110			
Sulfate	30.3	3.00	30.00	0	101	90	110			

Sample ID CCV4-190507	Batch ID: R103907	TestNo: E300	Units: mg/L							
SampType: CCV	Run ID: IC2_190507A	Analysis Date: 5/8/2019 1:24:49 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	4.07	0.400	4.000	0	102	90	110			
Nitrate-N	5.05	0.500	5.000	0	101	90	110			
Sulfate	30.6	3.00	30.00	0	102	90	110			

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: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: TITRATOR_190508A

The QC data in batch 90772 applies to the following samples: 1905066-01C, 1905066-02C, 1905066-03C, 1905066-04C, 1905066-05C, 1905066-06C, 1905066-07C

Sample ID MB-90772	Batch ID: 90772	TestNo: M2320 B	Units: mg/L @ pH 4.22
SampType: MBLK	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 9:20:00 AM	Prep Date: 5/7/2019

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-90772	Batch ID: 90772	TestNo: M2320 B	Units: mg/L @ pH 4.03
SampType: LCS	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 9:24:00 AM	Prep Date: 5/7/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	51.4	20.0	50.00	0	103	74	129			

Sample ID 1905054-29B DUP	Batch ID: 90772	TestNo: M2320 B	Units: mg/L @ pH 4.52
SampType: DUP	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 10:44:00 AM	Prep Date: 5/7/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	31.1	20.0	0	31.50				1.28	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)	31.1	20.0	0	31.50				1.28	20	

Sample ID 1905066-05C DUP	Batch ID: 90772	TestNo: M2320 B	Units: mg/L @ pH 4.5
SampType: DUP	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 11:51:00 AM	Prep Date: 5/7/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	114	20.0	0	113.1				0.529	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)	114	20.0	0	113.1				0.529	20	

Qualifiers: B Analyte detected in the associated Method Blank J Analyte detected between MDL and RL ND Not Detected at the Method Detection Limit RL Reporting Limit J Analyte detected between SDL and RL	DF Dilution Factor MDL Method Detection Limit R RPD outside accepted control limits S Spike Recovery outside control limits N Parameter not NELAP certified
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CLIENT: Golder
Work Order: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: TITRATOR_190508A

Sample ID ICV-190508	Batch ID: R103922	TestNo: M2320 B	Units: mg/L @ pH 4.07
SampType: ICV	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 9:16:00 AM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	9.12	20.0	0							
Alkalinity, Carbonate (As CaCO3)	90.6	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0							
Alkalinity, Total (As CaCO3)	99.7	20.0	100.0	0	99.7	98	102			

Sample ID CCV1-190508	Batch ID: R103922	TestNo: M2320 B	Units: mg/L @ pH 4.19
SampType: CCV	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 10:49:00 AM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	16.4	20.0	0							
Alkalinity, Carbonate (As CaCO3)	83.2	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0							
Alkalinity, Total (As CaCO3)	99.6	20.0	100.0	0	99.6	90	110			

Sample ID CCV2-190508	Batch ID: R103922	TestNo: M2320 B	Units: mg/L @ pH 4.25
SampType: CCV	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 11:56:00 AM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	24.4	20.0	0							
Alkalinity, Carbonate (As CaCO3)	75.0	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0							
Alkalinity, Total (As CaCO3)	99.4	20.0	100.0	0	99.4	90	110			

Sample ID CCV3-190508	Batch ID: R103922	TestNo: M2320 B	Units: mg/L @ pH 4.39
SampType: CCV	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 2:11:00 PM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	22.2	20.0	0							
Alkalinity, Carbonate (As CaCO3)	76.0	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0							
Alkalinity, Total (As CaCO3)	98.2	20.0	100.0	0	98.2	90	110			

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: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190507E

The QC data in batch 90774 applies to the following samples: 1905066-01C, 1905066-02C, 1905066-03C, 1905066-04C, 1905066-05C, 1905066-06C, 1905066-07C

Sample ID MB-90774	Batch ID: 90774	TestNo: M4500-P E	Units: mg/L							
SampType: MBLK	Run ID: UV/VIS_2_190507E	Analysis Date: 5/7/2019 3:42:00 PM	Prep Date: 5/7/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	<0.0300	0.100								

Sample ID LCS-90774	Batch ID: 90774	TestNo: M4500-P E	Units: mg/L							
SampType: LCS	Run ID: UV/VIS_2_190507E	Analysis Date: 5/7/2019 3:43:00 PM	Prep Date: 5/7/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.507	0.100	0.5000	0	101	80	120			

Sample ID LCSD-90774	Batch ID: 90774	TestNo: M4500-P E	Units: mg/L							
SampType: LCSD	Run ID: UV/VIS_2_190507E	Analysis Date: 5/7/2019 3:43:00 PM	Prep Date: 5/7/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.506	0.100	0.5000	0	101	80	120			

Sample ID 1905066-01CMS	Batch ID: 90774	TestNo: M4500-P E	Units: mg/L							
SampType: MS	Run ID: UV/VIS_2_190507E	Analysis Date: 5/7/2019 3:44:00 PM	Prep Date: 5/7/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.546	0.100	0.5000	0	109	80	120			

Sample ID 1905066-01CMSD	Batch ID: 90774	TestNo: M4500-P E	Units: mg/L							
SampType: MSD	Run ID: UV/VIS_2_190507E	Analysis Date: 5/7/2019 3:45:00 PM	Prep Date: 5/7/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.563	0.100	0.5000	0	113	80	120	3.07	15	

Qualifiers:	<p>B Analyte detected in the associated Method Blank</p> <p>J Analyte detected between MDL and RL</p> <p>ND Not Detected at the Method Detection Limit</p> <p>RL Reporting Limit</p> <p>J Analyte detected between SDL and RL</p>	<p>DF Dilution Factor</p> <p>MDL Method Detection Limit</p> <p>R RPD outside accepted control limits</p> <p>S Spike Recovery outside control limits</p> <p>N Parameter not NELAP certified</p>
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CLIENT: Golder
Work Order: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190507E

Sample ID ICV-190507	Batch ID: R103931	TestNo: M4500-P E	Units: mg/L							
SampType: ICV	Run ID: UV/VIS_2_190507E	Analysis Date: 5/7/2019 3:42:00 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 CCV1-190507	Batch ID: R103931	TestNo: M4500-P E	Units: mg/L							
SampType: CCV	Run ID: UV/VIS_2_190507E	Analysis Date: 5/7/2019 3:48:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.490	0.100	0.5000	0	98.0	85	115			

LUMINANT

Qualifiers:	<p>B Analyte detected in the associated Method Blank</p> <p>J Analyte detected between MDL and RL</p> <p>ND Not Detected at the Method Detection Limit</p> <p>RL Reporting Limit</p> <p>J Analyte detected between SDL and RL</p>	<p>DF Dilution Factor</p> <p>MDL Method Detection Limit</p> <p>R RPD outside accepted control limits</p> <p>S Spike Recovery outside control limits</p> <p>N Parameter not NELAP certified</p>
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CLIENT: Golder
Work Order: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190510A

The QC data in batch 90853 applies to the following samples: 1905066-01A, 1905066-02A, 1905066-03A, 1905066-04A, 1905066-05A, 1905066-06A, 1905066-07A

Sample ID: MB-90853	Batch ID: 90853	TestNo: M3500-Fe D	Units: mg/L
SampType: MBLK	Run ID: UV/VIS_2_190510A	Analysis Date: 5/10/2019 4:43:00 PM	Prep Date: 5/10/2019

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

Sample ID: LCS-90853	Batch ID: 90853	TestNo: M3500-Fe D	Units: mg/L
SampType: LCS	Run ID: UV/VIS_2_190510A	Analysis Date: 5/10/2019 4:44:00 PM	Prep Date: 5/10/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.0985	0.100	0.1000	0	98.5	85	115			N

Sample ID: LCSD-90853	Batch ID: 90853	TestNo: M3500-Fe D	Units: mg/L
SampType: LCSD	Run ID: UV/VIS_2_190510A	Analysis Date: 5/10/2019 4:45:00 PM	Prep Date: 5/10/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.103	0.100	0.1000	0	103	85	115	4.00	15	N

Sample ID: 1905088-01AMS	Batch ID: 90853	TestNo: M3500-Fe D	Units: mg/L
SampType: MS	Run ID: UV/VIS_2_190510A	Analysis Date: 5/10/2019 4:52:00 PM	Prep Date: 5/10/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.103	0.100	0.1000	0	103	85	115			N

Sample ID: 1905088-01AMSD	Batch ID: 90853	TestNo: M3500-Fe D	Units: mg/L
SampType: MSD	Run ID: UV/VIS_2_190510A	Analysis Date: 5/10/2019 4:52:00 PM	Prep Date: 5/10/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.100	0.100	0.1000	0	100	85	115	2.47	15	N

Qualifiers: B Analyte detected in the associated Method Blank J Analyte detected between MDL and RL ND Not Detected at the Method Detection Limit RL Reporting Limit J Analyte detected between SDL and RL	DF Dilution Factor MDL Method Detection Limit R RPD outside accepted control limits S Spike Recovery outside control limits N Parameter not NELAP certified
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CLIENT: Golder
Work Order: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190510A

Sample ID ICV-190510	Batch ID: R103996	TestNo: M3500-Fe D	Units: mg/L							
SampType: ICV	Run ID: UV/VIS_2_190510A	Analysis Date: 5/10/2019 4:43:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.105	0.100	0.1000	0	105	85	115			N

Sample ID CCV1-190510	Batch ID: R103996	TestNo: M3500-Fe D	Units: mg/L							
SampType: CCV	Run ID: UV/VIS_2_190510A	Analysis Date: 5/10/2019 4:54:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.208	0.100	0.2000	0	104	85	115			N

LUMINANT

<p>Qualifiers:</p> <p>B Analyte detected in the associated Method Blank</p> <p>J Analyte detected between MDL and RL</p> <p>ND Not Detected at the Method Detection Limit</p> <p>RL Reporting Limit</p> <p>J Analyte detected between SDL and RL</p>	<p>DF Dilution Factor</p> <p>MDL Method Detection Limit</p> <p>R RPD outside accepted control limits</p> <p>S Spike Recovery outside control limits</p> <p>N Parameter not NELAP certified</p>
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CLIENT: Golder
Work Order: 1905066
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: WC_190509C

The QC data in batch 90791 applies to the following samples: 1905066-01C, 1905066-02C, 1905066-03C, 1905066-04C, 1905066-05C, 1905066-06C, 1905066-07C

Sample ID MB-90791	Batch ID: 90791	TestNo: M2540C	Units: mg/L							
SampType: MBLK	Run ID: WC_190509C	Analysis Date: 5/9/2019 11:15:00 AM	Prep Date: 5/9/2019							
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-90791	Batch ID: 90791	TestNo: M2540C	Units: mg/L							
SampType: LCS	Run ID: WC_190509C	Analysis Date: 5/9/2019 11:15:00 AM	Prep Date: 5/9/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera										
	738	10.0	745.6	0	99.0	90	113			

Sample ID 1905063-01C-DUP	Batch ID: 90791	TestNo: M2540C	Units: mg/L							
SampType: DUP	Run ID: WC_190509C	Analysis Date: 5/9/2019 11:15:00 AM	Prep Date: 5/9/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera										
	16600	200	0	16400				1.45	5	

Sample ID 1905063-02C-DUP	Batch ID: 90791	TestNo: M2540C	Units: mg/L							
SampType: DUP	Run ID: WC_190509C	Analysis Date: 5/9/2019 11:15:00 AM	Prep Date: 5/9/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera										
	25600	1000	0	25900				1.17	5	

- | | | |
|--------------------|---|---|
| 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 |

June 12, 2019



²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

DHL Analytical, Inc.

Sample Delivery Group: L1097711
Samples Received: 05/10/2019
Project Number: 1905066
Description:

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

Entire Report Reviewed By:

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.

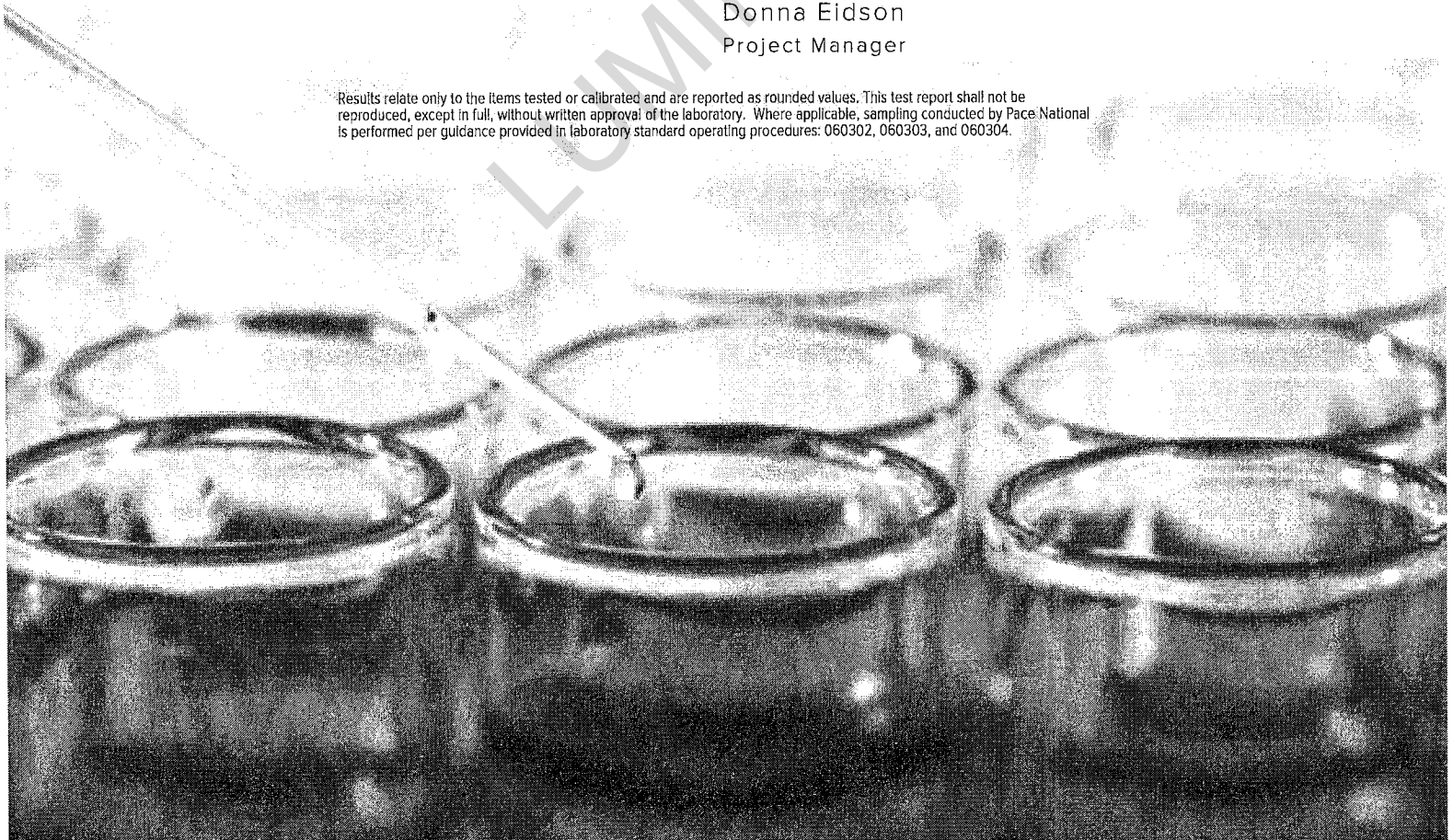


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LUMINANT

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

				Collected by	Collected date/time	Received date/time
AMW-13 L1097711-01 Non-Potable Water					05/06/19 07:50	05/10/19 09:05
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1281418	1	05/16/19 08:42	05/21/19 17:45	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1280210	1	05/15/19 15:26	05/21/19 17:45	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1280210	1	05/15/19 15:26	05/16/19 16:26	RGT	Mt. Juliet, TN

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

				Collected by	Collected date/time	Received date/time
AMW-14 L1097711-02 Non-Potable Water					05/06/19 08:55	05/10/19 09:05
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1281418	1	05/16/19 08:42	05/21/19 17:45	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1280210	1	05/15/19 15:26	05/21/19 17:45	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1280210	1	05/15/19 15:26	05/16/19 16:26	RGT	Mt. Juliet, TN

				Collected by	Collected date/time	Received date/time
AMW-23 L1097711-03 Non-Potable Water					05/06/19 09:50	05/10/19 09:05
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1281418	1	05/16/19 08:42	05/21/19 17:45	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1280210	1	05/15/19 15:26	05/21/19 17:45	RRE	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1280210	1	05/15/19 15:26	05/16/19 16:26	RRE	Mt. Juliet, TN

				Collected by	Collected date/time	Received date/time
AMW-22 L1097711-04 Non-Potable Water					05/06/19 10:45	05/10/19 09:05
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1281418	1	05/16/19 08:42	05/21/19 17:45	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1280210	1	05/15/19 15:26	05/21/19 17:45	RRE	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1280210	1	05/15/19 15:26	05/16/19 16:26	RRE	Mt. Juliet, TN

				Collected by	Collected date/time	Received date/time
AMW-20 L1097711-05 Non-Potable Water					05/06/19 11:05	05/10/19 09:05
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1281418	1	05/16/19 08:42	05/21/19 17:45	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1280210	1	05/15/19 15:26	05/21/19 17:45	RRE	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1280210	1	05/15/19 15:26	05/16/19 16:26	RRE	Mt. Juliet, TN

				Collected by	Collected date/time	Received date/time
AMW-10 L1097711-06 Non-Potable Water					05/06/19 13:00	05/10/19 09:05
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1281418	1	05/16/19 08:42	05/21/19 17:45	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1280210	1	05/15/19 15:26	05/21/19 17:45	RRE	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1280210	1	05/15/19 15:26	05/16/19 16:26	RRE	Mt. Juliet, TN

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

AMW-21 L1097711-07 Non-Potable Water

Collected by: _____
 Collected date/time: 05/06/19 14:05
 Received date/time: 05/10/19 09:05

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1281418	1	05/16/19 08:42	05/21/19 17:45	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1280210	1	05/15/19 15:26	05/21/19 17:45	RRE	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1280210	1	05/15/19 15:26	05/16/19 16:13	RRE	Mt. Juliet, TN

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

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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

LUMINANT



Collected date/time: 05/06/19 07:50

L1097711

Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	-0.101		0.399	0.589	05/21/2019 17:45	WG1281418
(T) Barium	99.8			62.0-143	05/21/2019 17:45	WG1281418
(T) Yttrium	125			79.0-136	05/21/2019 17:45	WG1281418

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.445		0.657	0.763	05/21/2019 17:45	WG1280210

4 Cn

Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.445		0.258	0.174	05/16/2019 16:26	WG1280210
(T) Barium-133	102			30.0-143	05/16/2019 16:26	WG1280210

6 Qc

7 Gl

8 Al

9 Sc

LUMINANT

Radiochemistry by Method 904

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-228	0.265		0.352	0.578	05/21/2019 17:45	WG1281418
(T) Barium	95.5			62.0-143	05/21/2019 17:45	WG1281418
(T) Yttrium	121			79.0-136	05/21/2019 17:45	WG1281418

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	0.708		0.609	0.751	05/21/2019 17:45	WG1280210

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	0.443		0.257	0.173	05/16/2019 16:26	WG1280210
(T) Barium-133	109			30.0-143	05/16/2019 16:26	WG1280210

6 Qc

7 Gf

8 Al

9 Sc

LUMINANT



Collected date/time: 05/06/19 09:50

L1097711

Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	1.15		0.401	0.658	05/21/2019 17:45	WG1281418
(T) Barium	98.4			62.0-143	05/21/2019 17:45	WG1281418
(T) Yttrium	125			79.0-136	05/21/2019 17:45	WG1281418

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.59		0.644	0.816	05/21/2019 17:45	WG1280210

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.438		0.243	0.158	05/16/2019 16:26	WG1280210
(T) Barium-133	102			30.0-143	05/16/2019 16:26	WG1280210

6 Qc

7 Gf

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	0.0398		0.352	0.617	05/21/2019 17:45	WG1281418
(T) Barium	92.8			62.0-143	05/21/2019 17:45	WG1281418
(T) Yttrium	122			79.0-136	05/21/2019 17:45	WG1281418

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.896		0.697	0.829	05/21/2019 17:45	WG1280210

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.857		0.345	0.212	05/16/2019 16:26	WG1280210
(T) Barium-133	103			30.0-143	05/16/2019 16:26	WG1280210

- 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	0.169		0.355	0.599	05/21/2019 17:45	WG1281418
(1) Barium	111			62.0-143	05/21/2019 17:45	WG1281418
(1) Yttrium	99.5			79.0-136	05/21/2019 17:45	WG1281418

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.660		0.669	0.915	05/21/2019 17:45	WG1280210

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.492		0.314	0.316	05/16/2019 16:26	WG1280210
(1) Barium-133	100			30.0-143	05/16/2019 16:26	WG1280210

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	1.90		0.565	0.841	05/21/2019 17:45	WG1281418
(T) Barium	111			62.0-143	05/21/2019 17:45	WG1281418
(T) Yttrium	119			79.0-136	05/21/2019 17:45	WG1281418

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	3.57		1.09	1.08	05/21/2019 17:45	WG1280210

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	1.68		0.525	0.24	05/16/2019 16:26	WG1280210
(T) Barium-133	98.0			30.0-143	05/16/2019 16:26	WG1280210

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	0.269		0.417	0.695	05/21/2019 17:45	WG1281418
(T) Barium	122			62.0-143	05/21/2019 17:45	WG1281418
(T) Yttrium	103			79.0-136	05/21/2019 17:45	WG1281418

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	2.04		0.896	0.849	05/21/2019 17:45	WG1280210

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	1.77		0.479	0.154	05/16/2019 16:13	WG1280210
(T) Barium-133	103			30.0-143	05/16/2019 16:13	WG1280210

6 Qc

7 Gl

8 Al

9 Sc

LUMINANT

Method Blank (MB)

(MB) R3413593-1 05/20/19 11:30

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-228	-0.648		0.393
(T) Barium	115		
(T) Yttrium	109		

L1097620-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1097620-01 05/20/19 11:30 • (DUP) R3413593-5 05/20/19 11:30

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-228	0.456	0.713	1	44.1	0.361		20	3
(T) Barium	108	118						
(T) Yttrium	113	108						

Laboratory Control Sample (LCS)

(LCS) R3413593-2 05/20/19 11:30

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	5.71	114	80.0-120	
(T) Barium			124		
(T) Yttrium			115		

L1097567-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1097567-01 05/20/19 11:30 • (MS) R3413593-3 05/20/19 11:30 • (MSD) R3413593-4 05/20/19 11:30

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	0.305	19.9	18.2	97.8	89.6	1	70.0-130			8.66		20
(T) Barium		169			99.9	120							
(T) Yttrium		113			111	106							

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

Method Blank (MB)

(MB) R3419485-1 05/16/19 16:03

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-226	0.0350		0.0513
(T) Barium-133	93.7		

L1097079-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1097079-05 05/16/19 16:03 • (DUP) R3419485-5 05/16/19 16:03

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-226	0.157	0.286	1	58.3	0.456		20	3
(T) Barium-133	88.5	95.8						

Laboratory Control Sample (LCS)

(LCS) R3419485-2 05/16/19 16:03

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.02	4.78	95.3	80.0-120	
(T) Barium-133			92.0		

L1097079-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1097079-05 05/16/19 16:03 • (MS) R3419485-3 05/16/19 16:03 • (MSD) R3419485-4 05/16/19 16:03

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	0.157	19.2	21.1	94.9	104	1	75.0-125			9.23		20
(T) Barium-133		88.5			88.7	98.4							

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



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.

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- GI
- 8 AI
- 9 Sc

Qualifier Description

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

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-05-15-05
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 ¹⁶	90010	South Carolina	84004
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ¹⁴	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 ⁷

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

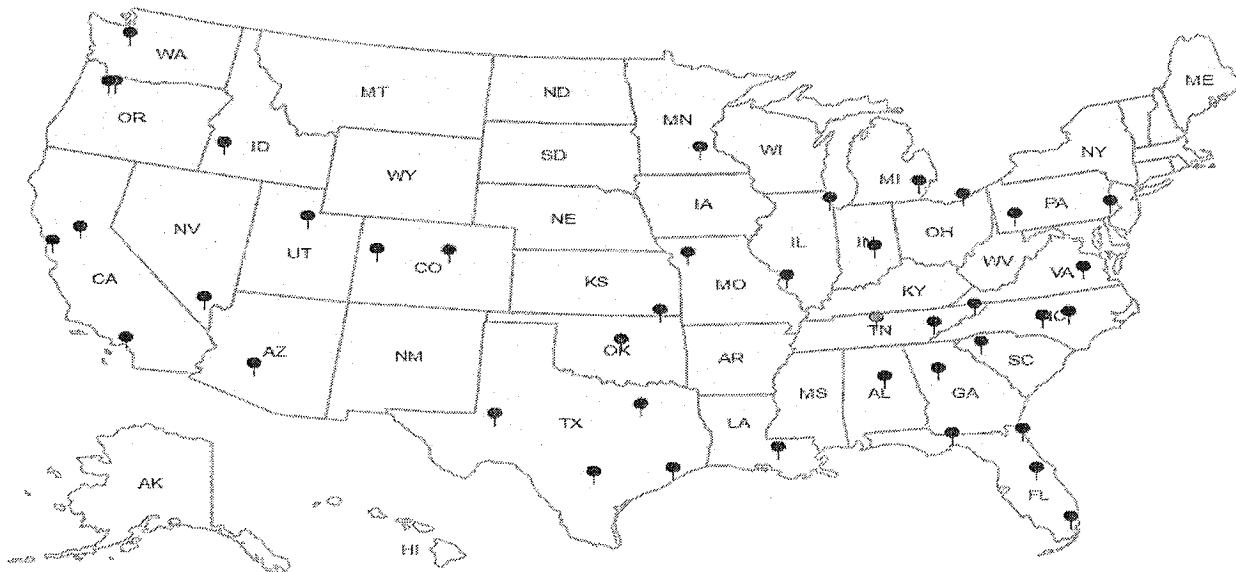
Third Party Federal Accreditations

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

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.



ACCOUNT:
DHL Analytical, Inc.

PROJECT:
1905066 **64**

SDG:
L109771

DATE/TIME:
06/12/19 12:25

PAGE:
16 of 19

Pace Analytical National Center for Testing & Innovation Cooler Receipt Form

Client: <i>DHLRRTX</i>	SDG#:	1097711	
Cooler Received/Opened On: 5/10/19	Temperature:	Amb	
Received By: Brock Fariss			
Signature: <i>BK Fariss</i>			
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?			

Kelsey Stephenson

Subject:

FW: L1097711 DHLRRTX Non Conformance



Login #:L1097711	Client:DHLRRTX	Date:05/10	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 / Court)
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	x Container lid not intact
Vials received with headspace.	Trip Blank not received.	If no Chain of Custody:
x 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#

Login Comments: RA-226 container for AMW-10 was received empty with the lid not intact.

Client informed by:	Call	X	Email	Voice Mail	Date:5/11/19	Time: 1656
TSR Initials:DE	Client Contact:					

Login Instructions:

1L remains; will analyze with smaller sample size.

1097711

CHAIN-OF-CUSTODY RECORD

H117

DHL Analytical, Inc.
 2300 Double Creek Drive
 Round Rock, TX 78664
 TEL: (512) 388-8222
 Work Order: 1905066

FAX: (512) 388-8229

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

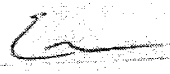

TEL: (615) 773-5923
 FAX:
 Acct #: DHLRRTX

08-May-19

Sample Id	Matrix	DHL#	Date Collected	Bottle Type	Requested Tests						
					Ra-228 E904.0	Ra-226 M7500 Ra B M					
AMW-13	Aqueous	-01D	05/06/19 07:50 AM	1LHDPEHNO3		1					-01
AMW-13	Aqueous	-01E	05/06/19 07:50 AM	1LHDPEHNO3	1						01
AMW-14	Aqueous	-02D	05/06/19 08:55 AM	1LHDPEHNO3		1					02
AMW-14	Aqueous	-02E	05/06/19 08:55 AM	1LHDPEHNO3	1						02
AMW-14	Aqueous	-02E	05/06/19 08:55 AM	1LHDPEHNO3		1					03
AMW-23	Aqueous	-03D	05/06/19 09:50 AM	1LHDPEHNO3	1						03
AMW-23	Aqueous	-03E	05/06/19 09:50 AM	1LHDPEHNO3		1					04
AMW-22	Aqueous	-04D	05/06/19 10:45 AM	1LHDPEHNO3	1						04
AMW-22	Aqueous	-04E	05/06/19 10:45 AM	1LHDPEHNO3		1					05
AMW-20	Aqueous	-05D	05/06/19 11:45 AM	1LHDPEHNO3	1						05
AMW-20	Aqueous	-05E	05/06/19 11:45 AM	1LHDPEHNO3		1					06
AMW-10	Aqueous	-06D	05/06/19 01:00 PM	1LHDPEHNO3	1						06
AMW-10	Aqueous	-06E	05/06/19 01:00 PM	1LHDPEHNO3		1					07
AMW-21	Aqueous	-07D	05/06/19 02:05 PM	1LHDPEHNO3	1						07
AMW-21	Aqueous	-07E	05/06/19 02:05 PM	1LHDPEHNO3		1					07

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

Relinquished by:		Date/Time	5/8/19 1700	Received by:		Date/Time	5/10/19 0905
Relinquished by:				Received by:			

UPS Rec: 13

Amb

RAD SCREEN: <0.5 MB/M



June 07, 2019

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

Order No.: 1905088

RE: Luminant-BBSES-Ash Landfill

Dear Will Vienne:

DHL Analytical, Inc. received 1 sample(s) on 5/8/2019 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,

A handwritten signature in black ink, appearing to read "John DuPont".

John DuPont
General Manager

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



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LUMINANT



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



No 82634
 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: 5-7-19 PAGE 1 OF 1
 PO #: _____ DHL WORK ORDER #: 1905089
 PROJECT LOCATION OR NAME: LUMINANT-BSES-ASH LANDFILL
 CLIENT PROJECT #: 19122262-A COLLECTOR: JOHN DEAYTON

Authorize 5% surcharge for TRRP Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		S=SOIL W=WATER A=AIR L=LIQUID SE=SEDIMENT		P=PAINT SL=SLUDGE O=OTHER SO=SOLID		PRESERVATION HCl HNO ₃ H ₂ SO ₄ □ NaOH □ ICE UNPRESERVED		ANALYSES BTEX □ MYBE □ IMETHOD 80211 TPH 1005 □ TPH 1006 □ HOLD 1006 □ GRO IMETHOD 80151 □ DRO IMETHOD 81051 □ VOC 8260 □ VOC 624 □ VOC 8260/5035 □ SVOC 8270 □ PAH 8270 □ HOLD PAH □ SVOC 8290 □ 8270 PEST □ 625 PEST □ 8082 PCB □ 808 PCB □ 8270 OP PEST □ T PHOS. AMMONIA □ METALS 6020 □ METALS 2008 □ DISS. METALS □ PH □ HEX. CHROM □ ALKALINITY □ COD □ RCLO □ FLASHPOINT □ RCRA 8 □ PEST □ TCLP-SVOC □ ANIONS □ TOC □ TSS □ % MOISTURE □ CYANIDE □ APPENDIX III & IV PEROXIDES □ FEDEX-CROWN ALK, NO ₂ , Pb, Na, Mg, S, K												FIELD NOTES				
Field Sample I.D.	DHL Lab #	Date	Time	Matrix	Container Type	# of Containers	HCl	HNO ₃	H ₂ SO ₄ □ NaOH □	ICE	UNPRESERVED													
<u>FMW-4R</u>	<u>01</u>	<u>5-7-19</u>	<u>1250</u>	<u>W</u>		<u>7</u>																		<u>XXX</u>

RELINQUISHED BY: (Signature) <u>[Signature]</u>	DATE/TIME <u>5-7-19 1800</u>	RECEIVED BY: (Signature) <u>[Signature]</u>	TURN AROUND TIME RUSH <input type="checkbox"/> CALL FIRST 1 DAY <input type="checkbox"/> CALL FIRST 2 DAY <input type="checkbox"/> NORMAL <input type="checkbox"/> OTHER <input type="checkbox"/>	LABORATORY USE ONLY: RECEIVING TEMP: <u>4-1/4-80</u> THERM #: <u>78</u> CUSTODY SEALS: <input type="checkbox"/> BROKEN <input type="checkbox"/> INTACT <input checked="" type="checkbox"/> NOT USED CARRIER: <input type="checkbox"/> LONE STAR <input checked="" type="checkbox"/> FEDEX <input type="checkbox"/> UPS <input type="checkbox"/> OTHER <input type="checkbox"/> COURIER DELIVERY <input type="checkbox"/> HAND DELIVERED
RELINQUISHED BY: (Signature) <u>[Signature]</u>	DATE/TIME <u>5-8-19 0948</u>	RECEIVED BY: (Signature) <u>[Signature]</u>		
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)		

DHL DISPOSAL @ \$5.00 each Return

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

ORIGIN ID:ACTA (512) 671-3434
J. BRAYTON
GOLDER
2201 DOUBLE CREEK OR STE 4004
ROUND ROCK, TX 78664
UNITED STATES US

SHIP DATE: 07MAY19
ACTWGT: 52.00 LB
CAD: 006993648/SSFE2002
DIMS: 24x14x13 IN
BILL THIRD PARTY

Part # 1562974856/789642195P 02/20

TO

DHL
2300 DOUBLE CREEK DR

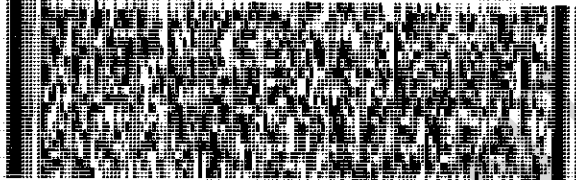
ROUND ROCK TX 78664

(512) 388-8222

REF:

INVT

DEPT:



FedEx
Express



AN10701081010101

TRK# 7871 1070 8060
0201

WED - 08 MAY 10:30A
PRIORITY OVERNIGHT

44 BSMA

78664
TX-US AUS



ORIGIN ID:ACTA (512) 671-3434
J. BRAYTON
GOLDER
2201 DOUBLE CREEK DR STE 4004
ROUND ROCK, TX 78664
UNITED STATES US

SHIP DATE: 07MAY19
ACTWGT: 59.00 LB
CAD: 006999648/SSFE2002
DIM6: 23x14x14 IN
BILL THIRD PARTY

Part # 156297-453 RFD02 EXP 02/20

TO

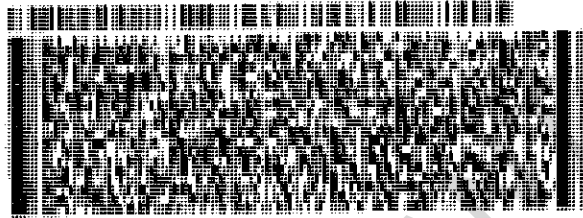
DHL
2300 DOUBLE CREEK DR

ROUND ROCK TX 78664

(512) 888-0222

REF:

DEPT:



FedEx
Express



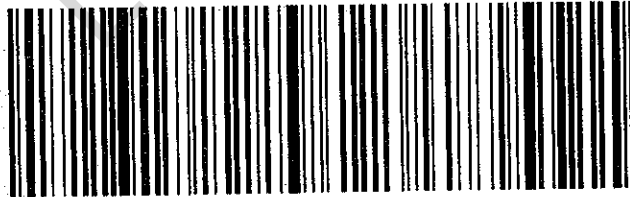
41107010510184

TRK# 7871 1068 8250
0201

WED - 08 MAY 10:30A
PRIORITY OVERNIGHT

44 BSMA

78664
TX-US AUS



Sample Receipt Checklist

Client Name Golder

Date Received: 5/8/2019

Work Order Number 1905088

Received by JW

Checklist completed by: [Signature] 5/8/2019
Signature Date

Reviewed by: [Initials] 5/8/2019
Initials Date

Carrier name FedEx 1day

- Shipping container/cooler in good condition? Yes [checked] No [] Not Present []
Custody seals intact on shipping container/cooler? Yes [] No [] Not Present [checked]
Custody seals intact on sample bottles? Yes [] No [] Not Present [checked]
Chain of custody present? Yes [checked] No []
Chain of custody signed when relinquished and received? Yes [checked] No []
Chain of custody agrees with sample labels? Yes [checked] No []
Samples in proper container/bottle? Yes [checked] No []
Sample containers intact? Yes [checked] No []
Sufficient sample volume for indicated test? Yes [checked] No []
All samples received within holding time? Yes [checked] No []
Container/Temp Blank temperature in compliance? Yes [checked] No [] 4.1 °C
Water - VOA vials have zero headspace? Yes [checked] No [] No VOA vials submitted []
Water - pH<2 acceptable upon receipt? Yes [checked] No [] NA [] LOT # 11837
Adjusted? [no] Checked by [initials]
Water - ph>9 (S) or ph>10 (CN) acceptable upon receipt? Yes [] No [] NA [checked] 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

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Lab Order: 1905088

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 M4500-P E - Orthophosphate 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 M2540C - TDS Analysis
 - Sub-contract - Radium-228 and Radium-226 analyses by methods E904 and SM 7500 Ra B M.
- Analyzed at Pace Analytical.

LOG IN

The sample was received and log-in performed on 5/8/19. A total of 1 sample was received. The sample arrived in good condition and was properly packaged.

METALS ANALYSIS

For Metals analysis performed on 5/15/19 the matrix spike and matrix spike duplicate recoveries were out of control limits for a total of four analytes. 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 these analytes. No further corrective actions were taken.

For Metals analysis performed on 5/15/19 the RPD for the serial dilution was slightly above control limits for Iron. This is flagged accordingly. The PDS was within control limits for this analyte. No further corrective actions were taken.

For Metals analysis performed on 5/15/19 CCV1-190515 was slightly above control limits for Lithium. This is flagged accordingly. The associated LCVL1-190515 was within control limits for this analyte. No further corrective actions were taken.

For Metals analysis performed on 5/15/19 LCV1-190515 was slightly above control limits for Boron. This is flagged accordingly. The associated CCVL1-190515 was within control limits for this analyte. No further corrective actions were taken.

MERCURY ANALYSIS

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Lab Order: 1905088

CASE NARRATIVE

For Mercury analysis performed on 5/15/19 CCV1-190515 was slightly above control limits. This is flagged accordingly in the QC summary report. The sample was below detection limits. No further corrective actions were taken.

LUMINANT

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Lab Order: 1905088

Work Order Sample Summary

Lab Smp ID	Client Sample ID	Tag Number	Date Collected	Date Recved
1905088-01	FMW-4R		05/07/19 12:50 PM	5/8/2019

LUMINANT

Lab Order: 1905088
Client: Golder
Project: Luminant-BBSES-Ash Landfill

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1905088-01A	FMW-4R	05/07/19 12:50 PM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	05/10/19 04:05 PM	90853
1905088-01B	FMW-4R	05/07/19 12:50 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/09/19 08:11 AM	90806
	FMW-4R	05/07/19 12:50 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/09/19 08:11 AM	90806
	FMW-4R	05/07/19 12:50 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	05/09/19 08:11 AM	90806
	FMW-4R	05/07/19 12:50 PM	Aqueous	SW7470A	Mercury Aq Prep	05/15/19 09:28 AM	90885
1905088-01C	FMW-4R	05/07/19 12:50 PM	Aqueous	M2320 B	Alkalinity Preparation	05/08/19 11:38 AM	90788
	FMW-4R	05/07/19 12:50 PM	Aqueous	E300	Anion Preparation	05/08/19 09:11 AM	90780
	FMW-4R	05/07/19 12:50 PM	Aqueous	E300	Anion Preparation	05/08/19 09:11 AM	90780
	FMW-4R	05/07/19 12:50 PM	Aqueous	M4500-P E	Orthophosphate Prep	05/08/19 01:28 PM	90796
	FMW-4R	05/07/19 12:50 PM	Aqueous	M2540C	TDS Preparation	05/10/19 02:30 PM	90849

Lab Order: 1905088
Client: Golder
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1905088-01A	FMW-4R	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	90853	1	05/16/19	UV/VIS_2_190516A
	FMW-4R	Aqueous	M3500-Fe D	Ferrous Iron	90853	1	05/10/19 04:52 PM	UV/VIS_2_190510A
1905088-01B	FMW-4R	Aqueous	SW7470A	Mercury Total: Aqueous	90885	1	05/15/19 02:09 PM	CETAC2_HG_190515 C
	FMW-4R	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90806	1	05/17/19 12:29 PM	ICP-MS4_190517A
	FMW-4R	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90806	1	05/15/19 06:34 PM	ICP-MS4_190515A
	FMW-4R	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	90806	10	05/15/19 05:57 PM	ICP-MS4_190515A
1905088-01C	FMW-4R	Aqueous	M2320 B	Alkalinity	90788	1	05/08/19 02:31 PM	TITRATOR_190508A
	FMW-4R	Aqueous	E300	Anions by IC method - Water	90780	1	05/08/19 09:21 PM	IC2_190508A
	FMW-4R	Aqueous	E300	Anions by IC method - Water	90780	1	05/08/19 08:49 PM	IC2_190508A
	FMW-4R	Aqueous	M4500-P E	Orthophosphate	90796	1	05/08/19 02:07 PM	UV/VIS_2_190508A
	FMW-4R	Aqueous	M2540C	Total Dissolved Solids	90849	1	05/10/19 05:00 PM	WC_190510D

CLIENT: Golder
 Project: Luminant-BBSES-Ash Landfill
 Project No: 19122262-A
 Lab Order: 1905088

Client Sample ID: FMW-4R
 Lab ID: 1905088-01
 Collection Date: 05/07/19 12:50 PM
 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	05/15/19 06:34 PM
Arsenic	<0.00200	0.00200	0.00500		mg/L	1	05/15/19 06:34 PM
Barium	0.0250	0.00300	0.0100		mg/L	1	05/15/19 06:34 PM
Beryllium	<0.000300	0.000300	0.00100		mg/L	1	05/17/19 12:29 PM
Boron	3.12	0.100	0.300		mg/L	10	05/15/19 05:57 PM
Cadmium	<0.000300	0.000300	0.00100		mg/L	1	05/15/19 06:34 PM
Calcium	39.1	1.00	3.00		mg/L	10	05/15/19 05:57 PM
Chromium	0.00231	0.00200	0.00500	J	mg/L	1	05/15/19 06:34 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	05/15/19 06:34 PM
Iron	0.401	0.0300	0.100		mg/L	1	05/15/19 06:34 PM
Lead	<0.000300	0.000300	0.00100		mg/L	1	05/15/19 06:34 PM
Lithium	<0.00500	0.00500	0.0100		mg/L	1	05/17/19 12:29 PM
Magnesium	13.2	0.100	0.300		mg/L	1	05/15/19 06:34 PM
Molybdenum	<0.00200	0.00200	0.00500		mg/L	1	05/15/19 06:34 PM
Potassium	6.97	0.100	0.300		mg/L	1	05/15/19 06:34 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	05/15/19 06:34 PM
Sodium	116	1.00	3.00		mg/L	10	05/15/19 05:57 PM
Thallium	<0.000500	0.000500	0.00150		mg/L	1	05/15/19 06:34 PM
MERCURY TOTAL: AQUEOUS		SW7470A		Analyst: AH			
Mercury	<0.0000800	0.0000800	0.000200		mg/L	1	05/15/19 02:09 PM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	9.90	0.300	1.00		mg/L	1	05/08/19 08:49 PM
Fluoride	0.105	0.100	0.400	J	mg/L	1	05/08/19 09:21 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	05/08/19 09:21 PM
Sulfate	18.2	1.00	3.00		mg/L	1	05/08/19 08:49 PM
ALKALINITY		M2320 B		Analyst: CC			
Alkalinity, Bicarbonate (As CaCO3)	73.4	10.0	20.0		mg/L @ pH 4.5	1	05/08/19 02:31 PM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.5	1	05/08/19 02:31 PM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.5	1	05/08/19 02:31 PM
Alkalinity, Total (As CaCO3)	73.4	20.0	20.0		mg/L @ pH 4.5	1	05/08/19 02:31 PM
FERRIC IRON (CALCULATED)		M3500-FE D		Analyst: CAC			
Iron, Ferric	0.401	0.0500	0.100	N	mg/L	1	05/16/19
FERROUS IRON		M3500-FE D		Analyst: BTJ			
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	05/10/19 04:52 PM

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: 07-Jun-19

CLIENT: Golder
Project: Luminant-BBSES-Ash Landfill
Project No: 19122262-A
Lab Order: 1905088

Client Sample ID: FMW-4R
Lab ID: 1905088-01
Collection Date: 05/07/19 12:50 PM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
ORTHOPHOSPHATE							Analyst: AH
Phosphorus, Total Orthophosphate (As P)	<0.0300	0.0300	0.100		mg/L	1	05/08/19 02:07 PM
TOTAL DISSOLVED SOLIDS							Analyst: BTJ
Total Dissolved Solids (Residue, Filterable)	529	10.0	10.0		mg/L	1	05/10/19 05:00 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

CLIENT: Golder
 Work Order: 1905088

ANALYTICAL QC SUMMARY REPORT

Project: Luminant-BBSES-Ash Landfill

RunID: CETAC2_HG_190515C

The QC data in batch 90885 applies to the following samples: 1905088-01B

Sample ID MB-90885	Batch ID: 90885	TestNo: SW7470A	Units: mg/L							
SampType: MBLK	Run ID: CETAC2_HG_190515	Analysis Date: 5/15/2019 1:55:28 PM	Prep Date: 5/15/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Mercury <0.0000800 0.000200

Sample ID LCS-90885	Batch ID: 90885	TestNo: SW7470A	Units: mg/L							
SampType: LCS	Run ID: CETAC2_HG_190515	Analysis Date: 5/15/2019 2:00:00 PM	Prep Date: 5/15/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Mercury 0.00197 0.000200 0.00200 0 98.5 85 115

Sample ID LCSD-90885	Batch ID: 90885	TestNo: SW7470A	Units: mg/L							
SampType: LCSD	Run ID: CETAC2_HG_190515	Analysis Date: 5/15/2019 2:02:16 PM	Prep Date: 5/15/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Mercury 0.00198 0.000200 0.00200 0 99.0 85 115 0.506 15

Sample ID 1905098-04B MS	Batch ID: 90885	TestNo: SW7470A	Units: mg/L							
SampType: MS	Run ID: CETAC2_HG_190515	Analysis Date: 5/15/2019 2:20:22 PM	Prep Date: 5/15/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Mercury 0.0112 0.00100 0.0100 0 112 80 120

Sample ID 1905098-04B MSD	Batch ID: 90885	TestNo: SW7470A	Units: mg/L							
SampType: MSD	Run ID: CETAC2_HG_190515	Analysis Date: 5/15/2019 2:22:38 PM	Prep Date: 5/15/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Mercury 0.0108 0.00100 0.0100 0 108 80 120 3.19 15

Sample ID 1905098-04B SD	Batch ID: 90885	TestNo: SW7470A	Units: mg/L							
SampType: SD	Run ID: CETAC2_HG_190515	Analysis Date: 5/15/2019 2:24:54 PM	Prep Date: 5/15/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Mercury <0.00200 0.00500 0 0 0 0 10

Sample ID 1905098-04B PDS	Batch ID: 90885	TestNo: SW7470A	Units: mg/L							
SampType: PDS	Run ID: CETAC2_HG_190515	Analysis Date: 5/15/2019 2:27:10 PM	Prep Date: 5/15/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Mercury 0.0124 0.00100 0.0125 0 99.2 85 115

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

CLIENT: Golder
Work Order: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: CETAC2_HG_190515C

Sample ID ICV-190515	Batch ID: R104099	TestNo: SW7470A	Units: mg/L							
SampType: ICV	Run ID: CETAC2_HG_190515	Analysis Date: 5/15/2019 1:50:54 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.00405	0.000200	0.00400	0	101	90	110			

Sample ID CCV1-190515	Batch ID: R104099	TestNo: SW7470A	Units: mg/L							
SampType: CCV	Run ID: CETAC2_HG_190515	Analysis Date: 5/15/2019 2:36:16 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.00223	0.000200	0.00200	0	112	90	110			S

LUMINANT

Qualifiers:	<p>B Analyte detected in the associated Method Blank</p> <p>J Analyte detected between MDL and RL</p> <p>ND Not Detected at the Method Detection Limit</p> <p>RL Reporting Limit</p> <p>J Analyte detected between SDL and RL</p>	<p>DF Dilution Factor</p> <p>MDL Method Detection Limit</p> <p>R RPD outside accepted control limits</p> <p>S Spike Recovery outside control limits</p> <p>N Parameter not NELAP certified</p>
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CLIENT: Golder
Work Order: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190514C

The QC data in batch 90806 applies to the following samples: 1905088-01B

Sample ID MB-90806	Batch ID: 90806	TestNo: SW6020A	Units: mg/L
SampType: MBLK	Run ID: ICP-MS4_190514C	Analysis Date: 5/14/2019 5:40:00 PM	Prep Date: 5/9/2019

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								
Cadmium	<0.000300	0.00100								
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-90806	Batch ID: 90806	TestNo: SW6020A	Units: mg/L
SampType: LCS	Run ID: ICP-MS4_190514C	Analysis Date: 5/14/2019 5:42:00 PM	Prep Date: 5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.198	0.00250	0.200	0	98.9	80	120			
Arsenic	0.194	0.00500	0.200	0	97.0	80	120			
Barium	0.197	0.0100	0.200	0	98.5	80	120			
Beryllium	0.206	0.00100	0.200	0	103	80	120			
Cadmium	0.197	0.00100	0.200	0	98.6	80	120			
Chromium	0.198	0.00500	0.200	0	99.2	80	120			
Cobalt	0.195	0.00500	0.200	0	97.6	80	120			
Iron	5.03	0.100	5.00	0	101	80	120			
Lead	0.188	0.00100	0.200	0	94.2	80	120			
Lithium	0.220	0.0100	0.200	0	110	80	120			
Magnesium	5.05	0.300	5.00	0	101	80	120			
Molybdenum	0.186	0.00500	0.200	0	93.0	80	120			
Potassium	4.86	0.300	5.00	0	97.2	80	120			
Selenium	0.188	0.00500	0.200	0	94.2	80	120			
Sodium	5.04	0.300	5.00	0	101	80	120			
Thallium	0.196	0.00150	0.200	0	97.9	80	120			

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

CLIENT: Golder
Work Order: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190514C

Sample ID: LCSD-90806	Batch ID: 90806	TestNo: SW6020A	Units: mg/L
SampType: LCSD	Run ID: ICP-MS4_190514C	Analysis Date: 5/14/2019 5:44:00 PM	Prep Date: 5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.199	0.00250	0.200	0	99.6	80	120	0.767	15	
Arsenic	0.196	0.00500	0.200	0	98.0	80	120	0.985	15	
Barium	0.198	0.0100	0.200	0	98.9	80	120	0.379	15	
Beryllium	0.206	0.00100	0.200	0	103	80	120	0.143	15	
Cadmium	0.198	0.00100	0.200	0	99.1	80	120	0.492	15	
Chromium	0.200	0.00500	0.200	0	100	80	120	1.04	15	
Cobalt	0.196	0.00500	0.200	0	97.9	80	120	0.275	15	
Iron	5.05	0.100	5.00	0	101	80	120	0.345	15	
Lead	0.193	0.00100	0.200	0	96.3	80	120	2.25	15	
Lithium	0.213	0.0100	0.200	0	106	80	120	3.31	15	
Magnesium	5.06	0.300	5.00	0	101	80	120	0.224	15	
Molybdenum	0.189	0.00500	0.200	0	94.7	80	120	1.74	15	
Potassium	4.90	0.300	5.00	0	98.0	80	120	0.817	15	
Selenium	0.191	0.00500	0.200	0	95.7	80	120	1.58	15	
Sodium	5.04	0.300	5.00	0	101	80	120	0.113	15	
Thallium	0.197	0.00150	0.200	0	98.4	80	120	0.549	15	

Sample ID: 1905083-01A SD	Batch ID: 90806	TestNo: SW6020A	Units: mg/L
SampType: SD	Run ID: ICP-MS4_190514C	Analysis Date: 5/14/2019 5:50:00 PM	Prep Date: 5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	<2.00	6.25	0	0				0	10	
Arsenic	<5.00	12.5	0	0				0	10	
Barium	<7.50	25.0	0	0				0	10	
Beryllium	<0.750	2.50	0	0				0	10	
Cadmium	<0.750	2.50	0	0				0	10	
Chromium	<5.00	12.5	0	0				0	10	
Cobalt	<7.50	12.5	0	0				0	10	
Lead	<0.750	2.50	0	0				0	10	
Lithium	<12.5	25.0	0	0				0	10	
Magnesium	<250	750	0	0				0	10	
Molybdenum	<5.00	12.5	0	0				0	10	
Potassium	<250	750	0	0				0	10	
Selenium	<5.00	12.5	0	0				0	10	
Sodium	2570	750	0	2520				1.73	10	
Thallium	<1.25	3.75	0	0				0	10	

Sample ID: 1905083-01A PDS	Batch ID: 90806	TestNo: SW6020A	Units: mg/L
SampType: PDS	Run ID: ICP-MS4_190514C	Analysis Date: 5/14/2019 6:21:00 PM	Prep Date: 5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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- Qualifiers:**
- B Analyte detected in the associated Method Blank
 - J Analyte detected between MDL and RL
 - ND Not Detected at the Method Detection Limit
 - RL Reporting Limit
 - J Analyte detected between SDL and RL
 - DF Dilution Factor
 - MDL Method Detection Limit
 - R RPD outside accepted control limits
 - S Spike Recovery outside control limits
 - N Parameter not NELAP certified

CLIENT: Golder
Work Order: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190514C

Sample ID: 1905083-01A PDS	Batch ID: 90806	TestNo: SW6020A	Units: mg/L
SampType: PDS	Run ID: ICP-MS4_190514C	Analysis Date: 5/14/2019 6:21:00 PM	Prep Date: 5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	98.9	1.25	100	0	98.9	80	120			
Arsenic	95.8	2.50	100	0	95.8	80	120			
Barium	95.7	5.00	100	0	95.7	80	120			
Beryllium	105	0.500	100	0	105	80	120			
Cadmium	99.1	0.500	100	0	99.1	80	120			
Chromium	103	2.50	100	0	103	80	120			
Cobalt	97.6	2.50	100	0	97.6	80	120			
Lead	92.2	0.500	100	0	92.2	80	120			
Lithium	109	5.00	100	0	109	80	120			
Magnesium	2470	150	2500	0	98.9	80	120			
Molybdenum	91.0	2.50	100	0	91.0	80	120			
Potassium	2430	150	2500	0	97.3	80	120			
Selenium	93.6	2.50	100	0	93.6	80	120			
Sodium	5130	150	2500	2520	104	80	120			
Thallium	95.7	0.750	100	0	95.7	80	120			

LUMINANT

<p>Qualifiers:</p> <p>B Analyte detected in the associated Method Blank</p> <p>J Analyte detected between MDL and RL</p> <p>ND Not Detected at the Method Detection Limit</p> <p>RL Reporting Limit</p> <p>J Analyte detected between SDL and RL</p>	<p>DF Dilution Factor</p> <p>MDL Method Detection Limit</p> <p>R RPD outside accepted control limits</p> <p>S Spike Recovery outside control limits</p> <p>N Parameter not NELAP certified</p>
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CLIENT: Golder
Work Order: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190514C

Sample ID ICV-190514	Batch ID: R104064	TestNo: SW6020A	Units: mg/L
SampType: ICV	Run ID: ICP-MS4_190514C	Analysis Date: 5/14/2019 11:03:00 AM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.0982	0.00250	0.100	0	98.2	90	110			
Arsenic	0.0976	0.00500	0.100	0	97.6	90	110			
Barium	0.0943	0.0100	0.100	0	94.3	90	110			
Beryllium	0.105	0.00100	0.100	0	105	90	110			
Boron	0.104	0.0300	0.100	0	104	90	110			
Cadmium	0.0991	0.00100	0.100	0	99.1	90	110			
Calcium	2.48	0.300	2.50	0	99.1	90	110			
Chromium	0.104	0.00500	0.100	0	104	90	110			
Cobalt	0.102	0.00500	0.100	0	102	90	110			
Iron	2.55	0.100	2.50	0	102	90	110			
Lead	0.0930	0.00100	0.100	0	93.0	90	110			
Lithium	0.106	0.0100	0.100	0	106	90	110			
Magnesium	2.52	0.300	2.50	0	101	90	110			
Molybdenum	0.0920	0.00500	0.100	0	92.0	90	110			
Potassium	2.49	0.300	2.50	0	99.4	90	110			
Selenium	0.0959	0.00500	0.100	0	95.9	90	110			
Sodium	2.67	0.300	2.50	0	107	90	110			
Thallium	0.0921	0.00150	0.100	0	92.1	90	110			

Sample ID LCVL-190514	Batch ID: R104064	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS4_190514C	Analysis Date: 5/14/2019 11:07:00 AM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.00186	0.00250	0.00200	0	92.8	70	130			
Arsenic	0.00492	0.00500	0.00500	0	98.3	70	130			
Barium	0.00461	0.0100	0.00500	0	92.2	70	130			
Beryllium	0.00101	0.00100	0.00100	0	101	70	130			
Cadmium	0.000945	0.00100	0.00100	0	94.5	70	130			
Chromium	0.00496	0.00500	0.00500	0	99.1	70	130			
Cobalt	0.00500	0.00500	0.00500	0	100	70	130			
Iron	0.114	0.100	0.100	0	114	70	130			
Lead	0.000895	0.00100	0.00100	0	89.5	70	130			
Lithium	0.0107	0.0100	0.0100	0	107	70	130			
Magnesium	0.101	0.300	0.100	0	101	70	130			
Molybdenum	0.00475	0.00500	0.00500	0	95.1	70	130			
Potassium	0.0971	0.300	0.100	0	97.1	70	130			
Selenium	0.00450	0.00500	0.00500	0	90.1	70	130			
Sodium	0.103	0.300	0.100	0	103	70	130			
Thallium	0.000860	0.00150	0.00100	0	86.0	70	130			

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: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190514C

Sample ID: CCV6-190514	Batch ID: R104064	TestNo: SW6020A	Units: mg/L
SampType: CCV	Run ID: ICP-MS4_190514C	Analysis Date: 5/14/2019 5:13:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.197	0.00250	0.200	0	98.3	90	110			
Arsenic	0.190	0.00500	0.200	0	95.0	90	110			
Barium	0.194	0.0100	0.200	0	97.2	90	110			
Beryllium	0.202	0.00100	0.200	0	101	90	110			
Cadmium	0.194	0.00100	0.200	0	97.1	90	110			
Chromium	0.197	0.00500	0.200	0	98.7	90	110			
Cobalt	0.189	0.00500	0.200	0	94.6	90	110			
Iron	4.98	0.100	5.00	0	99.6	90	110			
Lead	0.189	0.00100	0.200	0	94.4	90	110			
Lithium	0.210	0.0100	0.200	0	105	90	110			
Magnesium	5.02	0.300	5.00	0	100	90	110			
Molybdenum	0.186	0.00500	0.200	0	93.2	90	110			
Potassium	4.93	0.300	5.00	0	98.6	90	110			
Selenium	0.187	0.00500	0.200	0	93.5	90	110			
Sodium	5.05	0.300	5.00	0	101	90	110			
Thallium	0.193	0.00150	0.200	0	96.3	90	110			

Sample ID: LCVL6-190514	Batch ID: R104064	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS4_190514C	Analysis Date: 5/14/2019 5:36:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.00176	0.00250	0.00200	0	88.2	70	130			
Arsenic	0.00466	0.00500	0.00500	0	93.3	70	130			
Barium	0.00448	0.0100	0.00500	0	89.5	70	130			
Beryllium	0.000950	0.00100	0.00100	0	95.0	70	130			
Cadmium	0.000874	0.00100	0.00100	0	87.4	70	130			
Chromium	0.00476	0.00500	0.00500	0	95.3	70	130			
Cobalt	0.00463	0.00500	0.00500	0	92.7	70	130			
Iron	0.109	0.100	0.100	0	109	70	130			
Lead	0.000723	0.00100	0.00100	0	72.3	70	130			
Lithium	0.0109	0.0100	0.0100	0	109	70	130			
Magnesium	0.0987	0.300	0.100	0	98.7	70	130			
Molybdenum	0.00427	0.00500	0.00500	0	85.4	70	130			
Potassium	0.100	0.300	0.100	0	100	70	130			
Selenium	0.00481	0.00500	0.00500	0	96.2	70	130			
Sodium	0.108	0.300	0.100	0	108	70	130			
Thallium	0.000776	0.00150	0.00100	0	77.6	70	130			

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: 1905088
 Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190514C

Sample ID: CCV7-190514	Batch ID: R104064	TestNo: SW6020A	Units: mg/L
SampType: CCV	Run ID: ICP-MS4_190514C	Analysis Date: 5/14/2019 6:23:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.201	0.00250	0.200	0	101	90	110			
Arsenic	0.191	0.00500	0.200	0	95.3	90	110			
Barium	0.197	0.0100	0.200	0	98.5	90	110			
Beryllium	0.205	0.00100	0.200	0	102	90	110			
Cadmium	0.198	0.00100	0.200	0	98.8	90	110			
Chromium	0.198	0.00500	0.200	0	99.2	90	110			
Cobalt	0.191	0.00500	0.200	0	95.5	90	110			
Iron	4.95	0.100	5.00	0	99.0	90	110			
Lead	0.188	0.00100	0.200	0	94.1	90	110			
Lithium	0.213	0.0100	0.200	0	106	90	110			
Magnesium	5.01	0.300	5.00	0	100	90	110			
Molybdenum	0.192	0.00500	0.200	0	96.1	90	110			
Potassium	4.83	0.300	5.00	0	96.6	90	110			
Selenium	0.184	0.00500	0.200	0	92.1	90	110			
Sodium	5.04	0.300	5.00	0	101	90	110			
Thallium	0.197	0.00150	0.200	0	98.6	90	110			

Sample ID: LCVL7-190514	Batch ID: R104064	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS4_190514C	Analysis Date: 5/14/2019 6:27:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.00187	0.00250	0.00200	0	93.6	70	130			
Arsenic	0.00464	0.00500	0.00500	0	92.8	70	130			
Barium	0.00449	0.0100	0.00500	0	89.7	70	130			
Beryllium	0.000990	0.00100	0.00100	0	99.0	70	130			
Cadmium	0.000897	0.00100	0.00100	0	89.7	70	130			
Chromium	0.00472	0.00500	0.00500	0	94.3	70	130			
Cobalt	0.00467	0.00500	0.00500	0	93.5	70	130			
Iron	0.107	0.100	0.100	0	107	70	130			
Lead	0.000742	0.00100	0.00100	0	74.2	70	130			
Lithium	0.00960	0.0100	0.0100	0	96.0	70	130			
Magnesium	0.0963	0.300	0.100	0	96.3	70	130			
Molybdenum	0.00432	0.00500	0.00500	0	86.3	70	130			
Potassium	0.0948	0.300	0.100	0	94.8	70	130			
Selenium	0.00466	0.00500	0.00500	0	93.1	70	130			
Sodium	0.112	0.300	0.100	0	112	70	130			
Thallium	0.000786	0.00150	0.00100	0	78.6	70	130			

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: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190515A

The QC data in batch 90806 applies to the following samples: 1905088-01B

Sample ID MB-90806	Batch ID: 90806	TestNo: SW6020A	Units: mg/L							
SampType: MBLK	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 2:35:00 PM	Prep Date: 5/9/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Boron	<0.0100	0.0300								
Calcium	<0.100	0.300								

Sample ID LCS-90806	Batch ID: 90806	TestNo: SW6020A	Units: mg/L							
SampType: LCS	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 2:37:00 PM	Prep Date: 5/9/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Boron	0.203	0.0300	0.200	0	102	80	120			
Calcium	4.93	0.300	5.00	0	98.5	80	120			

Sample ID LCSD-90806	Batch ID: 90806	TestNo: SW6020A	Units: mg/L							
SampType: LCSD	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 2:39:00 PM	Prep Date: 5/9/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Boron	0.206	0.0300	0.200	0	103	80	120	1.54	15	
Calcium	4.95	0.300	5.00	0	99.0	80	120	0.495	15	

Sample ID 1905083-01A SD	Batch ID: 90806	TestNo: SW6020A	Units: mg/L							
SampType: SD	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 2:45:00 PM	Prep Date: 5/9/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Boron	4.03	1.50	0	3.83				5.16	10	
Calcium	66.2	15.0	0	64.6				2.46	10	

Sample ID 1905083-01A PDS	Batch ID: 90806	TestNo: SW6020A	Units: mg/L							
SampType: PDS	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 3:21:00 PM	Prep Date: 5/9/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Boron	5.78	0.300	2.00	3.83	97.3	80	120			
Calcium	111	3.00	50.0	64.6	92.6	80	120			

Sample ID 1905083-01A MS	Batch ID: 90806	TestNo: SW6020A	Units: mg/L							
SampType: MS	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 3:23:00 PM	Prep Date: 5/9/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Antimony	0.204	0.0250	0.200	0	102	80	120			
Arsenic	0.205	0.0500	0.200	0	103	80	120			
Barium	0.209	0.100	0.200	0	104	80	120			
Beryllium	0.203	0.0100	0.200	0	101	80	120			
Boron	4.10	0.300	0.200	3.83	134	80	120			S

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: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190515A

Sample ID: 1905083-01A MS	Batch ID: 90806	TestNo: SW6020A	Units: mg/L
SampType: MS	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 3:23:00 PM	Prep Date: 5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cadmium	0.198	0.0100	0.200	0	98.9	80	120			
Calcium	69.3	3.00	5.00	64.6	94.1	80	120			
Chromium	0.199	0.0500	0.200	0	99.6	80	120			
Cobalt	0.202	0.0500	0.200	0	101	80	120			
Iron	5.78	1.00	5.00	0	116	80	120			
Lead	0.185	0.0100	0.200	0	92.7	80	120			
Lithium	0.666	0.100	0.200	0.420	123	80	120			S
Magnesium	16.6	3.00	5.00	11.5	101	80	120			
Molybdenum	0.196	0.0500	0.200	0	98.2	80	120			
Potassium	12.4	3.00	5.00	7.17	104	80	120			
Selenium	0.197	0.0500	0.200	0	98.6	80	120			
Sodium	2550	3.00	5.00	2470	1460	80	120			S
Thallium	0.180	0.0150	0.200	0	90.0	80	120			

Sample ID: 1905083-01A MSD	Batch ID: 90806	TestNo: SW6020A	Units: mg/L
SampType: MSD	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 3:25:00 PM	Prep Date: 5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.202	0.0250	0.200	0	101	80	120	0.991	15	
Arsenic	0.204	0.0500	0.200	0	102	80	120	0.871	15	
Barium	0.206	0.100	0.200	0	103	80	120	1.60	15	
Beryllium	0.202	0.0100	0.200	0	101	80	120	0.529	15	
Boron	4.21	0.300	0.200	3.83	187	80	120	2.56	15	S
Cadmium	0.194	0.0100	0.200	0	97.0	80	120	1.88	15	
Calcium	68.3	3.00	5.00	64.6	74.2	80	120	1.45	15	S
Chromium	0.198	0.0500	0.200	0	99.1	80	120	0.503	15	
Cobalt	0.199	0.0500	0.200	0	99.5	80	120	1.68	15	
Iron	5.75	1.00	5.00	0	115	80	120	0.482	15	
Lead	0.182	0.0100	0.200	0	90.8	80	120	2.03	15	
Lithium	0.632	0.100	0.200	0.420	106	80	120	5.23	15	
Magnesium	16.7	3.00	5.00	11.5	104	80	120	0.809	15	
Molybdenum	0.193	0.0500	0.200	0	96.6	80	120	1.65	15	
Potassium	12.4	3.00	5.00	7.17	105	80	120	0.096	15	
Selenium	0.193	0.0500	0.200	0	96.7	80	120	1.94	15	
Sodium	2600	3.00	5.00	2470	2450	80	120	1.93	15	S
Thallium	0.176	0.0150	0.200	0	88.2	80	120	2.05	15	

Sample ID: 1905083-01A SD	Batch ID: 90806	TestNo: SW6020A	Units: mg/L
SampType: SD	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 7:14:00 PM	Prep Date: 5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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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: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190515A

Sample ID: 1905083-01A SD	Batch ID: 90806	TestNo: SW6020A	Units: mg/L
SampType: SD	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 7:14:00 PM	Prep Date: 5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	0.233	0.500	0	0.207				11.6	10	R

Sample ID: 1905083-01A PDS	Batch ID: 90806	TestNo: SW6020A	Units: mg/L
SampType: PDS	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 7:16:00 PM	Prep Date: 5/9/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	4.36	0.100	5.00	0.207	83.0	80	120			

LUMINANT

Qualifiers: B Analyte detected in the associated Method Blank J Analyte detected between MDL and RL ND Not Detected at the Method Detection Limit RL Reporting Limit J Analyte detected between SDL and RL	DF Dilution Factor MDL Method Detection Limit R RPD outside accepted control limits S Spike Recovery outside control limits N Parameter not NELAP certified
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CLIENT: Golder
Work Order: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190515A

Sample ID ICV-190515	Batch ID: R104091	TestNo: SW6020A	Units: mg/L
SampType: ICV	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 2:15:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.0991	0.00250	0.100	0	99.1	90	110			
Arsenic	0.101	0.00500	0.100	0	101	90	110			
Barium	0.0948	0.0100	0.100	0	94.8	90	110			
Beryllium	0.106	0.00100	0.100	0	106	90	110			
Boron	0.104	0.0300	0.100	0	104	90	110			
Cadmium	0.0994	0.00100	0.100	0	99.4	90	110			
Calcium	2.57	0.300	2.50	0	103	90	110			
Chromium	0.105	0.00500	0.100	0	105	90	110			
Cobalt	0.103	0.00500	0.100	0	103	90	110			
Iron	2.63	0.100	2.50	0	105	90	110			
Lead	0.0919	0.00100	0.100	0	91.9	90	110			
Lithium	0.107	0.0100	0.100	0	107	90	110			
Magnesium	2.53	0.300	2.50	0	101	90	110			
Molybdenum	0.0895	0.00500	0.100	0	89.5	90	110			
Potassium	2.55	0.300	2.50	0	102	90	110			
Selenium	0.0994	0.00500	0.100	0	99.4	90	110			
Sodium	2.62	0.300	2.50	0	105	90	110			
Thallium	0.0901	0.00150	0.100	0	90.1	90	110			

Sample ID LCVL-190515	Batch ID: R104091	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 2:20:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.00183	0.00250	0.00200	0	91.3	70	130			
Arsenic	0.00490	0.00500	0.00500	0	98.0	70	130			
Barium	0.00442	0.0100	0.00500	0	88.5	70	130			
Beryllium	0.00102	0.00100	0.00100	0	102	70	130			
Boron	0.0252	0.0300	0.0200	0	126	70	130			
Cadmium	0.000941	0.00100	0.00100	0	94.1	70	130			
Calcium	0.101	0.300	0.100	0	101	70	130			
Chromium	0.00499	0.00500	0.00500	0	99.9	70	130			
Cobalt	0.00500	0.00500	0.00500	0	100	70	130			
Iron	0.112	0.100	0.100	0	112	70	130			
Lead	0.000843	0.00100	0.00100	0	84.3	70	130			
Lithium	0.0101	0.0100	0.0100	0	101	70	130			
Magnesium	0.0992	0.300	0.100	0	99.2	70	130			
Molybdenum	0.00438	0.00500	0.00500	0	87.6	70	130			
Potassium	0.0972	0.300	0.100	0	97.2	70	130			
Selenium	0.00459	0.00500	0.00500	0	91.7	70	130			
Sodium	0.0999	0.300	0.100	0	99.9	70	130			
Thallium	0.000801	0.00150	0.00100	0	80.1	70	130			

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: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190515A

Sample ID: LCVL1-190515	Batch ID: R104091	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 3:53:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.00176	0.00250	0.00200	0	88.0	70	130			
Arsenic	0.00479	0.00500	0.00500	0	95.7	70	130			
Barium	0.00430	0.0100	0.00500	0	85.9	70	130			
Beryllium	0.000973	0.00100	0.00100	0	97.3	70	130			
Boron	0.0264	0.0300	0.0200	0	132	70	130			S
Cadmium	0.000915	0.00100	0.00100	0	91.5	70	130			
Calcium	0.0921	0.300	0.100	0	92.1	70	130			
Chromium	0.00501	0.00500	0.00500	0	100	70	130			
Cobalt	0.00494	0.00500	0.00500	0	98.8	70	130			
Iron	0.112	0.100	0.100	0	112	70	130			
Lead	0.000812	0.00100	0.00100	0	81.2	70	130			
Lithium	0.0110	0.0100	0.0100	0	110	70	130			
Magnesium	0.102	0.300	0.100	0	102	70	130			
Molybdenum	0.00431	0.00500	0.00500	0	86.2	70	130			
Potassium	0.100	0.300	0.100	0	100	70	130			
Selenium	0.00464	0.00500	0.00500	0	92.7	70	130			
Sodium	0.105	0.300	0.100	0	105	70	130			
Thallium	0.000783	0.00150	0.00100	0	78.3	70	130			

Sample ID: CCV2-190515	Batch ID: R104091	TestNo: SW6020A	Units: mg/L
SampType: CCV	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 4:55:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.219	0.0300	0.200	0	110	90	110			
Calcium	4.88	0.300	5.00	0	97.5	90	110			
Sodium	5.28	0.300	5.00	0	106	90	110			

Sample ID: LCVL2-190515	Batch ID: R104091	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 5:05:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.0251	0.0300	0.0200	0	125	70	130			
Calcium	0.0963	0.300	0.100	0	96.3	70	130			
Sodium	0.104	0.300	0.100	0	104	70	130			

Sample ID: CCV3-190515	Batch ID: R104091	TestNo: SW6020A	Units: mg/L
SampType: CCV	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 6:15:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.196	0.00250	0.200	0	97.8	90	110			
Arsenic	0.198	0.00500	0.200	0	99.0	90	110			

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

CLIENT: Golder
Work Order: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190515A

Sample ID: CCV3-190515	Batch ID: R104091	TestNo: SW6020A	Units: mg/L
SampType: CCV	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 6:15:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.192	0.0100	0.200	0	96.0	90	110			
Cadmium	0.200	0.00100	0.200	0	99.8	90	110			
Chromium	0.205	0.00500	0.200	0	102	90	110			
Cobalt	0.203	0.00500	0.200	0	102	90	110			
Iron	5.22	0.100	5.00	0	104	90	110			
Lead	0.186	0.00100	0.200	0	93.1	90	110			
Magnesium	5.29	0.300	5.00	0	106	90	110			
Molybdenum	0.189	0.00500	0.200	0	94.4	90	110			
Potassium	5.08	0.300	5.00	0	102	90	110			
Selenium	0.197	0.00500	0.200	0	98.4	90	110			
Sodium	5.26	0.300	5.00	0	105	90	110			
Thallium	0.196	0.00150	0.200	0	98.0	90	110			

Sample ID: LCVL3-190515	Batch ID: R104091	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 6:26:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.00183	0.00250	0.00200	0	91.3	70	130			
Arsenic	0.00486	0.00500	0.00500	0	97.1	70	130			
Barium	0.00443	0.0100	0.00500	0	88.7	70	130			
Cadmium	0.000992	0.00100	0.00100	0	99.2	70	130			
Chromium	0.00500	0.00500	0.00500	0	99.9	70	130			
Cobalt	0.00501	0.00500	0.00500	0	100	70	130			
Iron	0.113	0.100	0.100	0	113	70	130			
Lead	0.000823	0.00100	0.00100	0	82.3	70	130			
Magnesium	0.102	0.300	0.100	0	102	70	130			
Molybdenum	0.00437	0.00500	0.00500	0	87.4	70	130			
Potassium	0.100	0.300	0.100	0	100	70	130			
Selenium	0.00428	0.00500	0.00500	0	85.6	70	130			
Sodium	0.103	0.300	0.100	0	103	70	130			
Thallium	0.000806	0.00150	0.00100	0	80.6	70	130			

Sample ID: CCV4-190515	Batch ID: R104091	TestNo: SW6020A	Units: mg/L
SampType: CCV	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 7:00:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.196	0.00250	0.200	0	97.8	90	110			
Arsenic	0.199	0.00500	0.200	0	99.3	90	110			
Barium	0.191	0.0100	0.200	0	95.7	90	110			
Cadmium	0.198	0.00100	0.200	0	98.9	90	110			
Chromium	0.202	0.00500	0.200	0	101	90	110			

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: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190515A

Sample ID CCV4-190515	Batch ID: R104091	TestNo: SW6020A	Units: mg/L
SampType: CCV	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 7:00:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.203	0.00500	0.200	0	101	90	110			
Iron	5.13	0.100	5.00	0	103	90	110			
Lead	0.189	0.00100	0.200	0	94.4	90	110			
Magnesium	5.15	0.300	5.00	0	103	90	110			
Molybdenum	0.186	0.00500	0.200	0	93.1	90	110			
Potassium	5.07	0.300	5.00	0	101	90	110			
Selenium	0.197	0.00500	0.200	0	98.5	90	110			
Sodium	5.29	0.300	5.00	0	106	90	110			
Thallium	0.195	0.00150	0.200	0	97.5	90	110			

Sample ID LCVL4-190515	Batch ID: R104091	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 7:08:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.00179	0.00250	0.00200	0	89.4	70	130			
Arsenic	0.00491	0.00500	0.00500	0	98.3	70	130			
Barium	0.00433	0.0100	0.00500	0	86.7	70	130			
Cadmium	0.000934	0.00100	0.00100	0	93.4	70	130			
Chromium	0.00504	0.00500	0.00500	0	101	70	130			
Cobalt	0.00502	0.00500	0.00500	0	100	70	130			
Iron	0.112	0.100	0.100	0	112	70	130			
Lead	0.000830	0.00100	0.00100	0	83.0	70	130			
Magnesium	0.102	0.300	0.100	0	102	70	130			
Molybdenum	0.00432	0.00500	0.00500	0	86.4	70	130			
Potassium	0.0995	0.300	0.100	0	99.5	70	130			
Selenium	0.00474	0.00500	0.00500	0	94.7	70	130			
Sodium	0.103	0.300	0.100	0	103	70	130			
Thallium	0.000805	0.00150	0.00100	0	80.5	70	130			

Sample ID CCV5-190515	Batch ID: R104091	TestNo: SW6020A	Units: mg/L
SampType: CCV	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 7:18:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	4.98	0.100	5.00	0	99.7	90	110			

Sample ID LCVL5-190515	Batch ID: R104091	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 7:22:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	0.111	0.100	0.100	0	111	70	130			

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: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190515A

Sample ID: CCV1-190515	Batch ID: R104091	TestNo: SW6020A	Units: mg/L
SampType: CCV	Run ID: ICP-MS4_190515A	Analysis Date: 5/15/2019 3:38:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.194	0.00250	0.200	0	96.8	90	110			
Arsenic	0.194	0.00500	0.200	0	97.1	90	110			
Barium	0.189	0.0100	0.200	0	94.4	90	110			
Beryllium	0.218	0.00100	0.200	0	109	90	110			
Boron	0.219	0.0300	0.200	0	109	90	110			
Cadmium	0.199	0.00100	0.200	0	99.6	90	110			
Calcium	4.79	0.300	5.00	0	95.8	90	110			
Chromium	0.203	0.00500	0.200	0	102	90	110			
Cobalt	0.198	0.00500	0.200	0	98.9	90	110			
Iron	4.98	0.100	5.00	0	99.6	90	110			
Lead	0.188	0.00100	0.200	0	93.8	90	110			
Lithium	0.224	0.0100	0.200	0	112	90	110			S
Magnesium	5.17	0.300	5.00	0	103	90	110			
Molybdenum	0.185	0.00500	0.200	0	92.7	90	110			
Potassium	5.05	0.300	5.00	0	101	90	110			
Selenium	0.190	0.00500	0.200	0	94.8	90	110			
Sodium	5.16	0.300	5.00	0	103	90	110			
Thallium	0.195	0.00150	0.200	0	97.7	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: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190517A

Sample ID ICV-190517	Batch ID: R104128	TestNo: SW6020A	Units: mg/L							
SampType: ICV	Run ID: ICP-MS4_190517A	Analysis Date: 5/17/2019 10:36:00 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Beryllium	0.103	0.00100	0.100	0	103	90	110			
Lithium	0.107	0.0100	0.100	0	107	90	110			

Sample ID LCVL-190517	Batch ID: R104128	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_190517A	Analysis Date: 5/17/2019 10:46:00 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Beryllium	0.00110	0.00100	0.00100	0	110	70	130			
Lithium	0.0103	0.0100	0.0100	0	103	70	130			

Sample ID CCV2-190517	Batch ID: R104128	TestNo: SW6020A	Units: mg/L							
SampType: CCV	Run ID: ICP-MS4_190517A	Analysis Date: 5/17/2019 12:04:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Beryllium	0.212	0.00100	0.200	0	106	90	110			
Lithium	0.214	0.0100	0.200	0	107	90	110			

Sample ID LCVL2-190517	Batch ID: R104128	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_190517A	Analysis Date: 5/17/2019 12:13:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Beryllium	0.00102	0.00100	0.00100	0	102	70	130			
Lithium	0.0107	0.0100	0.0100	0	107	70	130			

Sample ID CCV3-190517	Batch ID: R104128	TestNo: SW6020A	Units: mg/L							
SampType: CCV	Run ID: ICP-MS4_190517A	Analysis Date: 5/17/2019 12:35:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Beryllium	0.216	0.00100	0.200	0	108	90	110			
Lithium	0.216	0.0100	0.200	0	108	90	110			

Sample ID LCVL3-190517	Batch ID: R104128	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_190517A	Analysis Date: 5/17/2019 12:39:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Beryllium	0.00106	0.00100	0.00100	0	106	70	130			
Lithium	0.0107	0.0100	0.0100	0	107	70	130			

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: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190508A

The QC data in batch 90780 applies to the following samples: 1905088-01C

Sample ID: MB-90780	Batch ID: 90780	TestNo: E300	Units: mg/L
SampType: MBLK	Run ID: IC2_190508A	Analysis Date: 5/8/2019 10:27:57 AM	Prep Date: 5/8/2019

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-90780	Batch ID: 90780	TestNo: E300	Units: mg/L
SampType: LCS	Run ID: IC2_190508A	Analysis Date: 5/8/2019 10:43:57 AM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	9.85	1.00	10.00	0	98.5	90	110			
Fluoride	3.93	0.400	4.000	0	98.3	90	110			
Nitrate-N	4.90	0.500	5.000	0	97.9	90	110			
Sulfate	29.5	3.00	30.00	0	98.3	90	110			

Sample ID: LCSD-90780	Batch ID: 90780	TestNo: E300	Units: mg/L
SampType: LCSD	Run ID: IC2_190508A	Analysis Date: 5/8/2019 10:59:57 AM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	9.99	1.00	10.00	0	99.9	90	110	1.36	20	
Fluoride	4.00	0.400	4.000	0	99.9	90	110	1.62	20	
Nitrate-N	5.03	0.500	5.000	0	101	90	110	2.66	20	
Sulfate	30.1	3.00	30.00	0	100	90	110	1.94	20	

Sample ID: 1905054-24BMS	Batch ID: 90780	TestNo: E300	Units: mg/L
SampType: MS	Run ID: IC2_190508A	Analysis Date: 5/8/2019 12:17:07 PM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	216	10.0	200.0	10.14	103	90	110			
Fluoride	208	4.00	200.0	1.135	103	90	110			
Nitrate-N	46.3	5.00	45.16	1.789	98.6	90	110			
Sulfate	358	30.0	200.0	157.0	100	90	110			

Sample ID: 1905054-24BMSD	Batch ID: 90780	TestNo: E300	Units: mg/L
SampType: MSD	Run ID: IC2_190508A	Analysis Date: 5/8/2019 12:33:07 PM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	214	10.0	200.0	10.14	102	90	110	0.693	20	
Fluoride	207	4.00	200.0	1.135	103	90	110	0.296	20	
Nitrate-N	46.5	5.00	45.16	1.789	99.0	90	110	0.370	20	
Sulfate	357	30.0	200.0	157.0	100	90	110	0.194	20	

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: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190508A

Sample ID: 1905084-01CMS	Batch ID: 90780	TestNo: E300	Units: mg/L							
SampType: MS	Run ID: IC2_190508A	Analysis Date: 5/8/2019 4:49:34 PM	Prep Date: 5/8/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	340	10.0	200.0	147.1	96.7	90	110			
Fluoride	208	4.00	200.0	0	104	90	110			
Nitrate-N	45.4	5.00	45.16	0	100	90	110			
Sulfate	384	30.0	200.0	184.2	100	90	110			

Sample ID: 1905084-01CMSD	Batch ID: 90780	TestNo: E300	Units: mg/L							
SampType: MSD	Run ID: IC2_190508A	Analysis Date: 5/8/2019 5:05:34 PM	Prep Date: 5/8/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	340	10.0	200.0	147.1	96.5	90	110	0.097	20	
Fluoride	208	4.00	200.0	0	104	90	110	0.090	20	
Nitrate-N	45.1	5.00	45.16	0	99.9	90	110	0.512	20	
Sulfate	381	30.0	200.0	184.2	98.5	90	110	0.823	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: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190508A

Sample ID ICV-190508	Batch ID: R103928	TestNo: E300	Units: mg/L							
SampType: ICV	Run ID: IC2_190508A	Analysis Date: 5/8/2019 9:55:57 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	25.6	1.00	25.00	0	102	90	110			
Fluoride	10.2	0.400	10.00	0	102	90	110			
Nitrate-N	12.9	0.500	12.50	0	103	90	110			
Sulfate	76.8	3.00	75.00	0	102	90	110			

Sample ID CCV1-190508	Batch ID: R103928	TestNo: E300	Units: mg/L							
SampType: CCV	Run ID: IC2_190508A	Analysis Date: 5/8/2019 4:01:34 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	9.95	1.00	10.00	0	99.5	90	110			
Fluoride	3.96	0.400	4.000	0	99.1	90	110			
Nitrate-N	4.96	0.500	5.000	0	99.2	90	110			
Sulfate	29.6	3.00	30.00	0	98.6	90	110			

Sample ID CCV2-190508	Batch ID: R103928	TestNo: E300	Units: mg/L							
SampType: CCV	Run ID: IC2_190508A	Analysis Date: 5/8/2019 8:17:34 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	9.91	1.00	10.00	0	99.1	90	110			
Fluoride	4.01	0.400	4.000	0	100	90	110			
Nitrate-N	4.97	0.500	5.000	0	99.3	90	110			
Sulfate	29.7	3.00	30.00	0	99.1	90	110			

Sample ID CCV3-190508	Batch ID: R103928	TestNo: E300	Units: mg/L							
SampType: CCV	Run ID: IC2_190508A	Analysis Date: 5/8/2019 10:09:34 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	9.99	1.00	10.00	0	99.9	90	110			
Sulfate	29.9	3.00	30.00	0	99.8	90	110			

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: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: TITRATOR_190508A

The QC data in batch 90788 applies to the following samples: 1905088-01C

Sample ID MB-90788	Batch ID: 90788	TestNo: M2320 B	Units: mg/L @ pH 4.45							
SampType: MBLK	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 12:27:00 PM	Prep Date: 5/8/2019							
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-90788	Batch ID: 90788	TestNo: M2320 B	Units: mg/L @ pH 4.17							
SampType: LCS	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 12:31:00 PM	Prep Date: 5/8/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Alkalinity, Total (As CaCO3)	51.8	20.0	50.00	0	104	74	129			
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Sample ID 1905085-01C DUP	Batch ID: 90788	TestNo: M2320 B	Units: mg/L @ pH 4.5							
SampType: DUP	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 2:23:00 PM	Prep Date: 5/8/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Alkalinity, Bicarbonate (As CaCO3)	137	20.0	0	138.1				0.946	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)	137	20.0	0	138.1				0.946	20	

Sample ID 1905088-01C DUP	Batch ID: 90788	TestNo: M2320 B	Units: mg/L @ pH 4.5							
SampType: DUP	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 2:37:00 PM	Prep Date: 5/8/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Alkalinity, Bicarbonate (As CaCO3)	73.3	20.0	0	73.40				0.136	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)	73.3	20.0	0	73.40				0.136	20	

Qualifiers:	<p>B Analyte detected in the associated Method Blank</p> <p>J Analyte detected between MDL and RL</p> <p>ND Not Detected at the Method Detection Limit</p> <p>RL Reporting Limit</p> <p>J Analyte detected between SDL and RL</p>	<p>DF Dilution Factor</p> <p>MDL Method Detection Limit</p> <p>R RPD outside accepted control limits</p> <p>S Spike Recovery outside control limits</p> <p>N Parameter not NELAP certified</p>
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CLIENT: Golder
Work Order: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: TITRATOR_190508A

Sample ID ICV-190508	Batch ID: R103922	TestNo: M2320 B	Units: mg/L @ pH 4.07
SampType: ICV	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 9:16:00 AM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	9.12	20.0	0							
Alkalinity, Carbonate (As CaCO3)	90.6	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0							
Alkalinity, Total (As CaCO3)	99.7	20.0	100.0	0	99.7	98	102			

Sample ID CCV2-190508	Batch ID: R103922	TestNo: M2320 B	Units: mg/L @ pH 4.25
SampType: CCV	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 11:56:00 AM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	24.4	20.0	0							
Alkalinity, Carbonate (As CaCO3)	75.0	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0							
Alkalinity, Total (As CaCO3)	99.4	20.0	100.0	0	99.4	90	110			

Sample ID CCV3-190508	Batch ID: R103922	TestNo: M2320 B	Units: mg/L @ pH 4.39
SampType: CCV	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 2:11:00 PM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	22.2	20.0	0							
Alkalinity, Carbonate (As CaCO3)	76.0	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	<10.0	20.0	0							
Alkalinity, Total (As CaCO3)	98.2	20.0	100.0	0	98.2	90	110			

Sample ID CCV4-190508	Batch ID: R103922	TestNo: M2320 B	Units: mg/L @ pH 4.21
SampType: CCV	Run ID: TITRATOR_190508A	Analysis Date: 5/8/2019 2:42:00 PM	Prep Date: 5/8/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	15.8	20.0	0							
Alkalinity, Carbonate (As CaCO3)	83.2	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			

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: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190508A

The QC data in batch 90796 applies to the following samples: 1905088-01C

Sample ID MB-90796	Batch ID: 90796	TestNo: M4500-P E	Units: mg/L							
SampType: MBLK	Run ID: UV/VIS_2_190508A	Analysis Date: 5/8/2019 2:09:00 PM	Prep Date: 5/8/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Phosphorus, Total Orthophosphate (As <0.0300 0.100

Sample ID LCS-90796	Batch ID: 90796	TestNo: M4500-P E	Units: mg/L							
SampType: LCS	Run ID: UV/VIS_2_190508A	Analysis Date: 5/8/2019 2:05:00 PM	Prep Date: 5/8/2019							
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

Sample ID LCSD-90796	Batch ID: 90796	TestNo: M4500-P E	Units: mg/L							
SampType: LCSD	Run ID: UV/VIS_2_190508A	Analysis Date: 5/8/2019 2:05:00 PM	Prep Date: 5/8/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Phosphorus, Total Orthophosphate (As 0.563 0.100 0.5000 0 113 80 120 12.7 15

Sample ID 1905088-01CMS	Batch ID: 90796	TestNo: M4500-P E	Units: mg/L							
SampType: MS	Run ID: UV/VIS_2_190508A	Analysis Date: 5/8/2019 2:05:00 PM	Prep Date: 5/8/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Phosphorus, Total Orthophosphate (As 0.524 0.100 0.5000 0 105 80 120

Sample ID 1905088-01CMSD	Batch ID: 90796	TestNo: M4500-P E	Units: mg/L							
SampType: MSD	Run ID: UV/VIS_2_190508A	Analysis Date: 5/8/2019 2:07:00 PM	Prep Date: 5/8/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Phosphorus, Total Orthophosphate (As 0.557 0.100 0.5000 0 111 80 120 6.11 15

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|--|---|
| <p>Qualifiers:</p> <ul style="list-style-type: none"> B Analyte detected in the associated Method Blank J Analyte detected between MDL and RL ND Not Detected at the Method Detection Limit RL Reporting Limit J Analyte detected between SDL and RL | <ul style="list-style-type: none"> DF Dilution Factor MDL Method Detection Limit R RPD outside accepted control limits S Spike Recovery outside control limits N Parameter not NELAP certified |
|--|---|

CLIENT: Golder
Work Order: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190508A

Sample ID ICV-190508	Batch ID: R103911	TestNo: M4500-P E	Units: mg/L							
SampType: ICV	Run ID: UV/VIS_2_190508A	Analysis Date: 5/8/2019 2:02:00 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 CCV1-190508	Batch ID: R103911	TestNo: M4500-P E	Units: mg/L							
SampType: CCV	Run ID: UV/VIS_2_190508A	Analysis Date: 5/8/2019 2:23:00 PM	Prep Date:							
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	85	115			

LUMINANT

Qualifiers:	<p>B Analyte detected in the associated Method Blank</p> <p>J Analyte detected between MDL and RL</p> <p>ND Not Detected at the Method Detection Limit</p> <p>RL Reporting Limit</p> <p>J Analyte detected between SDL and RL</p>	<p>DF Dilution Factor</p> <p>MDL Method Detection Limit</p> <p>R RPD outside accepted control limits</p> <p>S Spike Recovery outside control limits</p> <p>N Parameter not NELAP certified</p>
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CLIENT: Golder
Work Order: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190510A

The QC data in batch 90853 applies to the following samples: 1905088-01A

Sample ID MB-90853	Batch ID: 90853	TestNo: M3500-Fe D	Units: mg/L							
SampType: MBLK	Run ID: UV/VIS_2_190510A	Analysis Date: 5/10/2019 4:43:00 PM	Prep Date: 5/10/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	<0.0500	0.100								N

Sample ID LCS-90853	Batch ID: 90853	TestNo: M3500-Fe D	Units: mg/L							
SampType: LCS	Run ID: UV/VIS_2_190510A	Analysis Date: 5/10/2019 4:44:00 PM	Prep Date: 5/10/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.0985	0.100	0.1000	0	98.5	85	115			N

Sample ID LCSD-90853	Batch ID: 90853	TestNo: M3500-Fe D	Units: mg/L							
SampType: LCSD	Run ID: UV/VIS_2_190510A	Analysis Date: 5/10/2019 4:45:00 PM	Prep Date: 5/10/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.103	0.100	0.1000	0	103	85	115	4.00	15	N

Sample ID 1905088-01AMS	Batch ID: 90853	TestNo: M3500-Fe D	Units: mg/L							
SampType: MS	Run ID: UV/VIS_2_190510A	Analysis Date: 5/10/2019 4:52:00 PM	Prep Date: 5/10/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.103	0.100	0.1000	0	103	85	115			N

Sample ID 1905088-01AMSD	Batch ID: 90853	TestNo: M3500-Fe D	Units: mg/L							
SampType: MSD	Run ID: UV/VIS_2_190510A	Analysis Date: 5/10/2019 4:52:00 PM	Prep Date: 5/10/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.100	0.100	0.1000	0	100	85	115	2.47	15	N

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

CLIENT: Golder
Work Order: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190510A

Sample ID ICV-190510	Batch ID: R103996	TestNo: M3500-Fe D	Units: mg/L							
SampType: ICV	Run ID: UV/VIS_2_190510A	Analysis Date: 5/10/2019 4:43:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.105	0.100	0.1000	0	105	85	115			N

Sample ID CCV1-190510	Batch ID: R103996	TestNo: M3500-Fe D	Units: mg/L							
SampType: CCV	Run ID: UV/VIS_2_190510A	Analysis Date: 5/10/2019 4:54:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron, Ferrous	0.208	0.100	0.2000	0	104	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: 1905088
Project: Luminant-BBSES-Ash Landfill

ANALYTICAL QC SUMMARY REPORT

RunID: WC_190510D

The QC data in batch 90849 applies to the following samples: 1905088-01C

Sample ID MB-90849	Batch ID: 90849	TestNo: M2540C	Units: mg/L							
SampType: MBLK	Run ID: WC_190510D	Analysis Date: 5/10/2019 5:00:00 PM	Prep Date: 5/10/2019							
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-90849	Batch ID: 90849	TestNo: M2540C	Units: mg/L							
SampType: LCS	Run ID: WC_190510D	Analysis Date: 5/10/2019 5:00:00 PM	Prep Date: 5/10/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera										
	741	10.0	745.6	0	99.4	90	113			

Sample ID 1905092-01A-DUP	Batch ID: 90849	TestNo: M2540C	Units: mg/L							
SampType: DUP	Run ID: WC_190510D	Analysis Date: 5/10/2019 5:00:00 PM	Prep Date: 5/10/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera										
	1200	50.0	0	1180				1.68	5	

Sample ID 1905084-02C-DUP	Batch ID: 90849	TestNo: M2540C	Units: mg/L							
SampType: DUP	Run ID: WC_190510D	Analysis Date: 5/10/2019 5:00:00 PM	Prep Date: 5/10/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera										
	1490	50.0	0	1500				0.669	5	

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

ANALYTICAL REPORT

June 04, 2019



²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

DHL Analytical, Inc.

Sample Delivery Group: L1097567
Samples Received: 05/10/2019
Project Number: 1905088
Description:

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

Entire Report Reviewed By:

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.

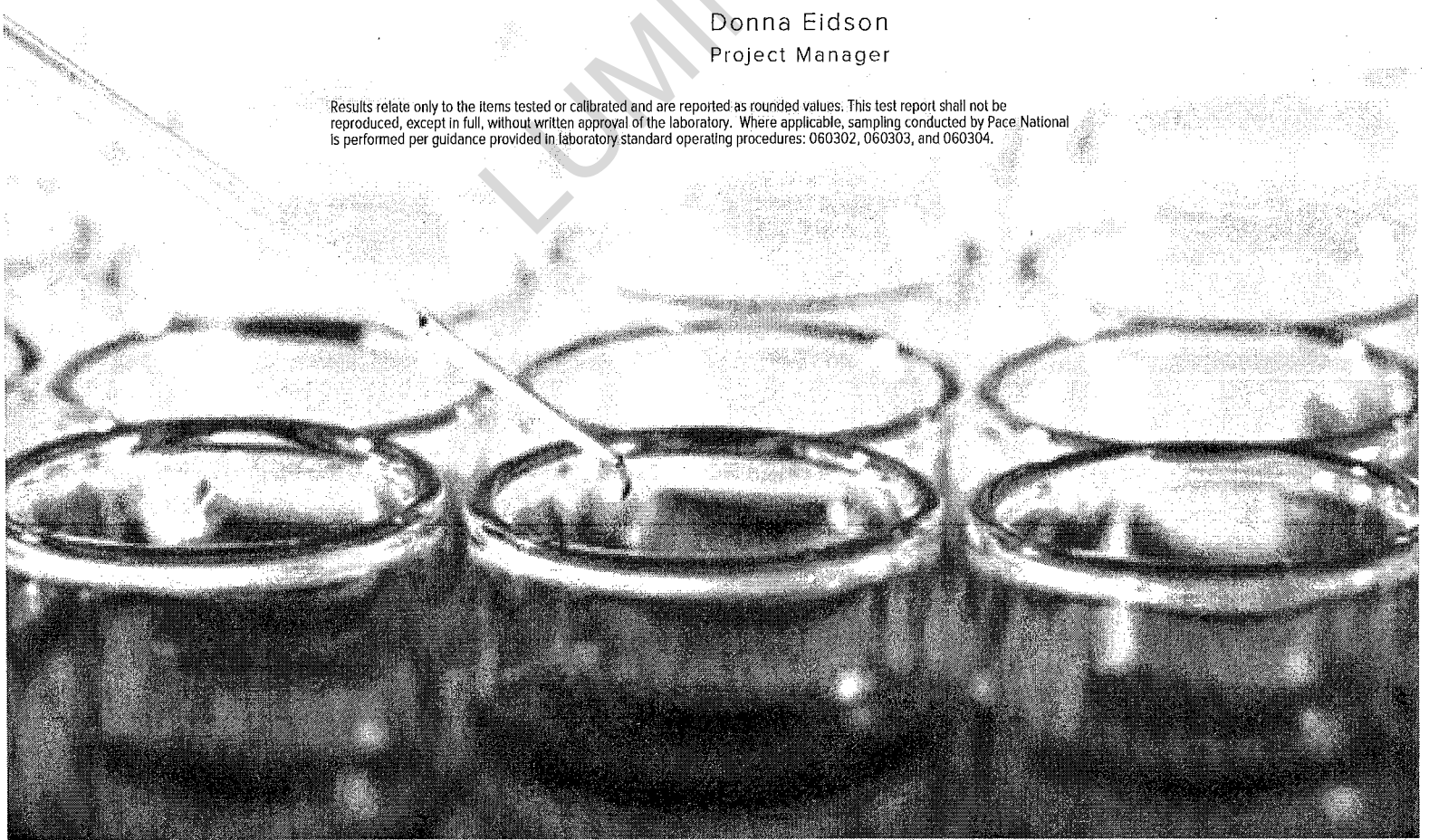


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ONE LAB. NATIONWIDE.



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LUMINANT

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



FMW-4R L1097567-01 Non-Potable Water

Collected by: _____ Collected date/time: 05/07/19 12:50 Received date/time: 05/10/19 09:05

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1281418	1	05/16/19 08:42	05/20/19 11:30	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1280200	1	05/13/19 15:11	05/20/19 11:30	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1280200	1	05/13/19 15:11	05/15/19 13:54	RGT	Mt. Juliet, TN

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

LUMINANT

Collected date/time: 05/07/19 12:50

L1097567

Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.305		0.556	0.886	05/20/2019 11:30	WG1281418
(T) Barium	169	Cl		62.0-143	05/20/2019 11:30	WG1281418
(T) Yttrium	113			79.0-136	05/20/2019 11:30	WG1281418



Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.445		0.713	1.09	05/20/2019 11:30	WG1280200



Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.140		0.157	0.207	05/15/2019 13:54	WG1280200
(T) Barium-133	94.8			30.0-143	05/15/2019 13:54	WG1280200



LUMINANT

Method Blank (MB)

(MB) R3413593-1 05/20/19 11:30

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-228	-0.648		0.393
(T) Barium	115		
(T) Yttrium	109		

L1097620-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1097620-01 05/20/19 11:30 • (DUP) R3413593-5 05/20/19 11:30

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-228	0.456	0.713	1	44.1	0.361		20	3
(T) Barium	108	118						
(T) Yttrium	113	108						

Laboratory Control Sample (LCS)

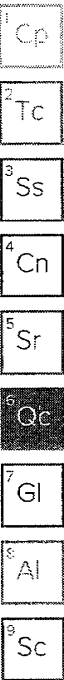
(LCS) R3413593-2 05/20/19 11:30

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	5.71	114	80.0-120	
(T) Barium			124		
(T) Yttrium			115		

L1097567-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1097567-01 05/20/19 11:30 • (MS) R3413593-3 05/20/19 11:30 • (MSD) R3413593-4 05/20/19 11:30

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	0.305	19.9	18.2	97.8	89.6	1	70.0-130			8.66		20
(T) Barium		169			99.9	120							
(T) Yttrium		113			111	106							



Method Blank (MB)

(MB) R3417238-1 05/15/19 13:54

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-226	-0.00737		0.0721
(T) Barium-133	89.2		

L1094622-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1094622-01 05/15/19 13:54 • (DUP) R3417238-5 05/15/19 13:54

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits	DUP RER Limit
Radium-226	2.77	0.778	1	112	1.28		20	3
(T) Barium-133	84.9	71.1						

Laboratory Control Sample (LCS)

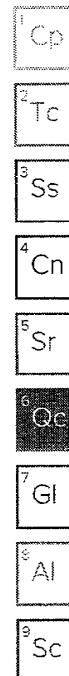
(LCS) R3417238-2 05/15/19 13:54

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.02	4.63	92.2	80.0-120	
(T) Barium-133			87.0		

L1094622-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1094622-01 05/15/19 13:54 • (MS) R3417238-3 05/15/19 13:54 • (MSD) R3417238-4 05/15/19 13:54

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	2.77	18.1	18.5	76.4	78.5	1	75.0-125			2.29		20
(T) Barium-133		84.9			57.9	49.0							





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.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ G

⁸ AI

⁹ Sc

Qualifier Description

C1	Tracer recovery limits have been exceeded; values are outside upper control limits.
----	---

**Pace Analytical National Center for Testing & Innovation
Cooler Receipt Form**

Client: <i>DHLRRTX</i>	SDG#: <i>1097567</i>		
Cooler Received/Opened On: <i>5/10/19</i>	Temperature: <i>Amb</i>		
Received By: Brock Fariss			
Signature: <i>BF Fariss</i>			
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?			

1097567

DHL Analytical, Inc.
2300 Double Creek Drive
Round Rock, TX 78664

CHAIN-OF-CUSTODY RECORD

H118

TEL: (512) 388-8222 FAX: (512) 388-8229
Work Order: 1905088

Subcontractor:

Pace Analytical
12065 Lebanon Rd
Mt. Juliet, TN 37122

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

LZ LZ



08-May-19

Sample Id	Matrix	DHL#	Date Collected	Bottle Type	RA-228	RA-226	Requested Tests						
					E904.0	M7500 Ra B M							
FMW-4R	Aqueous	-01D	05/07/19 12:50 PM	1LHDPEHNO3		1							
FMW-4R	Aqueous	-01E	05/07/19 12:50 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

Relinquished by: 	Date/Time: 5/8/19 1700	Received by: 	Date/Time: 5/10/19 0905
Relinquished by:		Received by:	

UPS
Rec: 2

Amid

RAD SCREEN: <0.5 mR/hr



July 15, 2019

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

Order No.: 1906089

Dear Will Vienne:

DHL Analytical, Inc. received 3 sample(s) on 6/11/2019 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,

A handwritten signature in red ink, appearing to read 'John DuPont', written over a large, faint, diagonal watermark that says 'LUMINANT'.

John DuPont
General Manager

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



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LUMINANT

ORIGIN ID:MIFA (512) 671-3434
J. BRYTON
60LDER
2201 DOUBLE CREEK DR
ROUND ROCK, TX 78664
UNITED STATES US

SHIP DATE: 10JUN19
ACTWGT: 48.70 LB
CAD: 6995508/SSF02002
DIMS: 24x13x14 IN
BILL THIRD PARTY

Part # 160297-4957-4110041-2357-03/20

TO **DHL**

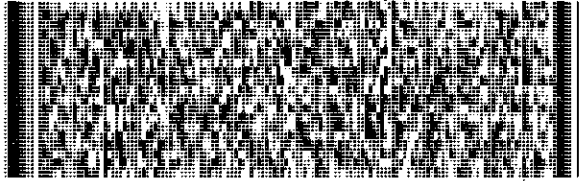
2300 DOUBLE CREEK DR

ROUND ROCK TX 78664

(512) 888-8222
INU:
PO:

REF:

DEPT:



FedEx
Express



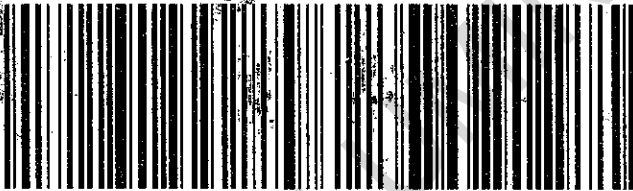
AS1020108101817

TRK# 7877 9653 1753
0201

TUE - 11 JUN 10:30A
PRIORITY OVERNIGHT

A8 BSMA

TX-US



7877
D
10:30
06:11
1753
7/2

Sample Receipt Checklist

Client Name Golder

Date Received: 6/11/2019

Work Order Number 1906089

Received by JW

Checklist completed by: [Signature] 6/11/2019
Signature Date

Reviewed by [Initials] 6/11/2019
Initials Date

Carrier name FedEx 1day

- Shipping container/cooler in good condition? Yes No Not Present
- Custody seals intact on shipping 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 3.2 °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 _____

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

Client contacted _____ Date contacted: _____ Person contacted _____

Contacted by: _____ Regarding: _____

Comments: _____

Corrective Action _____

CLIENT: Golder
Project: LUMINANT-BBSES-ASH DISPOSAL
Lab Order: 1906089

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 (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.

LOG IN

The samples were received and log-in performed on 6/11/2019. A total of 3 samples were received and analyzed. The samples arrived in good condition and were properly packaged.

METALS ANALYSIS

For Metals Analysis, the recoveries of two analytes for the Matrix Spike and Matrix Spike Duplicate (1906089-03 MS?MSD) were below the method control limits. These are flagged accordingly in the QC Summary Report. These analytes were within method control limits in the associated LCS. The reference sample selected for the Batch QC was from this workorder. No further corrective action was taken.

FERRIC IRON CALCULATION

The Ferric Iron is calculated as the Total Iron minus the Ferrous Iron.

CLIENT: Golder
Project: LUMINANT-BBSES-ASH DISPOSAL
Lab Order: 1906089

Work Order Sample Summary

Lab Smp ID	Client Sample ID	Tag Number	Date Collected	Date Recved
1906089-01	AMW-24		06/10/19 09:15 AM	6/11/2019
1906089-02	AMW-25		06/10/19 10:15 AM	6/11/2019
1906089-03	AMW-15		06/10/19 11:35 AM	6/11/2019

LUMINANT

Lab Order: 1906089
 Client: Golder
 Project: LUMINANT-BBSES-ASH DISPO

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1906089-01A	AMW-24	06/10/19 09:15 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	06/14/19 02:08 PM	91344
1906089-01B	AMW-24	06/10/19 09:15 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/13/19 08:34 AM	91315
	AMW-24	06/10/19 09:15 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/13/19 08:34 AM	91315
	AMW-24	06/10/19 09:15 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/13/19 08:34 AM	91315
1906089-01C	AMW-24	06/10/19 09:15 AM	Aqueous	M2320 B	Alkalinity Preparation	06/17/19 08:32 AM	91346
	AMW-24	06/10/19 09:15 AM	Aqueous	E300	Anion Preparation	06/11/19 08:47 AM	91283
	AMW-24	06/10/19 09:15 AM	Aqueous	E300	Anion Preparation	06/11/19 08:47 AM	91283
	AMW-24	06/10/19 09:15 AM	Aqueous	E300	Anion Preparation	06/11/19 08:47 AM	91283
	AMW-24	06/10/19 09:15 AM	Aqueous	M4500-P E	Orthophosphate Prep	06/11/19 11:42 AM	91295
	AMW-24	06/10/19 09:15 AM	Aqueous	M2540C	TDS Preparation	06/13/19 04:04 PM	91332
1906089-02A	AMW-25	06/10/19 10:15 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	06/14/19 02:08 PM	91344
1906089-02B	AMW-25	06/10/19 10:15 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/13/19 08:34 AM	91315
	AMW-25	06/10/19 10:15 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/13/19 08:34 AM	91315
	AMW-25	06/10/19 10:15 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/13/19 08:34 AM	91315
1906089-02C	AMW-25	06/10/19 10:15 AM	Aqueous	M2320 B	Alkalinity Preparation	06/17/19 08:32 AM	91346
	AMW-25	06/10/19 10:15 AM	Aqueous	E300	Anion Preparation	06/11/19 08:47 AM	91283
	AMW-25	06/10/19 10:15 AM	Aqueous	E300	Anion Preparation	06/11/19 08:47 AM	91283
	AMW-25	06/10/19 10:15 AM	Aqueous	E300	Anion Preparation	06/11/19 08:47 AM	91283
	AMW-25	06/10/19 10:15 AM	Aqueous	M4500-P E	Orthophosphate Prep	06/11/19 11:42 AM	91295
	AMW-25	06/10/19 10:15 AM	Aqueous	M2540C	TDS Preparation	06/13/19 04:04 PM	91332
1906089-03A	AMW-15	06/10/19 11:35 AM	Aqueous	M3500-Fe	Ferrous Iron Prep Water	06/14/19 02:08 PM	91344
1906089-03B	AMW-15	06/10/19 11:35 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/13/19 08:34 AM	91315
	AMW-15	06/10/19 11:35 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	06/13/19 08:34 AM	91315
1906089-03C	AMW-15	06/10/19 11:35 AM	Aqueous	M2320 B	Alkalinity Preparation	06/17/19 08:32 AM	91346
	AMW-15	06/10/19 11:35 AM	Aqueous	E300	Anion Preparation	06/11/19 08:47 AM	91283
	AMW-15	06/10/19 11:35 AM	Aqueous	E300	Anion Preparation	06/11/19 08:47 AM	91283
	AMW-15	06/10/19 11:35 AM	Aqueous	E300	Anion Preparation	06/11/19 08:47 AM	91283
	AMW-15	06/10/19 11:35 AM	Aqueous	M4500-P E	Orthophosphate Prep	06/11/19 11:42 AM	91295

Lab Order: 1906089
Client: Golder
Project: LUMINANT-BBSES-ASH DISPO

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1906089-03C	AMW-15	06/10/19 11:35 AM	Aqueous	M2540C	TDS Preparation	06/13/19 04:04 PM	91332

LUMINANT

Lab Order: 1906089
 Client: Golder
 Project: LUMINANT-BBSES-ASH DISPO

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1906089-01A	AMW-24	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	R104666	1	06/19/19	UV/VIS_2_190619B
	AMW-24	Aqueous	M3500-Fe D	Ferrous Iron	91344	1	06/14/19 02:53 PM	UV/VIS_2_190614C
1906089-01B	AMW-24	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91315	10	06/17/19 03:46 PM	ICP-MS4_190617A
	AMW-24	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91315	1	06/17/19 04:14 PM	ICP-MS4_190617A
	AMW-24	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91315	1	06/14/19 01:44 PM	ICP-MS5_190614C
1906089-01C	AMW-24	Aqueous	M2320 B	Alkalinity	91346	1	06/17/19 09:28 AM	TITRATOR_190617A
	AMW-24	Aqueous	E300	Anions by IC method - Water	91283	10	06/11/19 12:25 PM	IC2_190611A
	AMW-24	Aqueous	E300	Anions by IC method - Water	91283	1	06/11/19 01:13 PM	IC2_190611A
	AMW-24	Aqueous	E300	Anions by IC method - Water	91283	100	06/11/19 11:05 AM	IC2_190611A
	AMW-24	Aqueous	M4500-P E	Orthophosphate	91295	1	06/11/19 12:11 PM	UV/VIS_2_190611A
	AMW-24	Aqueous	M2540C	Total Dissolved Solids	91332	1	06/14/19 12:00 PM	WC_190614B
1906089-02A	AMW-25	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	R104666	1	06/19/19	UV/VIS_2_190619B
	AMW-25	Aqueous	M3500-Fe D	Ferrous Iron	91344	1	06/14/19 02:56 PM	UV/VIS_2_190614C
1906089-02B	AMW-25	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91315	1	06/14/19 01:46 PM	ICP-MS5_190614C
	AMW-25	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91315	1	06/17/19 04:16 PM	ICP-MS4_190617A
	AMW-25	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91315	10	06/17/19 03:48 PM	ICP-MS4_190617A
1906089-02C	AMW-25	Aqueous	M2320 B	Alkalinity	91346	1	06/17/19 09:40 AM	TITRATOR_190617A
	AMW-25	Aqueous	E300	Anions by IC method - Water	91283	100	06/11/19 11:53 AM	IC2_190611A
	AMW-25	Aqueous	E300	Anions by IC method - Water	91283	10	06/11/19 12:41 PM	IC2_190611A
	AMW-25	Aqueous	E300	Anions by IC method - Water	91283	1	06/11/19 01:29 PM	IC2_190611A
	AMW-25	Aqueous	M4500-P E	Orthophosphate	91295	1	06/11/19 12:11 PM	UV/VIS_2_190611A
	AMW-25	Aqueous	M2540C	Total Dissolved Solids	91332	1	06/14/19 12:00 PM	WC_190614B
1906089-03A	AMW-15	Aqueous	M3500-Fe D	Ferric Iron (Calculated)	R104666	1	06/19/19	UV/VIS_2_190619B
	AMW-15	Aqueous	M3500-Fe D	Ferrous Iron	91344	1	06/14/19 02:56 PM	UV/VIS_2_190614C
1906089-03B	AMW-15	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91315	20	06/17/19 03:38 PM	ICP-MS4_190617A
	AMW-15	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	91315	1	06/14/19 01:35 PM	ICP-MS5_190614C
1906089-03C	AMW-15	Aqueous	M2320 B	Alkalinity	91346	1	06/17/19 09:45 AM	TITRATOR_190617A
	AMW-15	Aqueous	E300	Anions by IC method - Water	91283	100	06/11/19 12:09 PM	IC2_190611A

Lab Order: 1906089
Client: Golder
Project: LUMINANT-BBSES-ASH DISPO

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1906089-03C	AMW-15	Aqueous	E300	Anions by IC method - Water	91283	10	06/11/19 12:57 PM	IC2_190611A
	AMW-15	Aqueous	E300	Anions by IC method - Water	91283	1	06/11/19 01:45 PM	IC2_190611A
	AMW-15	Aqueous	M4500-P E	Orthophosphate	91295	1	06/11/19 12:11 PM	UV/VIS_2_190611A
	AMW-15	Aqueous	M2540C	Total Dissolved Solids	91332	1	06/14/19 12:00 PM	WC_190614B

LUMINANT

DHL Analytical, Inc.

Date: 15-Jul-19

CLIENT: Golder
Project: LUMINANT-BBSES-ASH DISPOSAL
Project No: 19117805
Lab Order: 1906089

Client Sample ID: AMW-24
Lab ID: 1906089-01
Collection Date: 06/10/19 09:15 AM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A		Analyst: SP			
Boron	0.311	0.0100	0.0300		mg/L	1	06/17/19 04:14 PM
Calcium	79.1	1.00	3.00		mg/L	10	06/17/19 03:46 PM
Cobalt	0.00369	0.00300	0.00500	J	mg/L	1	06/14/19 01:44 PM
Iron	0.378	0.0300	0.100		mg/L	1	06/14/19 01:44 PM
Magnesium	13.5	0.100	0.300		mg/L	1	06/14/19 01:44 PM
Potassium	3.68	0.100	0.300		mg/L	1	06/14/19 01:44 PM
Selenium	<0.00200	0.00200	0.00500		mg/L	1	06/14/19 01:44 PM
Sodium	162	1.00	3.00		mg/L	10	06/17/19 03:46 PM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	106	3.00	10.0		mg/L	10	06/11/19 12:25 PM
Fluoride	0.285	0.100	0.400	J	mg/L	1	06/11/19 01:13 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	06/11/19 01:13 PM
Sulfate	123	1.00	3.00		mg/L	1	06/11/19 01:13 PM
ALKALINITY		M2320 B		Analyst: CC			
Alkalinity, Bicarbonate (As CaCO3)	325	10.0	20.0		mg/L @ pH 4.54	1	06/17/19 09:28 AM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	06/17/19 09:28 AM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.54	1	06/17/19 09:28 AM
Alkalinity, Total (As CaCO3)	325	20.0	20.0		mg/L @ pH 4.54	1	06/17/19 09:28 AM
FERRIC IRON (CALCULATED)		M3500-FE D		Analyst: CAC			
Iron, Ferric	0.378	0.0500	0.100	N	mg/L	1	06/19/19
FERROUS IRON		M3500-FE D		Analyst: BTJ			
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	06/14/19 02:53 PM
ORTHOPHOSPHATE		M4500-P E		Analyst: CC			
Phosphorus, Total Orthophosphate (As P)	0.0600	0.0300	0.100	J	mg/L	1	06/11/19 12:11 PM
TOTAL DISSOLVED SOLIDS		M2540C		Analyst: JS			
Total Dissolved Solids (Residue, Filterable)	699	10.0	10.0		mg/L	1	06/14/19 12:00 PM

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
 Project: LUMINANT-BBSES-ASH DISPOSAL
 Project No: 19117805
 Lab Order: 1906089

Client Sample ID: AMW-25
 Lab ID: 1906089-02
 Collection Date: 06/10/19 10:15 AM
 Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A		Analyst: SP			
Barium	0.307	0.00300	0.0100		mg/L	1	06/14/19 01:46 PM
Boron	0.181	0.0100	0.0300		mg/L	1	06/17/19 04:16 PM
Calcium	101	1.00	3.00		mg/L	10	06/17/19 03:48 PM
Cobalt	0.00323	0.00300	0.00500	J	mg/L	1	06/14/19 01:46 PM
Iron	<0.0300	0.0300	0.100		mg/L	1	06/14/19 01:46 PM
Magnesium	27.8	1.00	3.00		mg/L	10	06/17/19 03:48 PM
Potassium	7.60	0.100	0.300		mg/L	1	06/14/19 01:46 PM
Sodium	193	1.00	3.00		mg/L	10	06/17/19 03:48 PM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	206	3.00	10.0		mg/L	10	06/11/19 12:41 PM
Fluoride	0.495	0.100	0.400		mg/L	1	06/11/19 01:29 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	06/11/19 01:29 PM
Sulfate	140	1.00	3.00		mg/L	1	06/11/19 01:29 PM
ALKALINITY		M2320 B		Analyst: CC			
Alkalinity, Bicarbonate (As CaCO3)	343	10.0	20.0		mg/L @ pH 4.53	1	06/17/19 09:40 AM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.53	1	06/17/19 09:40 AM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.53	1	06/17/19 09:40 AM
Alkalinity, Total (As CaCO3)	343	20.0	20.0		mg/L @ pH 4.53	1	06/17/19 09:40 AM
FERRIC IRON (CALCULATED)		M3500-FE D		Analyst: CAC			
Iron, Ferric	<0.0500	0.0500	0.100	N	mg/L	1	06/19/19
FERROUS IRON		M3500-FE D		Analyst: BTJ			
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	06/14/19 02:56 PM
ORTHOPHOSPHATE		M4500-P E		Analyst: CC			
Phosphorus, Total Orthophosphate (As P)	0.0370	0.0300	0.100	J	mg/L	1	06/11/19 12:11 PM
TOTAL DISSOLVED SOLIDS		M2540C		Analyst: JS			
Total Dissolved Solids (Residue, Filterable)	990	50.0	50.0		mg/L	1	06/14/19 12:00 PM

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: 15-Jul-19

CLIENT: Golder
Project: LUMINANT-BBSES-ASH DISPOSAL
Project No: 19117805
Lab Order: 1906089

Client Sample ID: AMW-15
Lab ID: 1906089-03
Collection Date: 06/10/19 11:35 AM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A		Analyst: SP			
Boron	2.84	0.200	0.600		mg/L	20	06/17/19 03:38 PM
Calcium	35.9	2.00	6.00		mg/L	20	06/17/19 03:38 PM
Cobalt	<0.00300	0.00300	0.00500		mg/L	1	06/14/19 01:35 PM
Iron	<0.0300	0.0300	0.100		mg/L	1	06/14/19 01:35 PM
Lithium	<0.00500	0.00500	0.0100		mg/L	1	06/14/19 01:35 PM
Magnesium	10.1	0.100	0.300		mg/L	1	06/14/19 01:35 PM
Potassium	6.23	0.100	0.300		mg/L	1	06/14/19 01:35 PM
Sodium	92.6	2.00	6.00		mg/L	20	06/17/19 03:38 PM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	76.5	3.00	10.0		mg/L	10	06/11/19 12:57 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	06/11/19 01:45 PM
Nitrate-N	<0.100	0.100	0.500		mg/L	1	06/11/19 01:45 PM
Sulfate	146	10.0	30.0		mg/L	10	06/11/19 12:57 PM
ALKALINITY		M2320 B		Analyst: CC			
Alkalinity, Bicarbonate (As CaCO3)	79.9	10.0	20.0		mg/L @ pH 4.5	1	06/17/19 09:45 AM
Alkalinity, Carbonate (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.5	1	06/17/19 09:45 AM
Alkalinity, Hydroxide (As CaCO3)	<10.0	10.0	20.0		mg/L @ pH 4.5	1	06/17/19 09:45 AM
Alkalinity, Total (As CaCO3)	79.9	20.0	20.0		mg/L @ pH 4.5	1	06/17/19 09:45 AM
FERRIC IRON (CALCULATED)		M3500-FE D		Analyst: CAC			
Iron, Ferric	<0.0500	0.0500	0.100	N	mg/L	1	06/19/19
FERROUS IRON		M3500-FE D		Analyst: BTJ			
Iron, Ferrous	<0.0500	0.0500	0.100	N	mg/L	1	06/14/19 02:56 PM
ORTHOPHOSPHATE		M4500-P E		Analyst: CC			
Phosphorus, Total Orthophosphate (As P)	0.0670	0.0300	0.100	J	mg/L	1	06/11/19 12:11 PM
TOTAL DISSOLVED SOLIDS		M2540C		Analyst: JS			
Total Dissolved Solids (Residue, Filterable)	463	10.0	10.0		mg/L	1	06/14/19 12:00 PM

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: 1906089

ANALYTICAL QC SUMMARY REPORT

Project: LUMINANT-BBSES-ASH DISPOSAL

RunID: ICP-MS4_190617A

The QC data in batch 91315 applies to the following samples: 1906089-01B, 1906089-02B, 1906089-03B

Sample ID	MB-91315	Batch ID:	91315	TestNo:	SW6020A	Units:	mg/L			
SampType:	MBLK	Run ID:	ICP-MS4_190617A	Analysis Date:	6/17/2019 3:30:00 PM	Prep Date:	6/13/2019			
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Boron	<0.0100	0.0300								
Sodium	<0.100	0.300								

Sample ID	LCS-91315	Batch ID:	91315	TestNo:	SW6020A	Units:	mg/L			
SampType:	LCS	Run ID:	ICP-MS4_190617A	Analysis Date:	6/17/2019 3:32:00 PM	Prep Date:	6/13/2019			
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Boron	0.226	0.0300	0.200	0	113	80	120			
Sodium	5.20	0.300	5.00	0	104	80	120			

Sample ID	LCSD-91315	Batch ID:	91315	TestNo:	SW6020A	Units:	mg/L			
SampType:	LCSD	Run ID:	ICP-MS4_190617A	Analysis Date:	6/17/2019 3:34:00 PM	Prep Date:	6/13/2019			
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Boron	0.220	0.0300	0.200	0	110	80	120	2.87	15	
Sodium	5.11	0.300	5.00	0	102	80	120	1.73	15	

Sample ID	1906089-03B SD	Batch ID:	91315	TestNo:	SW6020A	Units:	mg/L			
SampType:	SD	Run ID:	ICP-MS4_190617A	Analysis Date:	6/17/2019 3:40:00 PM	Prep Date:	6/13/2019			
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Boron	2.85	3.00	0	2.84				0.337	10	
Calcium	35.2	30.0	0	35.9				1.99	10	
Sodium	93.3	30.0	0	92.6				0.691	10	

Sample ID	1906089-03B PDS	Batch ID:	91315	TestNo:	SW6020A	Units:	mg/L			
SampType:	PDS	Run ID:	ICP-MS4_190617A	Analysis Date:	6/17/2019 3:50:00 PM	Prep Date:	6/13/2019			
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Boron	6.92	0.600	4.00	2.84	102	80	120			
Calcium	139	6.00	100	35.9	104	80	120			
Sodium	199	6.00	100	92.6	106	80	120			

Sample ID	1906089-03B MS	Batch ID:	91315	TestNo:	SW6020A	Units:	mg/L			
SampType:	MS	Run ID:	ICP-MS4_190617A	Analysis Date:	6/17/2019 3:52:00 PM	Prep Date:	6/13/2019			
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Boron	2.95	0.600	0.200	2.84	52.6	80	120			S
Sodium	95.1	6.00	5.00	92.6	50.4	80	120			S

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

CLIENT: Golder
Work Order: 1906089
Project: LUMINANT-BBSES-ASH DISPOSAL

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190617A

Sample ID	1906089-03B MSD	Batch ID:	91315	TestNo:	SW6020A	Units:	mg/L			
SampType:	MSD	Run ID:	ICP-MS4_190617A	Analysis Date:	6/17/2019 3:54:00 PM	Prep Date:	6/13/2019			
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	2.96	0.600	0.200	2.84	61.7	80	120	0.613	15	S
Sodium	94.6	6.00	5.00	92.6	40.3	80	120	0.532	15	S

LUMINANT

Qualifiers: B Analyte detected in the associated Method Blank J Analyte detected between MDL and RL ND Not Detected at the Method Detection Limit RL Reporting Limit J Analyte detected between SDL and RL	DF Dilution Factor MDL Method Detection Limit R RPD outside accepted control limits S Spike Recovery outside control limits N Parameter not NELAP certified
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CLIENT: Golder
Work Order: 1906089
Project: LUMINANT-BBSES-ASH DISPOSAL

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190617A

Sample ID ICV-190617	Batch ID: R104624	TestNo: SW6020A	Units: mg/L							
SampType: ICV	Run ID: ICP-MS4_190617A	Analysis Date: 6/17/2019 1:41:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.107	0.0300	0.100	0	107	90	110			
Calcium	2.65	0.300	2.50	0	106	90	110			
Magnesium	2.46	0.300	2.50	0	98.5	90	110			
Sodium	2.54	0.300	2.50	0	102	90	110			

Sample ID LCVL-190617	Batch ID: R104624	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_190617A	Analysis Date: 6/17/2019 1:49:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.0206	0.0300	0.0200	0	103	70	130			
Calcium	0.0942	0.300	0.100	0	94.2	70	130			
Magnesium	0.101	0.300	0.100	0	101	70	130			
Sodium	0.0971	0.300	0.100	0	97.1	70	130			

Sample ID CCV2-190617	Batch ID: R104624	TestNo: SW6020A	Units: mg/L							
SampType: CCV	Run ID: ICP-MS4_190617A	Analysis Date: 6/17/2019 3:22:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.204	0.0300	0.200	0	102	90	110			
Calcium	4.95	0.300	5.00	0	99.0	90	110			
Magnesium	4.90	0.300	5.00	0	97.9	90	110			
Sodium	4.92	0.300	5.00	0	98.5	90	110			

Sample ID LCVL2-190617	Batch ID: R104624	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_190617A	Analysis Date: 6/17/2019 3:26:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.0251	0.0300	0.0200	0	125	70	130			
Calcium	0.105	0.300	0.100	0	105	70	130			
Magnesium	0.104	0.300	0.100	0	104	70	130			
Sodium	0.0990	0.300	0.100	0	99.0	70	130			

Sample ID CCV3-190617	Batch ID: R104624	TestNo: SW6020A	Units: mg/L							
SampType: CCV	Run ID: ICP-MS4_190617A	Analysis Date: 6/17/2019 4:02:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.208	0.0300	0.200	0	104	90	110			
Calcium	4.98	0.300	5.00	0	99.6	90	110			
Magnesium	5.00	0.300	5.00	0	100	90	110			
Sodium	4.93	0.300	5.00	0	98.5	90	110			

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: 1906089
Project: LUMINANT-BBSES-ASH DISPOSAL

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_190617A

Sample ID: LCVL3-190617	Batch ID: R104624	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_190617A	Analysis Date: 6/17/2019 4:06:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.0244	0.0300	0.0200	0	122	70	130			
Calcium	0.105	0.300	0.100	0	105	70	130			
Magnesium	0.100	0.300	0.100	0	100	70	130			
Sodium	0.0983	0.300	0.100	0	98.3	70	130			

Sample ID: CCV4-190617	Batch ID: R104624	TestNo: SW6020A	Units: mg/L							
SampType: CCV	Run ID: ICP-MS4_190617A	Analysis Date: 6/17/2019 4:23:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.208	0.0300	0.200	0	104	90	110			

Sample ID: LCVL4-190617	Batch ID: R104624	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_190617A	Analysis Date: 6/17/2019 4:35:00 PM	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			

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: 1906089
Project: LUMINANT-BBSES-ASH DISPOSAL

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190614C

The QC data in batch 91315 applies to the following samples: 1906089-01B, 1906089-02B, 1906089-03B

Sample ID MB-91315	Batch ID: 91315	TestNo: SW6020A	Units: mg/L							
SampType: MBLK	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 1:26:00 PM	Prep Date: 6/13/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Barium	<0.00300	0.0100								
Calcium	<0.100	0.300								
Cobalt	<0.00300	0.00500								
Iron	<0.0300	0.100								
Lithium	<0.00500	0.0100								
Magnesium	<0.100	0.300								
Potassium	<0.100	0.300								
Selenium	<0.00200	0.00500								

Sample ID LCS-91315	Batch ID: 91315	TestNo: SW6020A	Units: mg/L							
SampType: LCS	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 1:29:00 PM	Prep Date: 6/13/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Barium	0.200	0.0100	0.200	0	100	80	120			
Calcium	4.97	0.300	5.00	0	99.4	80	120			
Cobalt	0.205	0.00500	0.200	0	102	80	120			
Iron	5.01	0.100	5.00	0	100	80	120			
Lithium	0.208	0.0100	0.200	0	104	80	120			
Magnesium	5.04	0.300	5.00	0	101	80	120			
Potassium	5.01	0.300	5.00	0	100	80	120			
Selenium	0.209	0.00500	0.200	0	104	80	120			

Sample ID LCSD-91315	Batch ID: 91315	TestNo: SW6020A	Units: mg/L							
SampType: LCSD	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 1:31:00 PM	Prep Date: 6/13/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Barium	0.199	0.0100	0.200	0	99.7	80	120	0.495	15	
Calcium	4.97	0.300	5.00	0	99.4	80	120	0.050	15	
Cobalt	0.206	0.00500	0.200	0	103	80	120	0.727	15	
Iron	4.99	0.100	5.00	0	99.8	80	120	0.334	15	
Lithium	0.206	0.0100	0.200	0	103	80	120	0.802	15	
Magnesium	5.05	0.300	5.00	0	101	80	120	0.267	15	
Potassium	4.99	0.300	5.00	0	99.7	80	120	0.532	15	
Selenium	0.209	0.00500	0.200	0	105	80	120	0.276	15	

Sample ID 1906089-03B SD	Batch ID: 91315	TestNo: SW6020A	Units: mg/L							
SampType: SD	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 1:38:00 PM	Prep Date: 6/13/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Barium	0.0219	0.0500	0	0.0220				0.455	10	
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| <p>Qualifiers:</p> <ul style="list-style-type: none"> B Analyte detected in the associated Method Blank J Analyte detected between MDL and RL ND Not Detected at the Method Detection Limit RL Reporting Limit J Analyte detected between SDL and RL | <ul style="list-style-type: none"> DF Dilution Factor MDL Method Detection Limit R RPD outside accepted control limits S Spike Recovery outside control limits N Parameter not NELAP certified |
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CLIENT: Golder
 Work Order: 1906089
 Project: LUMINANT-BBSES-ASH DISPOSAL

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190614C

Sample ID 1906089-03B SD	Batch ID: 91315	TestNo: SW6020A	Units: mg/L
SampType: SD	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 1:38:00 PM	Prep Date: 6/13/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	<0.0150	0.0250	0	0				0	10	
Iron	<0.150	0.500	0	0				0	10	
Lithium	<0.0250	0.0500	0	0				0	10	
Magnesium	10.2	1.50	0	10.1				0.950	10	
Potassium	6.12	1.50	0	6.23				1.81	10	

Sample ID 1906089-03B PDS	Batch ID: 91315	TestNo: SW6020A	Units: mg/L
SampType: PDS	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 1:51:00 PM	Prep Date: 6/13/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.218	0.0100	0.200	0.0220	98.0	80	120			
Cobalt	0.194	0.00500	0.200	0	97.0	80	120			
Iron	5.09	0.100	5.00	0	102	80	120			
Lithium	0.210	0.0100	0.200	0	105	80	120			
Magnesium	14.5	0.300	5.00	10.1	86.4	80	120			
Potassium	10.7	0.300	5.00	6.23	89.8	80	120			

Sample ID 1906089-03B MS	Batch ID: 91315	TestNo: SW6020A	Units: mg/L
SampType: MS	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 1:53:00 PM	Prep Date: 6/13/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.222	0.0100	0.200	0.0220	100	80	120			
Calcium	37.9	0.300	5.00	33.6	86.8	80	120			
Cobalt	0.196	0.00500	0.200	0	98.0	80	120			
Iron	5.04	0.100	5.00	0	101	80	120			
Lithium	0.209	0.0100	0.200	0	105	80	120			
Magnesium	15.1	0.300	5.00	10.1	99.4	80	120			
Potassium	11.1	0.300	5.00	6.23	97.2	80	120			

Sample ID 1906089-03B MSD	Batch ID: 91315	TestNo: SW6020A	Units: mg/L
SampType: MSD	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 1:55:00 PM	Prep Date: 6/13/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.224	0.0100	0.200	0.0220	101	80	120	0.709	15	
Calcium	38.1	0.300	5.00	33.6	90.7	80	120	0.521	15	
Cobalt	0.196	0.00500	0.200	0	97.8	80	120	0.127	15	
Iron	5.05	0.100	5.00	0	101	80	120	0.291	15	
Lithium	0.210	0.0100	0.200	0	105	80	120	0.419	15	
Magnesium	15.2	0.300	5.00	10.1	100	80	120	0.333	15	
Potassium	11.2	0.300	5.00	6.23	99.6	80	120	1.08	15	

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: 1906089
 Project: LUMINANT-BBSES-ASH DISPOSAL

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190614C

Sample ID ICV-190614	Batch ID: R104607	TestNo: SW6020A	Units: mg/L
SampType: ICV	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 10:48:00 AM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.0985	0.0100	0.100	0	98.5	90	110			
Calcium	2.53	0.300	2.50	0	101	90	110			
Cobalt	0.102	0.00500	0.100	0	102	90	110			
Iron	2.52	0.100	2.50	0	101	90	110			
Lithium	0.102	0.0100	0.100	0	102	90	110			
Magnesium	2.44	0.300	2.50	0	97.8	90	110			
Potassium	2.47	0.300	2.50	0	98.8	90	110			
Selenium	0.101	0.00500	0.100	0	101	90	110			

Sample ID LCVL-190614	Batch ID: R104607	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 10:52:00 AM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.00485	0.0100	0.00500	0	97.0	70	130			
Calcium	0.0941	0.300	0.100	0	94.1	70	130			
Cobalt	0.00520	0.00500	0.00500	0	104	70	130			
Iron	0.0970	0.100	0.100	0	97.0	70	130			
Lithium	0.0101	0.0100	0.0100	0	101	70	130			
Magnesium	0.0988	0.300	0.100	0	98.8	70	130			
Potassium	0.0901	0.300	0.100	0	90.1	70	130			
Selenium	0.00643	0.00500	0.00500	0	129	70	130			

Sample ID CCV3-190614	Batch ID: R104607	TestNo: SW6020A	Units: mg/L
SampType: CCV	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 1:11:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.201	0.0100	0.200	0	100	90	110			
Calcium	4.91	0.300	5.00	0	98.2	90	110			
Cobalt	0.200	0.00500	0.200	0	100	90	110			
Iron	4.97	0.100	5.00	0	99.4	90	110			
Lithium	0.205	0.0100	0.200	0	102	90	110			
Magnesium	5.01	0.300	5.00	0	100	90	110			
Potassium	4.94	0.300	5.00	0	98.8	90	110			
Selenium	0.208	0.00500	0.200	0	104	90	110			

Sample ID LCVL3-190614	Batch ID: R104607	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 1:16:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.00546	0.0100	0.00500	0	109	70	130			
Calcium	0.117	0.300	0.100	0	117	70	130			

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: 1906089
Project: LUMINANT-BBSES-ASH DISPOSAL

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS5_190614C

Sample ID: LCVL3-190614	Batch ID: R104607	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 1:16:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.00521	0.00500	0.00500	0	104	70	130			
Iron	0.100	0.100	0.100	0	100	70	130			
Lithium	0.0108	0.0100	0.0100	0	108	70	130			
Magnesium	0.103	0.300	0.100	0	103	70	130			
Potassium	0.0795	0.300	0.100	0	79.5	70	130			
Selenium	0.00499	0.00500	0.00500	0	99.9	70	130			

Sample ID: CCV4-190614	Batch ID: R104607	TestNo: SW6020A	Units: mg/L
SampType: CCV	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 1:58:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.201	0.0100	0.200	0	100	90	110			
Calcium	4.75	0.300	5.00	0	95.1	90	110			
Cobalt	0.201	0.00500	0.200	0	100	90	110			
Iron	4.91	0.100	5.00	0	98.2	90	110			
Lithium	0.207	0.0100	0.200	0	104	90	110			
Magnesium	4.95	0.300	5.00	0	98.9	90	110			
Potassium	4.86	0.300	5.00	0	97.3	90	110			
Selenium	0.205	0.00500	0.200	0	103	90	110			

Sample ID: LCVL4-190614	Batch ID: R104607	TestNo: SW6020A	Units: mg/L
SampType: LCVL	Run ID: ICP-MS5_190614C	Analysis Date: 6/14/2019 2:05:00 PM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.00528	0.0100	0.00500	0	106	70	130			
Calcium	0.0945	0.300	0.100	0	94.5	70	130			
Cobalt	0.00498	0.00500	0.00500	0	99.6	70	130			
Iron	0.0943	0.100	0.100	0	94.3	70	130			
Lithium	0.0106	0.0100	0.0100	0	106	70	130			
Magnesium	0.0974	0.300	0.100	0	97.4	70	130			
Potassium	0.0823	0.300	0.100	0	82.3	70	130			
Selenium	0.00573	0.00500	0.00500	0	115	70	130			

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: 1906089
Project: LUMINANT-BBSES-ASH DISPOSAL

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190611A

The QC data in batch 91283 applies to the following samples: 1906089-01C, 1906089-02C, 1906089-03C

Sample ID: MB-91283	Batch ID: 91283	TestNo: E300	Units: mg/L
SampType: MBLK	Run ID: IC2_190611A	Analysis Date: 6/11/2019 10:09:09 AM	Prep Date: 6/11/2019

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-91283	Batch ID: 91283	TestNo: E300	Units: mg/L
SampType: LCS	Run ID: IC2_190611A	Analysis Date: 6/11/2019 10:25:09 AM	Prep Date: 6/11/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.1	1.00	10.00	0	101	90	110			
Fluoride	4.02	0.400	4.000	0	101	90	110			
Nitrate-N	5.11	0.500	5.000	0	102	90	110			
Sulfate	30.6	3.00	30.00	0	102	90	110			

Sample ID: LCSD-91283	Batch ID: 91283	TestNo: E300	Units: mg/L
SampType: LCSD	Run ID: IC2_190611A	Analysis Date: 6/11/2019 10:41:09 AM	Prep Date: 6/11/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	10.1	1.00	10.00	0	101	90	110	0.307	20	
Fluoride	4.05	0.400	4.000	0	101	90	110	0.663	20	
Nitrate-N	5.15	0.500	5.000	0	103	90	110	0.808	20	
Sulfate	30.8	3.00	30.00	0	103	90	110	0.772	20	

Sample ID: 1906089-01CMS	Batch ID: 91283	TestNo: E300	Units: mg/L
SampType: MS	Run ID: IC2_190611A	Analysis Date: 6/11/2019 11:21:58 AM	Prep Date: 6/11/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	2140	100	2000	95.05	102	90	110			
Fluoride	2060	40.0	2000	0	103	90	110			
Nitrate-N	444	50.0	451.6	0	98.4	90	110			
Sulfate	2110	300	2000	117.0	99.5	90	110			

Sample ID: 1906089-01CMSD	Batch ID: 91283	TestNo: E300	Units: mg/L
SampType: MSD	Run ID: IC2_190611A	Analysis Date: 6/11/2019 11:37:58 AM	Prep Date: 6/11/2019

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	2140	100	2000	95.05	102	90	110	0.191	20	
Fluoride	2060	40.0	2000	0	103	90	110	0.168	20	
Nitrate-N	443	50.0	451.6	0	98.1	90	110	0.358	20	
Sulfate	2100	300	2000	117.0	99.0	90	110	0.500	20	

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: 1906089
Project: LUMINANT-BBSES-ASH DISPOSAL

ANALYTICAL QC SUMMARY REPORT

RunID: IC2_190611A

Sample ID ICV-190611	Batch ID: R104542	TestNo: E300	Units: mg/L							
SampType: ICV	Run ID: IC2_190611A	Analysis Date: 6/11/2019 9:37:09 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	10.3	0.400	10.00	0	103	90	110			
Nitrate-N	13.1	0.500	12.50	0	105	90	110			
Sulfate	77.9	3.00	75.00	0	104	90	110			

Sample ID CCV1-190611	Batch ID: R104542	TestNo: E300	Units: mg/L							
SampType: CCV	Run ID: IC2_190611A	Analysis Date: 6/11/2019 2:49:58 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	4.09	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			

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: 1906089
Project: LUMINANT-BBSES-ASH DISPOSAL

ANALYTICAL QC SUMMARY REPORT

RunID: TITRATOR_190617A

The QC data in batch 91346 applies to the following samples: 1906089-01C, 1906089-02C, 1906089-03C

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			
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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	

Qualifiers: B Analyte detected in the associated Method Blank J Analyte detected between MDL and RL ND Not Detected at the Method Detection Limit RL Reporting Limit J Analyte detected between SDL and RL	DF Dilution Factor MDL Method Detection Limit R RPD outside accepted control limits S Spike Recovery outside control limits N Parameter not NELAP certified
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CLIENT: Golder
Work Order: 1906089
Project: LUMINANT-BBSES-ASH DISPOSAL

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			

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: 1906089
Project: LUMINANT-BBSES-ASH DISPOSAL

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190611A

The QC data in batch 91295 applies to the following samples: 1906089-01C, 1906089-02C, 1906089-03C

Sample ID MB-91295	Batch ID: 91295	TestNo: M4500-P E	Units: mg/L							
SampType: MBLK	Run ID: UV/VIS_2_190611A	Analysis Date: 6/11/2019 12:08:00 PM	Prep Date: 6/11/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Phosphorus, Total Orthophosphate (As <0.0300 0.100

Sample ID LCS-91295	Batch ID: 91295	TestNo: M4500-P E	Units: mg/L							
SampType: LCS	Run ID: UV/VIS_2_190611A	Analysis Date: 6/11/2019 12:08:00 PM	Prep Date: 6/11/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Phosphorus, Total Orthophosphate (As 0.490 0.100 0.5000 0 98.0 80 120

Sample ID LCSD-91295	Batch ID: 91295	TestNo: M4500-P E	Units: mg/L							
SampType: LCSD	Run ID: UV/VIS_2_190611A	Analysis Date: 6/11/2019 12:09:00 PM	Prep Date: 6/11/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Phosphorus, Total Orthophosphate (As 0.500 0.100 0.5000 0 100 80 120 2.02 15

Sample ID 1906089-01CMS	Batch ID: 91295	TestNo: M4500-P E	Units: mg/L							
SampType: MS	Run ID: UV/VIS_2_190611A	Analysis Date: 6/11/2019 12:09:00 PM	Prep Date: 6/11/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Phosphorus, Total Orthophosphate (As 0.587 0.100 0.5000 0.06000 105 80 120

Sample ID 1906089-01CMSD	Batch ID: 91295	TestNo: M4500-P E	Units: mg/L							
SampType: MSD	Run ID: UV/VIS_2_190611A	Analysis Date: 6/11/2019 12:10:00 PM	Prep Date: 6/11/2019							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Phosphorus, Total Orthophosphate (As 0.531 0.100 0.5000 0.06000 94.2 80 120 10.0 15

Qualifiers:	<p>B Analyte detected in the associated Method Blank</p> <p>J Analyte detected between MDL and RL</p> <p>ND Not Detected at the Method Detection Limit</p> <p>RL Reporting Limit</p> <p>J Analyte detected between SDL and RL</p>	<p>DF Dilution Factor</p> <p>MDL Method Detection Limit</p> <p>R RPD outside accepted control limits</p> <p>S Spike Recovery outside control limits</p> <p>N Parameter not NELAP certified</p>
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CLIENT: Golder
Work Order: 1906089
Project: LUMINANT-BBSES-ASH DISPOSAL

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190611A

Sample ID ICV-190611	Batch ID: R104532	TestNo: M4500-P E	Units: mg/L							
SampType: ICV	Run ID: UV/VIS_2_190611A	Analysis Date: 6/11/2019 12:07:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Total Orthophosphate (As	0.213	0.100	0.2000	0	106	85	115			

Sample ID CCV1-190611	Batch ID: R104532	TestNo: M4500-P E	Units: mg/L							
SampType: CCV	Run ID: UV/VIS_2_190611A	Analysis Date: 6/11/2019 12:12:00 PM	Prep Date:							
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	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: 1906089
Project: LUMINANT-BBSES-ASH DISPOSAL

ANALYTICAL QC SUMMARY REPORT

RunID: UV/VIS_2_190614C

The QC data in batch 91344 applies to the following samples: 1906089-01A, 1906089-02A, 1906089-03A

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

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

CLIENT: Golder
Work Order: 1906089
Project: LUMINANT-BBSES-ASH DISPOSAL

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

<p>Qualifiers:</p> <p>B Analyte detected in the associated Method Blank</p> <p>J Analyte detected between MDL and RL</p> <p>ND Not Detected at the Method Detection Limit</p> <p>RL Reporting Limit</p> <p>J Analyte detected between SDL and RL</p>	<p>DF Dilution Factor</p> <p>MDL Method Detection Limit</p> <p>R RPD outside accepted control limits</p> <p>S Spike Recovery outside control limits</p> <p>N Parameter not NELAP certified</p>
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CLIENT: Golder
 Work Order: 1906089
 Project: LUMINANT-BBSES-ASH DISPOSAL

ANALYTICAL QC SUMMARY REPORT

RunID: WC_190614B

The QC data in batch 91332 applies to the following samples: 1906089-01C, 1906089-02C, 1906089-03C

Sample ID	MB-91332	Batch ID:	91332	TestNo:	M2540C	Units:	mg/L
SampType:	MBLK	Run ID:	WC_190614B	Analysis Date:	6/14/2019 12:00:00 PM	Prep Date:	6/13/2019
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-91332	Batch ID:	91332	TestNo:	M2540C	Units:	mg/L
SampType:	LCS	Run ID:	WC_190614B	Analysis Date:	6/14/2019 12:00:00 PM	Prep Date:	6/13/2019
Analyte		Result	RL	SPK value	Ref Val	%REC	LowLimit HighLimit %RPD RPDLimit Qual
Total Dissolved Solids (Residue, Filtera		762	10.0	745.6	0	102	90 113

Sample ID	1906109-02B-DUP	Batch ID:	91332	TestNo:	M2540C	Units:	mg/L
SampType:	DUP	Run ID:	WC_190614B	Analysis Date:	6/14/2019 12:00:00 PM	Prep Date:	6/13/2019
Analyte		Result	RL	SPK value	Ref Val	%REC	LowLimit HighLimit %RPD RPDLimit Qual
Total Dissolved Solids (Residue, Filtera		1800	50.0	0	1825		1.38 5

LUMINANT

Qualifiers: B Analyte detected in the associated Method Blank J Analyte detected between MDL and RL ND Not Detected at the Method Detection Limit RL Reporting Limit J Analyte detected between SDL and RL	DF Dilution Factor MDL Method Detection Limit R RPD outside accepted control limits S Spike Recovery outside control limits N Parameter not NELAP certified
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July 11, 2019

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

DHL Analytical, Inc.

Sample Delivery Group: L1108609

Samples Received: 06/13/2019

Project Number: 1906089

Description:

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

Entire Report Reviewed By:



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.



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		⁹Sc

LUMINANT



AMW-25 L1108609-01 Non-Potable Water

Collected by
Collected date/time
Received date/time

06/10/19 10:15
06/13/19 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1302066	1	06/26/19 13:32	07/10/19 11:05	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1300120	1	06/25/19 09:40	07/10/19 11:05	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1300120	1	06/25/19 09:40	06/26/19 17:14	RGT	Mt. Juliet, TN

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

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

- 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	1.63		0.463	0.736	07/10/2019 11:05	WG1302066
(T) Barium	103			62.0-143	07/10/2019 11:05	WG1302066
(T) Yttrium	105			79.0-136	07/10/2019 11:05	WG1302066

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	2.32		0.852	1.02	07/10/2019 11:05	WG1300120

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.682		0.389	0.286	06/26/2019 17:14	WG1300120
(T) Barium-133	69.3			30.0-143	06/26/2019 17:14	WG1300120

6 Qc

7 Gl

8 Al

9 Sc

LUMINANT



Method Blank (MB)

(MB) R3429617-1 07/10/19 11:05

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-228	0.284		0.447
(T) Barium	111		
(T) Yttrium	92.7		

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L1107592-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1107592-01 07/10/19 11:05 • (DUP) R3429617-5 07/10/19 11:05

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-228	0.627	0.940	1	39.9	0.487		20	3
(T) Barium	108	111						
(T) Yttrium	86.9	94.5						

Laboratory Control Sample (LCS)

(LCS) R3429617-2 07/10/19 11:05

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	5.80	116	80.0-120	
(T) Barium			110		
(T) Yttrium			87.7		

L1108597-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1108597-01 07/10/19 11:05 • (MS) R3429617-3 07/10/19 11:05 • (MSD) R3429617-4 07/10/19 11:05

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	7.14	0.711	7.45	7.59	94.4	96.3	1	70.0-130			1.78		20
(T) Barium		112			115	109							
(T) Yttrium		94.4			97.9	99.3							



Method Blank (MB)

(MB) R3425425-1 06/26/19 12:51

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-226	0.481	E	0.0511
(T) Barium-133	82.2		

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L1111912-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1111912-03 06/26/19 17:14 • (DUP) R3425425-5 06/26/19 12:51

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits	DUP RER Limit
Radium-226	0.637	0.531	1	18.1	0.207		20	3
(T) Barium-133	77.5	71.9						

Laboratory Control Sample (LCS)

(LCS) R3425425-2 06/26/19 12:51

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.02	4.73	94.2	80.0-120	
(T) Barium-133			80.0		

L1111912-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1111912-01 06/26/19 17:14 • (MS) R3425425-3 06/26/19 12:51 • (MSD) R3425425-4 06/26/19 12:51

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	0.471	20.4	20.3	99.0	98.4	1	75.0-125			0.591		20
(T) Barium-133		63.5			87.6	79.5							



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.

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

Qualifier Description

B	The same analyte is found in the associated blank.
---	--



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.

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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

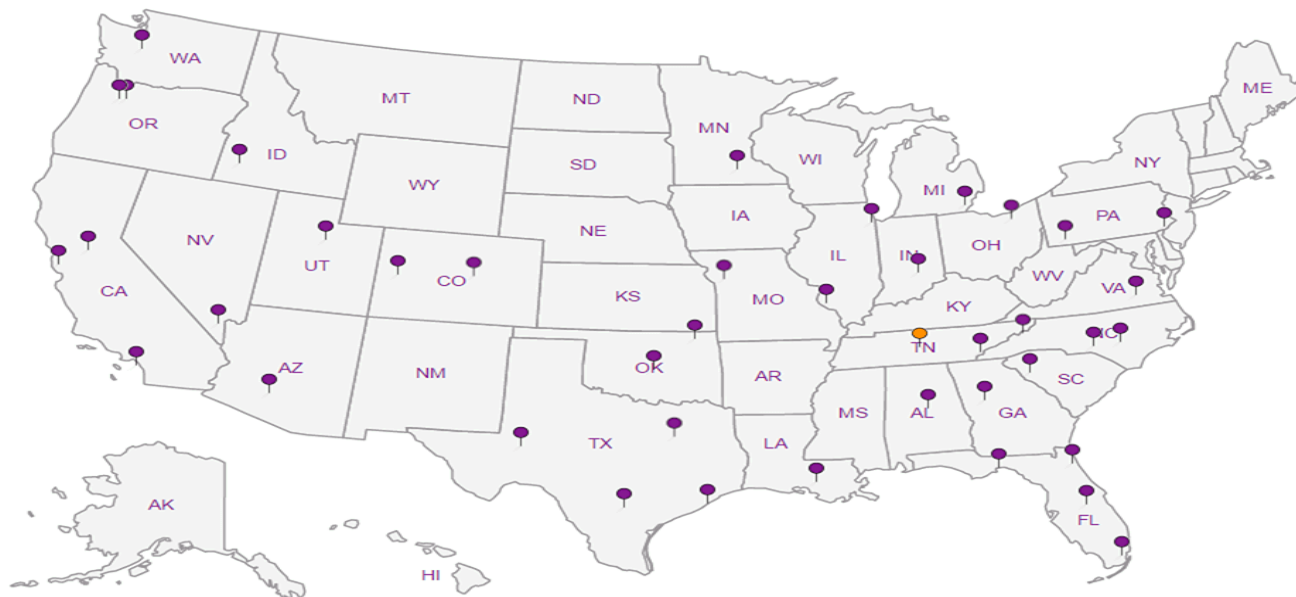
Third Party Federal Accreditations

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

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.



1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

1108609

DHL Analytical, Inc.
2300 Double Creek Drive
Round Rock, TX 78664

CHAIN-OF-CUSTODY RECORD

TEL: (512) 388-8222 FAX: (512) 388-8229
Work Order: 1906089

H116

Subcontractor:

Pace Analytical
12065 Lebanon Rd
Mt. Juliet, TN 37122

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

11-Jun-19

Sample Id	Matrix	DHL#	Date Collected	Bottle Type	Requested Tests	
					12 22 Ra-228 E904.0	Ra-226 M7500 Ra B M
AMW-25	Aqueous	-02D	06/10/19 10:15 AM	1LHDPEHNO3		
AMW-25	Aqueous	-02E	06/10/19 10:15 AM	1LHDPEHNO3	1	1

-01
1



LUMINANT

RAD SCREEN: <0.5 mR/hr

Amb

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

Relinquished by: 	Date/Time: 6/11/19 1700	Received by: 	Date/Time: 6/13/19 0845 DF 0930
Relinquished by:		Received by:	

41 WPS Rec: 2

Pace Analytical National Center for Testing & Innovation Cooler Receipt Form

Client: <i>DHURRIX</i>	SDG#:	<i>1108609</i>		
Cooler Received/Opened On: <i>6/13/19</i>	Temperature:	<i>Amb</i>		
Received By: Brock Fariss				
Signature: <i>BK Fariss</i>				
Receipt Check List		NP	Yes	No
COC Seal Present / Intact?		<input checked="" type="checkbox"/>		
COC Signed / Accurate?			<input checked="" type="checkbox"/>	
Bottles arrive intact?			<input checked="" type="checkbox"/>	
Correct bottles used?			<input checked="" type="checkbox"/>	
Sufficient volume sent?				
If Applicable				
VOA Zero headspace?			<input checked="" type="checkbox"/>	
Preservation Correct / Checked?				



Quantitative X-Ray Diffraction by Rietveld Refinement

Report Prepared for: Golder Associates - Will Vienne

Project Number/ LIMS No. 17431-01 / MI7011-JUN19

Batch: Big Brown Ash Disposal Area II

Sample Receipt: June 13, 2019

Sample Analysis: June 17, 2019

Reporting Date: June 24, 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.

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.

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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

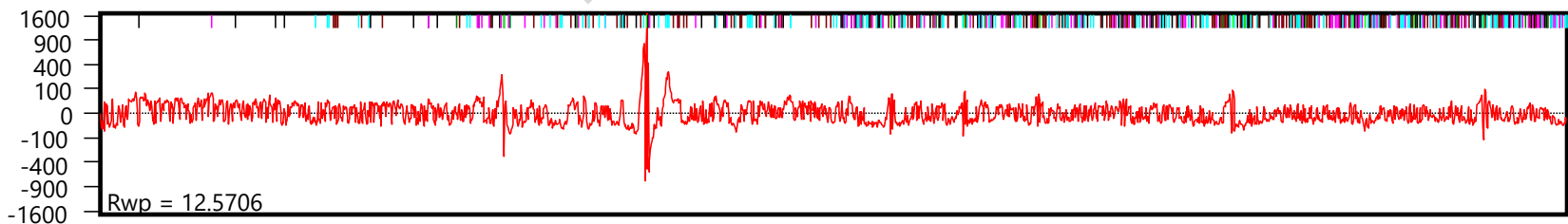
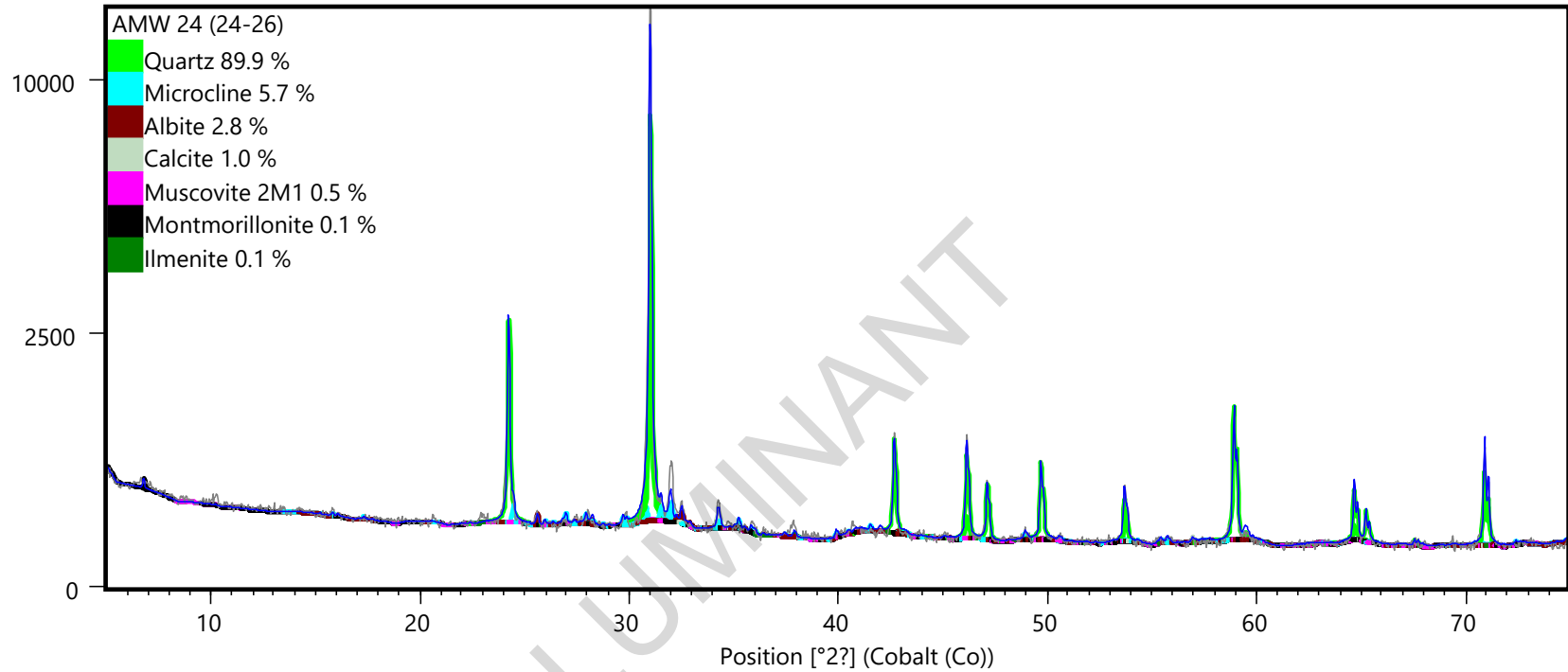
Mineral/Compound	1	2	3
	AMW 24 (24-26)	AMW 25 (55-57)	ADA-2019-1 (51-53)
	(wt %)	(wt %)	(wt %)
Quartz	89.9	86.3	84.5
K-Feldspar (Microcline)	5.7	8.9	7.8
Albite	2.8	2.8	6.1
Calcite	1.0	--	--
Muscovite	0.5	1.9	1.4
Montmorillonite	0.1	0.1	0.2
Ilmenite	0.1	--	--
TOTAL	100	100	100

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.

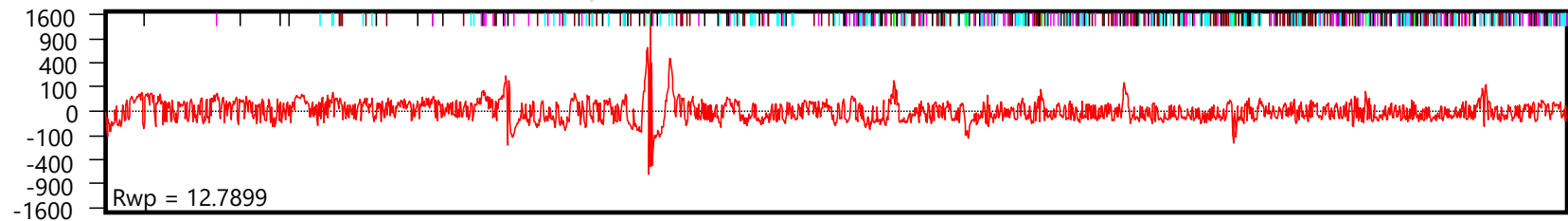
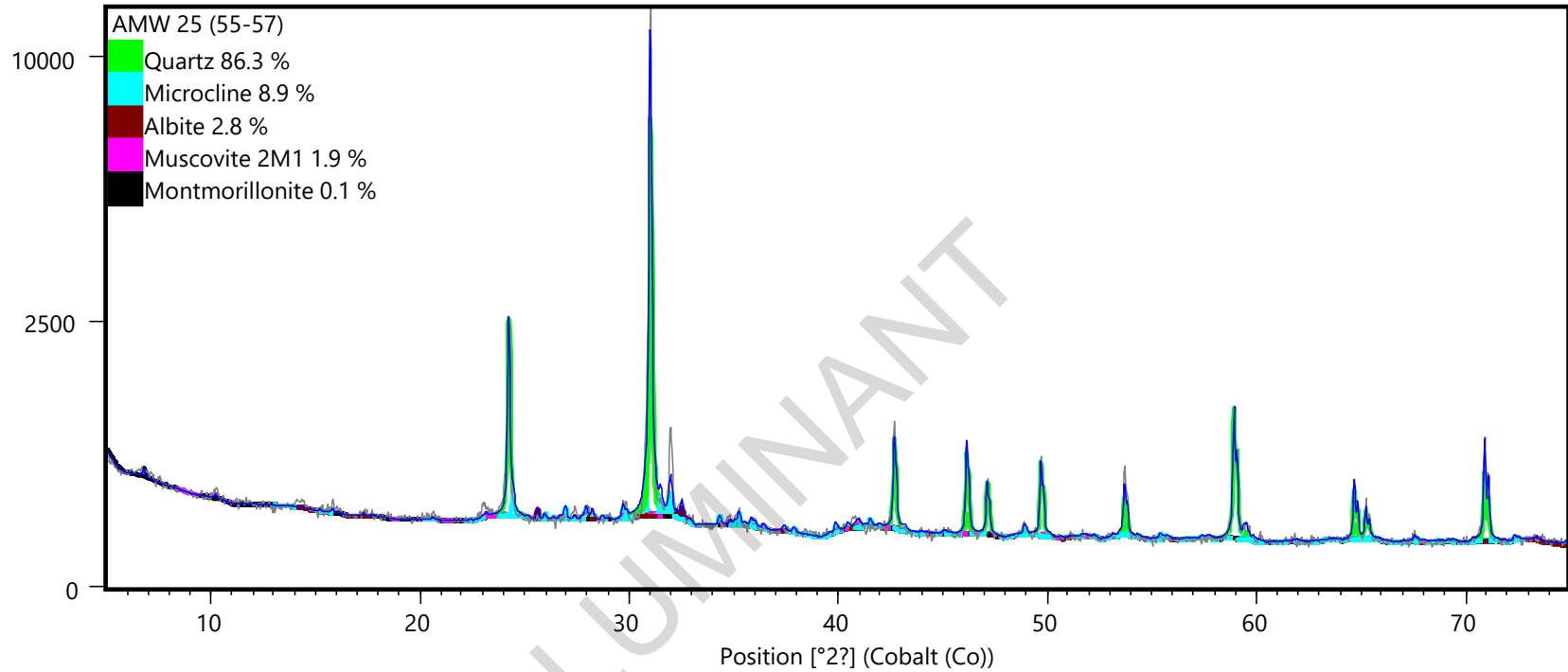
Mineral/Compound	Formula
Quartz	SiO ₂
K-Feldspar (Microcline)	K(AlSi ₃ O ₈)
Albite	NaAlSi ₃ O ₈
Calcite	CaCO ₃
Muscovite	KAl ₂ (AlSi ₃ O ₁₀)(OH) ₂
Montmorillonite	Na _{0.2} Ca _{0.1} Al _{1.5} Mg _{0.5} Si ₄ O ₁₀ (OH) ₂ ·4(H ₂ O)
Ilmenite	FeTiO ₃

Counts



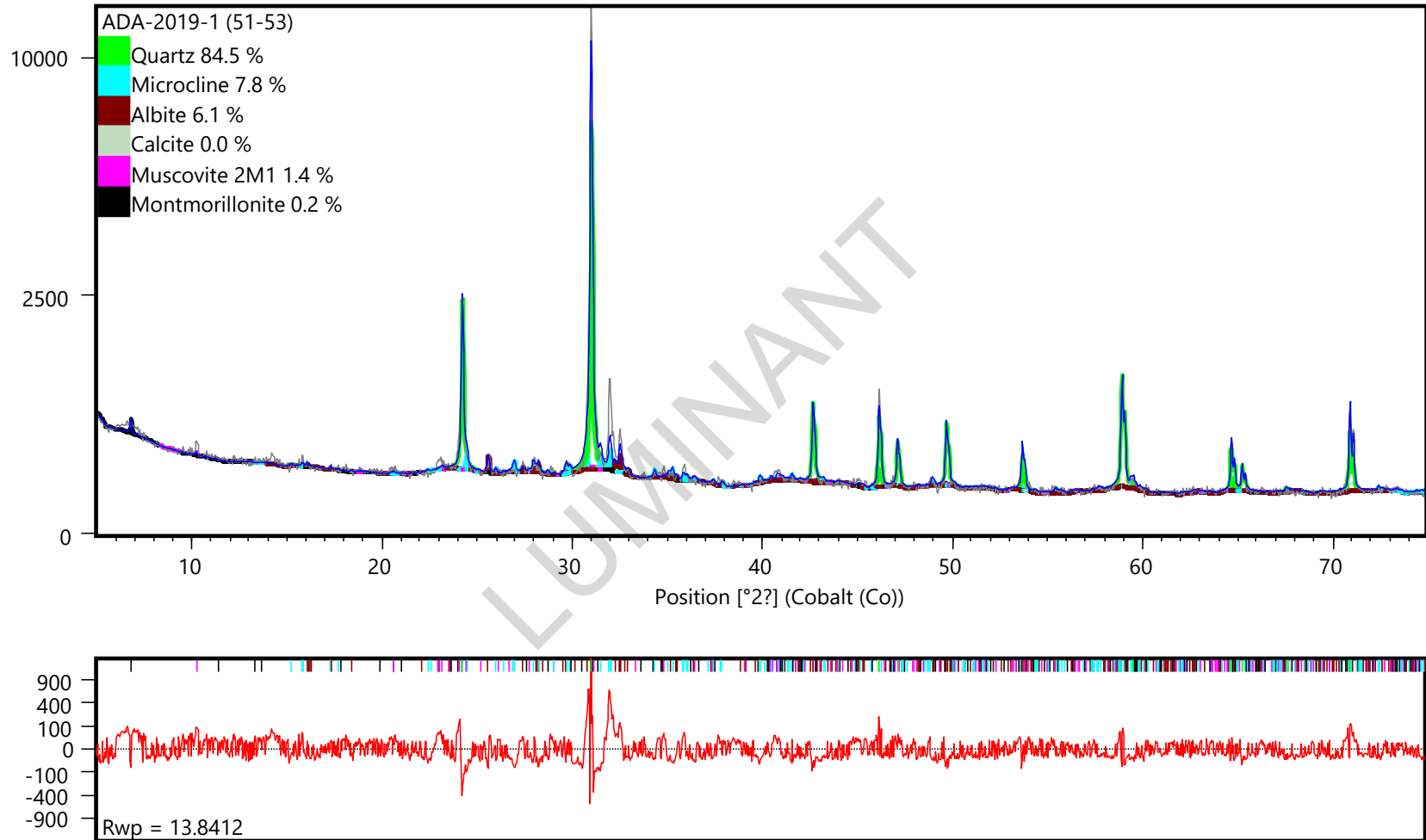
X-ray diffractogram. The upper pattern is the measured diffractogram, the blue curve is the calculated pattern from the Rietveld Refinement and the lower red curve is the difference plot.

Counts



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.

Counts



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.

ANALYTICAL REPORT

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

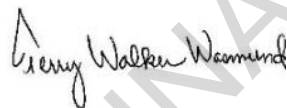
Laboratory Job ID: 140-15518-1

Client Project/Site: Big Brown Disposal Area I - SEP & Totals

For:

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

Attn: Will Vienne



Authorized for release by:
7/18/2019 4:29:24 PM

Terry Walker Wasmund, Project Manager II
(865)291-3000

terry.wasmund@testamericainc.com

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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.



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LUMINANT

Definitions/Glossary

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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

Case Narrative

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Job ID: 140-15518-1

Laboratory: Eurofins TestAmerica, Knoxville

Narrative

Job Narrative 140-15518-1

Receipt

The samples were received on 6/7/2019 at 10:00 AM. The samples arrived in good condition, properly preserved, and on ice. The temperature of the cooler at receipt was 0.5° C.

Metals - Method 6010B

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:

$$\text{Result, } \mu\text{g/g or mg/Kg, dry weight} = (C \times V \times V1 \times D) / (W \times S \times V2)$$

Where:

- C = Concentration from instrument readout, $\mu\text{g/mL}$
- 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

Case Narrative

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Job ID: 140-15518-1 (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 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.

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.

Samples AMW24 (24-26) (140-15518-1), AMW25 (55-57) (140-15518-2) and ADA-2019-1 (51-53) (140-15518-3) 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 AMW24 (24-26) (140-15518-1), AMW25 (55-57) (140-15518-2) and ADA-2019-1 (51-53) (140-15518-3) 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.

Detection Summary

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: AMW24 (24-26)

Lab Sample ID: 140-15518-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	1.0	J	12	0.58	mg/Kg	4	☼	6010B SEP	Step 1
Manganese	0.37	J	3.6	0.15	mg/Kg	4	☼	6010B SEP	Step 1
Aluminum	17	J*	36	5.8	mg/Kg	3	☼	6010B SEP	Step 2
Barium	0.86	J*	9.0	0.43	mg/Kg	3	☼	6010B SEP	Step 2
Manganese	3.6		2.7	1.0	mg/Kg	3	☼	6010B SEP	Step 2
Selenium	0.91	J B	1.8	0.61	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	34		12	2.5	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.32	J	0.60	0.16	mg/Kg	1	☼	6010B SEP	Step 3
Barium	6.1	B	3.0	0.14	mg/Kg	1	☼	6010B SEP	Step 3
Beryllium	0.018	J	0.30	0.018	mg/Kg	1	☼	6010B SEP	Step 3
Cobalt	0.41	J	3.0	0.054	mg/Kg	1	☼	6010B SEP	Step 3
Iron	54		6.0	3.5	mg/Kg	1	☼	6010B SEP	Step 3
Manganese	8.5	B	0.90	0.032	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	820		12	1.9	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	1.2	B	0.60	0.26	mg/Kg	1	☼	6010B SEP	Step 4
Barium	9.9		3.0	0.14	mg/Kg	1	☼	6010B SEP	Step 4
Beryllium	0.14	J	0.30	0.019	mg/Kg	1	☼	6010B SEP	Step 4
Cobalt	1.5	J	3.0	0.064	mg/Kg	1	☼	6010B SEP	Step 4
Iron	3400		6.0	3.5	mg/Kg	1	☼	6010B SEP	Step 4
Li	0.72	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 4
Manganese	20		0.90	0.16	mg/Kg	1	☼	6010B SEP	Step 4
Selenium	0.73	B*	0.60	0.56	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	68	J*	180	28	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	1400		12	1.9	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.47	J	0.60	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Barium	4.6		3.0	0.14	mg/Kg	1	☼	6010B SEP	Step 6
Beryllium	0.056	J	0.30	0.014	mg/Kg	1	☼	6010B SEP	Step 6
Cobalt	0.61	J	3.0	0.055	mg/Kg	1	☼	6010B SEP	Step 6
Iron	1900		6.0	3.5	mg/Kg	1	☼	6010B SEP	Step 6
Li	0.73	J	3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Manganese	12		0.90	0.30	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	22000		120	19	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	1.0	J	1.2	0.31	mg/Kg	2	☼	6010B SEP	Step 7
Barium	430		30	1.4	mg/Kg	10	☼	6010B SEP	Step 7
Beryllium	0.28	J	0.30	0.0090	mg/Kg	1	☼	6010B SEP	Step 7
Cobalt	0.58	J	6.0	0.36	mg/Kg	2	☼	6010B SEP	Step 7
Iron	2600		6.0	4.9	mg/Kg	1	☼	6010B SEP	Step 7
Li	5.0		3.0	0.18	mg/Kg	1	☼	6010B SEP	Step 7
Manganese	33		0.90	0.062	mg/Kg	1	☼	6010B SEP	Step 7
Thallium	0.65	J	4.2	0.43	mg/Kg	2	☼	6010B SEP	Step 7
Aluminum	24000		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	450		2.5	0.12	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Beryllium	0.49		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	8000		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Knoxville

Detection Summary

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: AMW24 (24-26) (Continued)

Lab Sample ID: 140-15518-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Li	6.5		2.5	0.15	mg/Kg	1		6010B SEP	Sum of
Manganese	78		0.75	0.052	mg/Kg	1		6010B SEP	Steps 1-7
Selenium	1.6		0.50	0.17	mg/Kg	1		6010B SEP	Sum of
Thallium	0.65	J	1.8	0.18	mg/Kg	1		6010B SEP	Steps 1-7
Chromium	5.7		1.7	0.25	mg/Kg	1	☼	6010B	Sum of
Lead	6.1		1.7	0.31	mg/Kg	1	☼	6010B	Steps 1-7
Phosphorus	93		34	2.7	mg/Kg	1	☼	6010B	Total/NA
Aluminum	27000		120	19	mg/Kg	10	☼	6010B	Total/NA
Arsenic	2.9		1.2	0.31	mg/Kg	2	☼	6010B	Total/NA
Barium	500		30	1.4	mg/Kg	10	☼	6010B	Total/NA
Beryllium	0.49		0.30	0.0090	mg/Kg	1	☼	6010B	Total/NA
Cobalt	3.2	J	6.0	0.36	mg/Kg	2	☼	6010B	Total/NA
Iron	8300		6.0	4.9	mg/Kg	1	☼	6010B	Total/NA
Lithium	7.3		3.0	0.18	mg/Kg	1	☼	6010B	Total/NA
Manganese	82		0.90	0.062	mg/Kg	1	☼	6010B	Total/NA
Molybdenum	0.17	J	2.4	0.098	mg/Kg	1	☼	6010B	Total/NA

Client Sample ID: AMW25 (55-57)

Lab Sample ID: 140-15518-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.75	J	12	0.59	mg/Kg	4	☼	6010B SEP	Step 1
Manganese	0.51	J	3.7	0.15	mg/Kg	4	☼	6010B SEP	Step 1
Aluminum	7.8	J*	37	5.9	mg/Kg	3	☼	6010B SEP	Step 2
Barium	0.62	J*	9.2	0.44	mg/Kg	3	☼	6010B SEP	Step 2
Manganese	2.9		2.8	1.0	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	66		12	2.6	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.41	J	0.61	0.16	mg/Kg	1	☼	6010B SEP	Step 3
Barium	8.3	B	3.1	0.15	mg/Kg	1	☼	6010B SEP	Step 3
Beryllium	0.066	J	0.31	0.018	mg/Kg	1	☼	6010B SEP	Step 3
Cobalt	2.1	J	3.1	0.055	mg/Kg	1	☼	6010B SEP	Step 3
Iron	150		6.1	3.6	mg/Kg	1	☼	6010B SEP	Step 3
Manganese	54	B	0.92	0.033	mg/Kg	1	☼	6010B SEP	Step 3
Selenium	0.26	J B	0.61	0.21	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	1300		12	2.0	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	1.6	B	0.61	0.27	mg/Kg	1	☼	6010B SEP	Step 4
Barium	27		3.1	0.15	mg/Kg	1	☼	6010B SEP	Step 4
Beryllium	0.26	J	0.31	0.020	mg/Kg	1	☼	6010B SEP	Step 4
Cobalt	1.8	J	3.1	0.065	mg/Kg	1	☼	6010B SEP	Step 4
Iron	5400		6.1	3.6	mg/Kg	1	☼	6010B SEP	Step 4
Li	0.91	J	3.1	0.18	mg/Kg	1	☼	6010B SEP	Step 4
Manganese	47		0.92	0.16	mg/Kg	1	☼	6010B SEP	Step 4
Selenium	0.59	J B*	0.61	0.58	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	58	J*	180	29	mg/Kg	5	☼	6010B SEP	Step 5
Barium	10	J*	46	2.2	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	2300		12	2.0	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.67		0.61	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Barium	9.4		3.1	0.15	mg/Kg	1	☼	6010B SEP	Step 6
Beryllium	0.10	J	0.31	0.015	mg/Kg	1	☼	6010B SEP	Step 6

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Knoxville

Detection Summary

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: AMW25 (55-57) (Continued)

Lab Sample ID: 140-15518-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cobalt	0.71	J	3.1	0.056	mg/Kg	1	✳	6010B SEP	Step 6
Iron	2800		6.1	3.6	mg/Kg	1	✳	6010B SEP	Step 6
Li	0.99	J	3.1	0.18	mg/Kg	1	✳	6010B SEP	Step 6
Manganese	18		0.92	0.31	mg/Kg	1	✳	6010B SEP	Step 6
Aluminum	21000		120	20	mg/Kg	10	✳	6010B SEP	Step 7
Arsenic	0.54	J	0.61	0.16	mg/Kg	1	✳	6010B SEP	Step 7
Barium	300		31	1.5	mg/Kg	10	✳	6010B SEP	Step 7
Beryllium	0.42		0.31	0.0092	mg/Kg	1	✳	6010B SEP	Step 7
Cobalt	0.77	J	6.1	0.37	mg/Kg	2	✳	6010B SEP	Step 7
Iron	5300		6.1	5.0	mg/Kg	1	✳	6010B SEP	Step 7
Li	9.2		3.1	0.18	mg/Kg	1	✳	6010B SEP	Step 7
Manganese	29		0.92	0.064	mg/Kg	1	✳	6010B SEP	Step 7
Mo	0.17	J	2.5	0.10	mg/Kg	1	✳	6010B SEP	Step 7
Aluminum	24000		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	360		2.5	0.12	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Beryllium	0.84		0.25	0.0075	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Cobalt	5.3		2.5	0.023	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	14000		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	11		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Manganese	150		0.75	0.052	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Mo	0.17	J	2.0	0.082	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Selenium	0.85		0.50	0.17	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Chromium	6.1		1.7	0.25	mg/Kg	1	✳	6010B	Total/NA
Lead	5.2		1.7	0.31	mg/Kg	1	✳	6010B	Total/NA
Phosphorus	110		34	2.7	mg/Kg	1	✳	6010B	Total/NA
Aluminum	35000		120	20	mg/Kg	10	✳	6010B	Total/NA
Arsenic	3.1		0.61	0.16	mg/Kg	1	✳	6010B	Total/NA
Barium	590		31	1.5	mg/Kg	10	✳	6010B	Total/NA
Beryllium	0.70		0.31	0.0092	mg/Kg	1	✳	6010B	Total/NA
Cobalt	3.7		3.1	0.18	mg/Kg	1	✳	6010B	Total/NA
Iron	10000		6.1	5.0	mg/Kg	1	✳	6010B	Total/NA
Lithium	8.6		3.1	0.18	mg/Kg	1	✳	6010B	Total/NA
Manganese	120		0.92	0.064	mg/Kg	1	✳	6010B	Total/NA
Molybdenum	0.24	J	2.5	0.10	mg/Kg	1	✳	6010B	Total/NA
Thallium	0.46	J	2.1	0.22	mg/Kg	1	✳	6010B	Total/NA

Client Sample ID: ADA-2019-1 (51-53)

Lab Sample ID: 140-15518-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.71	J	12	0.59	mg/Kg	4	✳	6010B SEP	Step 1
Manganese	10		3.7	0.15	mg/Kg	4	✳	6010B SEP	Step 1
Barium	0.46	J*	9.2	0.44	mg/Kg	3	✳	6010B SEP	Step 2
Manganese	2.0	J	2.8	1.0	mg/Kg	3	✳	6010B SEP	Step 2

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Knoxville

Detection Summary

Client: Golder Associates Inc.

Job ID: 140-15518-1

Project/Site: Big Brown Disposal Area I - SEP & Totals

Client Sample ID: ADA-2019-1 (51-53) (Continued)

Lab Sample ID: 140-15518-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Selenium	0.86	J B	1.8	0.62	mg/Kg	3	☼	6010B SEP	Step 2
Aluminum	56		12	2.6	mg/Kg	1	☼	6010B SEP	Step 3
Arsenic	0.34	J	0.61	0.16	mg/Kg	1	☼	6010B SEP	Step 3
Barium	8.9	B	3.1	0.15	mg/Kg	1	☼	6010B SEP	Step 3
Beryllium	0.043	J	0.31	0.018	mg/Kg	1	☼	6010B SEP	Step 3
Cobalt	1.4	J	3.1	0.055	mg/Kg	1	☼	6010B SEP	Step 3
Iron	95		6.1	3.6	mg/Kg	1	☼	6010B SEP	Step 3
Manganese	33	B	0.92	0.033	mg/Kg	1	☼	6010B SEP	Step 3
Selenium	0.24	J B	0.61	0.21	mg/Kg	1	☼	6010B SEP	Step 3
Aluminum	980		12	2.0	mg/Kg	1	☼	6010B SEP	Step 4
Arsenic	1.3	B	0.61	0.27	mg/Kg	1	☼	6010B SEP	Step 4
Barium	24		3.1	0.15	mg/Kg	1	☼	6010B SEP	Step 4
Beryllium	0.20	J	0.31	0.020	mg/Kg	1	☼	6010B SEP	Step 4
Cobalt	1.7	J	3.1	0.065	mg/Kg	1	☼	6010B SEP	Step 4
Iron	4800		6.1	3.6	mg/Kg	1	☼	6010B SEP	Step 4
Li	0.73	J	3.1	0.18	mg/Kg	1	☼	6010B SEP	Step 4
Manganese	37		0.92	0.16	mg/Kg	1	☼	6010B SEP	Step 4
Aluminum	74	J *	180	29	mg/Kg	5	☼	6010B SEP	Step 5
Barium	6.0	J *	46	2.2	mg/Kg	5	☼	6010B SEP	Step 5
Aluminum	1900		12	2.0	mg/Kg	1	☼	6010B SEP	Step 6
Arsenic	0.69		0.61	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Barium	7.1		3.1	0.15	mg/Kg	1	☼	6010B SEP	Step 6
Beryllium	0.093	J	0.31	0.015	mg/Kg	1	☼	6010B SEP	Step 6
Cobalt	0.89	J	3.1	0.056	mg/Kg	1	☼	6010B SEP	Step 6
Iron	2800		6.1	3.6	mg/Kg	1	☼	6010B SEP	Step 6
Li	1.0	J	3.1	0.18	mg/Kg	1	☼	6010B SEP	Step 6
Manganese	18		0.92	0.31	mg/Kg	1	☼	6010B SEP	Step 6
Aluminum	13000		120	20	mg/Kg	10	☼	6010B SEP	Step 7
Arsenic	0.82		0.61	0.16	mg/Kg	1	☼	6010B SEP	Step 7
Barium	390		31	1.5	mg/Kg	10	☼	6010B SEP	Step 7
Beryllium	0.39		0.31	0.0092	mg/Kg	1	☼	6010B SEP	Step 7
Cobalt	0.66	J	6.1	0.37	mg/Kg	2	☼	6010B SEP	Step 7
Iron	4100		6.1	5.0	mg/Kg	1	☼	6010B SEP	Step 7
Li	6.5		3.1	0.18	mg/Kg	1	☼	6010B SEP	Step 7
Manganese	29		0.92	0.064	mg/Kg	1	☼	6010B SEP	Step 7
Mo	0.14	J	2.4	0.10	mg/Kg	1	☼	6010B SEP	Step 7
Aluminum	16000		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	440		2.5	0.12	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Beryllium	0.73		0.25	0.0075	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Cobalt	4.6		2.5	0.023	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	12000		5.0	4.1	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Li	8.3		2.5	0.15	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Manganese	130		0.75	0.052	mg/Kg	1		6010B SEP	Sum of Steps 1-7

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Knoxville

Detection Summary

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: ADA-2019-1 (51-53) (Continued)

Lab Sample ID: 140-15518-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mo	0.14	J	2.0	0.082	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Selenium	1.1		0.50	0.17	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Chromium	6.9		1.7	0.25	mg/Kg	1	*	6010B	Total/NA
Lead	6.2		1.7	0.32	mg/Kg	1	*	6010B	Total/NA
Phosphorus	79		35	2.8	mg/Kg	1	*	6010B	Total/NA
Aluminum	42000		120	20	mg/Kg	10	*	6010B	Total/NA
Arsenic	3.0		0.61	0.16	mg/Kg	1	*	6010B	Total/NA
Barium	680		31	1.5	mg/Kg	10	*	6010B	Total/NA
Beryllium	0.72		0.31	0.0092	mg/Kg	1	*	6010B	Total/NA
Cobalt	5.8	J	6.1	0.37	mg/Kg	2	*	6010B	Total/NA
Iron	11000		6.1	5.0	mg/Kg	1	*	6010B	Total/NA
Lithium	9.4		3.1	0.18	mg/Kg	1	*	6010B	Total/NA
Manganese	140		0.92	0.064	mg/Kg	1	*	6010B	Total/NA
Molybdenum	0.29	J	2.4	0.10	mg/Kg	1	*	6010B	Total/NA

LUMINANT

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Knoxville

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Client Sample Results

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: AMW24 (24-26)

Lab Sample ID: 140-15518-1

Date Collected: 06/04/19 14:15

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 83.3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		48	7.7	mg/Kg	☼	06/29/19 08:00	07/11/19 13:50	4
Antimony	ND		14	1.3	mg/Kg	☼	06/29/19 08:00	07/11/19 13:50	4
Arsenic	ND		2.4	0.62	mg/Kg	☼	06/29/19 08:00	07/11/19 13:50	4
Barium	1.0	J	12	0.58	mg/Kg	☼	06/29/19 08:00	07/11/19 13:50	4
Beryllium	ND		1.2	0.37	mg/Kg	☼	06/29/19 08:00	07/11/19 13:50	4
Cobalt	ND		12	0.22	mg/Kg	☼	06/29/19 08:00	07/11/19 13:50	4
Iron	ND		24	14	mg/Kg	☼	06/29/19 08:00	07/11/19 13:50	4
Li	ND		12	0.72	mg/Kg	☼	06/29/19 08:00	07/11/19 13:50	4
Manganese	0.37	J	3.6	0.15	mg/Kg	☼	06/29/19 08:00	07/11/19 13:50	4
Mo	ND		9.6	0.39	mg/Kg	☼	06/29/19 08:00	07/11/19 13:50	4
Selenium	ND		2.4	0.82	mg/Kg	☼	06/29/19 08:00	07/11/19 13:50	4
Thallium	ND		8.4	1.0	mg/Kg	☼	06/29/19 08:00	07/11/19 13:50	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	17	J *	36	5.8	mg/Kg	☼	06/30/19 08:00	07/11/19 15:19	3
Antimony	ND		11	1.0	mg/Kg	☼	06/30/19 08:00	07/11/19 15:19	3
Arsenic	ND		1.8	0.47	mg/Kg	☼	06/30/19 08:00	07/11/19 15:19	3
Barium	0.86	J *	9.0	0.43	mg/Kg	☼	06/30/19 08:00	07/11/19 15:19	3
Beryllium	ND	*	0.90	0.058	mg/Kg	☼	06/30/19 08:00	07/11/19 15:19	3
Cobalt	ND		9.0	0.23	mg/Kg	☼	06/30/19 08:00	07/11/19 15:19	3
Iron	ND	*	18	10	mg/Kg	☼	06/30/19 08:00	07/11/19 15:19	3
Li	ND		9.0	0.54	mg/Kg	☼	06/30/19 08:00	07/11/19 15:19	3
Manganese	3.6		2.7	1.0	mg/Kg	☼	06/30/19 08:00	07/11/19 15:19	3
Mo	ND		7.2	0.30	mg/Kg	☼	06/30/19 08:00	07/11/19 15:19	3
Selenium	0.91	J B	1.8	0.61	mg/Kg	☼	06/30/19 08:00	07/11/19 15:19	3
Thallium	ND		6.3	0.76	mg/Kg	☼	06/30/19 08:00	07/11/19 15:19	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	34		12	2.5	mg/Kg	☼	07/02/19 08:00	07/11/19 17:08	1
Antimony	ND		3.6	0.34	mg/Kg	☼	07/02/19 08:00	07/11/19 17:08	1
Arsenic	0.32	J	0.60	0.16	mg/Kg	☼	07/02/19 08:00	07/11/19 17:08	1
Barium	6.1	B	3.0	0.14	mg/Kg	☼	07/02/19 08:00	07/11/19 17:08	1
Beryllium	0.018	J	0.30	0.018	mg/Kg	☼	07/02/19 08:00	07/11/19 17:08	1
Cobalt	0.41	J	3.0	0.054	mg/Kg	☼	07/02/19 08:00	07/11/19 17:08	1
Iron	54		6.0	3.5	mg/Kg	☼	07/02/19 08:00	07/11/19 17:08	1
Li	ND		3.0	0.18	mg/Kg	☼	07/02/19 08:00	07/11/19 17:08	1
Manganese	8.5	B	0.90	0.032	mg/Kg	☼	07/02/19 08:00	07/11/19 17:08	1
Mo	ND		2.4	0.098	mg/Kg	☼	07/02/19 08:00	07/11/19 17:08	1
Selenium	ND		0.60	0.20	mg/Kg	☼	07/02/19 08:00	07/11/19 17:08	1
Thallium	ND		2.1	0.25	mg/Kg	☼	07/02/19 08:00	07/11/19 17:08	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	820		12	1.9	mg/Kg	☼	07/03/19 08:00	07/11/19 18:50	1
Antimony	ND		3.6	0.54	mg/Kg	☼	07/03/19 08:00	07/11/19 18:50	1
Arsenic	1.2	B	0.60	0.26	mg/Kg	☼	07/03/19 08:00	07/11/19 18:50	1
Barium	9.9		3.0	0.14	mg/Kg	☼	07/03/19 08:00	07/11/19 18:50	1
Beryllium	0.14	J	0.30	0.019	mg/Kg	☼	07/03/19 08:00	07/11/19 18:50	1

Eurofins TestAmerica, Knoxville

Client Sample Results

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: AMW24 (24-26)

Lab Sample ID: 140-15518-1

Date Collected: 06/04/19 14:15

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 83.3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cobalt	1.5	J	3.0	0.064	mg/Kg	☼	07/03/19 08:00	07/11/19 18:50	1
Iron	3400		6.0	3.5	mg/Kg	☼	07/03/19 08:00	07/11/19 18:50	1
Li	0.72	J	3.0	0.18	mg/Kg	☼	07/03/19 08:00	07/11/19 18:50	1
Manganese	20		0.90	0.16	mg/Kg	☼	07/03/19 08:00	07/11/19 18:50	1
Mo	ND		2.4	0.098	mg/Kg	☼	07/03/19 08:00	07/11/19 18:50	1
Selenium	0.73	B *	0.60	0.56	mg/Kg	☼	07/03/19 08:00	07/11/19 18:50	1
Thallium	ND		2.1	0.35	mg/Kg	☼	07/03/19 08:00	07/11/19 18:50	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	68	J *	180	28	mg/Kg	☼	07/10/19 08:00	07/12/19 12:58	5
Antimony	ND		54	5.0	mg/Kg	☼	07/10/19 08:00	07/12/19 12:58	5
Arsenic	ND		9.0	2.3	mg/Kg	☼	07/10/19 08:00	07/12/19 12:58	5
Barium	ND	*	45	2.2	mg/Kg	☼	07/10/19 08:00	07/12/19 12:58	5
Beryllium	ND	*	4.5	0.38	mg/Kg	☼	07/10/19 08:00	07/12/19 12:58	5
Cobalt	ND	*	45	0.72	mg/Kg	☼	07/10/19 08:00	07/12/19 12:58	5
Iron	ND	*	90	53	mg/Kg	☼	07/10/19 08:00	07/12/19 12:58	5
Li	ND		45	2.6	mg/Kg	☼	07/10/19 08:00	07/12/19 12:58	5
Manganese	ND	*	14	2.2	mg/Kg	☼	07/10/19 08:00	07/12/19 12:58	5
Mo	ND		36	1.5	mg/Kg	☼	07/10/19 08:00	07/12/19 12:58	5
Selenium	ND		9.0	3.1	mg/Kg	☼	07/10/19 08:00	07/12/19 12:58	5
Thallium	ND	*	32	4.2	mg/Kg	☼	07/10/19 08:00	07/12/19 12:58	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	1400		12	1.9	mg/Kg	☼	07/10/19 08:00	07/12/19 14:26	1
Antimony	ND		3.6	0.34	mg/Kg	☼	07/10/19 08:00	07/12/19 14:26	1
Arsenic	0.47	J	0.60	0.18	mg/Kg	☼	07/10/19 08:00	07/12/19 14:26	1
Barium	4.6		3.0	0.14	mg/Kg	☼	07/10/19 08:00	07/12/19 14:26	1
Beryllium	0.056	J	0.30	0.014	mg/Kg	☼	07/10/19 08:00	07/12/19 14:26	1
Cobalt	0.61	J	3.0	0.055	mg/Kg	☼	07/10/19 08:00	07/12/19 14:26	1
Iron	1900		6.0	3.5	mg/Kg	☼	07/10/19 08:00	07/12/19 14:26	1
Li	0.73	J	3.0	0.18	mg/Kg	☼	07/10/19 08:00	07/12/19 14:26	1
Manganese	12		0.90	0.30	mg/Kg	☼	07/10/19 08:00	07/12/19 14:26	1
Mo	ND		2.4	0.12	mg/Kg	☼	07/10/19 08:00	07/12/19 14:26	1
Selenium	ND		0.60	0.20	mg/Kg	☼	07/10/19 08:00	07/12/19 14:26	1
Thallium	ND		2.1	0.25	mg/Kg	☼	07/10/19 08:00	07/12/19 14:26	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	22000		120	19	mg/Kg	☼	07/12/19 09:08	07/15/19 14:09	10
Antimony	ND		3.6	0.17	mg/Kg	☼	07/12/19 09:08	07/15/19 12:43	1
Arsenic	1.0	J	1.2	0.31	mg/Kg	☼	07/12/19 09:08	07/15/19 18:13	2
Barium	430		30	1.4	mg/Kg	☼	07/12/19 09:08	07/15/19 14:09	10
Beryllium	0.28	J	0.30	0.0090	mg/Kg	☼	07/12/19 09:08	07/15/19 12:43	1
Cobalt	0.58	J	6.0	0.36	mg/Kg	☼	07/12/19 09:08	07/15/19 18:13	2
Iron	2600		6.0	4.9	mg/Kg	☼	07/12/19 09:08	07/15/19 12:43	1
Li	5.0		3.0	0.18	mg/Kg	☼	07/12/19 09:08	07/15/19 12:43	1
Manganese	33		0.90	0.062	mg/Kg	☼	07/12/19 09:08	07/15/19 12:43	1
Mo	ND		2.4	0.098	mg/Kg	☼	07/12/19 09:08	07/15/19 12:43	1

Eurofins TestAmerica, Knoxville

Client Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: AMW24 (24-26)

Lab Sample ID: 140-15518-1

Date Collected: 06/04/19 14:15

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 83.3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		1.2	0.41	mg/Kg	☼	07/12/19 09:08	07/15/19 18:13	2
Thallium	0.65	J	4.2	0.43	mg/Kg	☼	07/12/19 09:08	07/15/19 18:13	2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	24000		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	450		2.5	0.12	mg/Kg			07/16/19 17:31	1
Beryllium	0.49		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	8000		5.0	4.1	mg/Kg			07/16/19 17:31	1
Li	6.5		2.5	0.15	mg/Kg			07/16/19 17:31	1
Manganese	78		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	0.65	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		22	11	mg/Kg	☼	06/26/19 08:00	07/10/19 13:23	1
Chromium	5.7		1.7	0.25	mg/Kg	☼	06/26/19 08:00	07/10/19 13:23	1
Lead	6.1		1.7	0.31	mg/Kg	☼	06/26/19 08:00	07/10/19 13:23	1
Phosphorus	93		34	2.7	mg/Kg	☼	06/26/19 08:00	07/10/19 13:23	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	27000		120	19	mg/Kg	☼	06/11/19 08:00	07/15/19 16:45	10
Antimony	ND		3.6	0.17	mg/Kg	☼	06/11/19 08:00	07/15/19 15:29	1
Arsenic	2.9		1.2	0.31	mg/Kg	☼	06/11/19 08:00	07/15/19 19:29	2
Barium	500		30	1.4	mg/Kg	☼	06/11/19 08:00	07/15/19 16:45	10
Beryllium	0.49		0.30	0.0090	mg/Kg	☼	06/11/19 08:00	07/15/19 15:29	1
Cobalt	3.2	J	6.0	0.36	mg/Kg	☼	06/11/19 08:00	07/15/19 19:29	2
Iron	8300		6.0	4.9	mg/Kg	☼	06/11/19 08:00	07/15/19 15:29	1
Lithium	7.3		3.0	0.18	mg/Kg	☼	06/11/19 08:00	07/15/19 15:29	1
Manganese	82		0.90	0.062	mg/Kg	☼	06/11/19 08:00	07/15/19 15:29	1
Molybdenum	0.17	J	2.4	0.098	mg/Kg	☼	06/11/19 08:00	07/15/19 15:29	1
Selenium	ND		1.2	0.41	mg/Kg	☼	06/11/19 08:00	07/15/19 19:29	2
Thallium	ND		4.2	0.43	mg/Kg	☼	06/11/19 08:00	07/15/19 19:29	2

Method: 7470A - SEP Mercury (CVAA) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.12	0.048	mg/Kg	☼	06/11/19 08:00	06/16/19 14:31	1

Client Sample Results

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: AMW25 (55-57)

Lab Sample ID: 140-15518-2

Date Collected: 06/04/19 16:35

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 81.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		49	7.9	mg/Kg	☼	06/29/19 08:00	07/11/19 13:55	4
Antimony	ND		15	1.4	mg/Kg	☼	06/29/19 08:00	07/11/19 13:55	4
Arsenic	ND		2.5	0.64	mg/Kg	☼	06/29/19 08:00	07/11/19 13:55	4
Barium	0.75	J	12	0.59	mg/Kg	☼	06/29/19 08:00	07/11/19 13:55	4
Beryllium	ND		1.2	0.38	mg/Kg	☼	06/29/19 08:00	07/11/19 13:55	4
Cobalt	ND		12	0.22	mg/Kg	☼	06/29/19 08:00	07/11/19 13:55	4
Iron	ND		25	14	mg/Kg	☼	06/29/19 08:00	07/11/19 13:55	4
Li	ND		12	0.74	mg/Kg	☼	06/29/19 08:00	07/11/19 13:55	4
Manganese	0.51	J	3.7	0.15	mg/Kg	☼	06/29/19 08:00	07/11/19 13:55	4
Mo	ND		9.8	0.40	mg/Kg	☼	06/29/19 08:00	07/11/19 13:55	4
Selenium	ND		2.5	0.83	mg/Kg	☼	06/29/19 08:00	07/11/19 13:55	4
Thallium	ND		8.6	1.0	mg/Kg	☼	06/29/19 08:00	07/11/19 13:55	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	7.8	J *	37	5.9	mg/Kg	☼	06/30/19 08:00	07/11/19 15:40	3
Antimony	ND		11	1.0	mg/Kg	☼	06/30/19 08:00	07/11/19 15:40	3
Arsenic	ND		1.8	0.48	mg/Kg	☼	06/30/19 08:00	07/11/19 15:40	3
Barium	0.62	J *	9.2	0.44	mg/Kg	☼	06/30/19 08:00	07/11/19 15:40	3
Beryllium	ND	*	0.92	0.059	mg/Kg	☼	06/30/19 08:00	07/11/19 15:40	3
Cobalt	ND		9.2	0.23	mg/Kg	☼	06/30/19 08:00	07/11/19 15:40	3
Iron	ND	*	18	11	mg/Kg	☼	06/30/19 08:00	07/11/19 15:40	3
Li	ND		9.2	0.55	mg/Kg	☼	06/30/19 08:00	07/11/19 15:40	3
Manganese	2.9		2.8	1.0	mg/Kg	☼	06/30/19 08:00	07/11/19 15:40	3
Mo	ND		7.4	0.30	mg/Kg	☼	06/30/19 08:00	07/11/19 15:40	3
Selenium	ND		1.8	0.63	mg/Kg	☼	06/30/19 08:00	07/11/19 15:40	3
Thallium	ND		6.4	0.77	mg/Kg	☼	06/30/19 08:00	07/11/19 15:40	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	66		12	2.6	mg/Kg	☼	07/02/19 08:00	07/11/19 17:14	1
Antimony	ND		3.7	0.34	mg/Kg	☼	07/02/19 08:00	07/11/19 17:14	1
Arsenic	0.41	J	0.61	0.16	mg/Kg	☼	07/02/19 08:00	07/11/19 17:14	1
Barium	8.3	B	3.1	0.15	mg/Kg	☼	07/02/19 08:00	07/11/19 17:14	1
Beryllium	0.066	J	0.31	0.018	mg/Kg	☼	07/02/19 08:00	07/11/19 17:14	1
Cobalt	2.1	J	3.1	0.055	mg/Kg	☼	07/02/19 08:00	07/11/19 17:14	1
Iron	150		6.1	3.6	mg/Kg	☼	07/02/19 08:00	07/11/19 17:14	1
Li	ND		3.1	0.18	mg/Kg	☼	07/02/19 08:00	07/11/19 17:14	1
Manganese	54	B	0.92	0.033	mg/Kg	☼	07/02/19 08:00	07/11/19 17:14	1
Mo	ND		2.5	0.10	mg/Kg	☼	07/02/19 08:00	07/11/19 17:14	1
Selenium	0.26	J B	0.61	0.21	mg/Kg	☼	07/02/19 08:00	07/11/19 17:14	1
Thallium	ND		2.1	0.26	mg/Kg	☼	07/02/19 08:00	07/11/19 17:14	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	1300		12	2.0	mg/Kg	☼	07/03/19 08:00	07/11/19 18:55	1
Antimony	ND		3.7	0.55	mg/Kg	☼	07/03/19 08:00	07/11/19 18:55	1
Arsenic	1.6	B	0.61	0.27	mg/Kg	☼	07/03/19 08:00	07/11/19 18:55	1
Barium	27		3.1	0.15	mg/Kg	☼	07/03/19 08:00	07/11/19 18:55	1
Beryllium	0.26	J	0.31	0.020	mg/Kg	☼	07/03/19 08:00	07/11/19 18:55	1

Eurofins TestAmerica, Knoxville

Client Sample Results

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: AMW25 (55-57)

Lab Sample ID: 140-15518-2

Date Collected: 06/04/19 16:35

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 81.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cobalt	1.8	J	3.1	0.065	mg/Kg	☼	07/03/19 08:00	07/11/19 18:55	1
Iron	5400		6.1	3.6	mg/Kg	☼	07/03/19 08:00	07/11/19 18:55	1
Li	0.91	J	3.1	0.18	mg/Kg	☼	07/03/19 08:00	07/11/19 18:55	1
Manganese	47		0.92	0.16	mg/Kg	☼	07/03/19 08:00	07/11/19 18:55	1
Mo	ND		2.5	0.10	mg/Kg	☼	07/03/19 08:00	07/11/19 18:55	1
Selenium	0.59	J B *	0.61	0.58	mg/Kg	☼	07/03/19 08:00	07/11/19 18:55	1
Thallium	ND		2.1	0.36	mg/Kg	☼	07/03/19 08:00	07/11/19 18:55	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	58	J *	180	29	mg/Kg	☼	07/10/19 08:00	07/12/19 13:03	5
Antimony	ND		55	5.2	mg/Kg	☼	07/10/19 08:00	07/12/19 13:03	5
Arsenic	ND		9.2	2.3	mg/Kg	☼	07/10/19 08:00	07/12/19 13:03	5
Barium	10	J *	46	2.2	mg/Kg	☼	07/10/19 08:00	07/12/19 13:03	5
Beryllium	ND	*	4.6	0.39	mg/Kg	☼	07/10/19 08:00	07/12/19 13:03	5
Cobalt	ND	*	46	0.74	mg/Kg	☼	07/10/19 08:00	07/12/19 13:03	5
Iron	ND	*	92	54	mg/Kg	☼	07/10/19 08:00	07/12/19 13:03	5
Li	ND		46	2.7	mg/Kg	☼	07/10/19 08:00	07/12/19 13:03	5
Manganese	ND	*	14	2.3	mg/Kg	☼	07/10/19 08:00	07/12/19 13:03	5
Mo	ND		37	1.5	mg/Kg	☼	07/10/19 08:00	07/12/19 13:03	5
Selenium	ND		9.2	3.2	mg/Kg	☼	07/10/19 08:00	07/12/19 13:03	5
Thallium	ND	*	32	4.3	mg/Kg	☼	07/10/19 08:00	07/12/19 13:03	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	2300		12	2.0	mg/Kg	☼	07/10/19 08:00	07/12/19 14:46	1
Antimony	ND		3.7	0.34	mg/Kg	☼	07/10/19 08:00	07/12/19 14:46	1
Arsenic	0.67		0.61	0.18	mg/Kg	☼	07/10/19 08:00	07/12/19 14:46	1
Barium	9.4		3.1	0.15	mg/Kg	☼	07/10/19 08:00	07/12/19 14:46	1
Beryllium	0.10	J	0.31	0.015	mg/Kg	☼	07/10/19 08:00	07/12/19 14:46	1
Cobalt	0.71	J	3.1	0.056	mg/Kg	☼	07/10/19 08:00	07/12/19 14:46	1
Iron	2800		6.1	3.6	mg/Kg	☼	07/10/19 08:00	07/12/19 14:46	1
Li	0.99	J	3.1	0.18	mg/Kg	☼	07/10/19 08:00	07/12/19 14:46	1
Manganese	18		0.92	0.31	mg/Kg	☼	07/10/19 08:00	07/12/19 14:46	1
Mo	ND		2.5	0.12	mg/Kg	☼	07/10/19 08:00	07/12/19 14:46	1
Selenium	ND		0.61	0.21	mg/Kg	☼	07/10/19 08:00	07/12/19 14:46	1
Thallium	ND		2.1	0.26	mg/Kg	☼	07/10/19 08:00	07/12/19 14:46	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	21000		120	20	mg/Kg	☼	07/12/19 09:08	07/15/19 14:14	10
Antimony	ND		3.7	0.17	mg/Kg	☼	07/12/19 09:08	07/15/19 12:48	1
Arsenic	0.54	J	0.61	0.16	mg/Kg	☼	07/12/19 09:08	07/15/19 12:48	1
Barium	300		31	1.5	mg/Kg	☼	07/12/19 09:08	07/15/19 14:14	10
Beryllium	0.42		0.31	0.0092	mg/Kg	☼	07/12/19 09:08	07/15/19 12:48	1
Cobalt	0.77	J	6.1	0.37	mg/Kg	☼	07/12/19 09:08	07/15/19 18:18	2
Iron	5300		6.1	5.0	mg/Kg	☼	07/12/19 09:08	07/15/19 12:48	1
Li	9.2		3.1	0.18	mg/Kg	☼	07/12/19 09:08	07/15/19 12:48	1
Manganese	29		0.92	0.064	mg/Kg	☼	07/12/19 09:08	07/15/19 12:48	1
Mo	0.17	J	2.5	0.10	mg/Kg	☼	07/12/19 09:08	07/15/19 12:48	1

Eurofins TestAmerica, Knoxville

Client Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: AMW25 (55-57)

Lab Sample ID: 140-15518-2

Date Collected: 06/04/19 16:35

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 81.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		0.61	0.21	mg/Kg	☼	07/12/19 09:08	07/15/19 12:48	1
Thallium	ND		4.3	0.44	mg/Kg	☼	07/12/19 09:08	07/15/19 18:18	2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	24000		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	360		2.5	0.12	mg/Kg			07/16/19 17:31	1
Beryllium	0.84		0.25	0.0075	mg/Kg			07/16/19 17:31	1
Cobalt	5.3		2.5	0.023	mg/Kg			07/16/19 17:31	1
Iron	14000		5.0	4.1	mg/Kg			07/16/19 17:31	1
Li	11		2.5	0.15	mg/Kg			07/16/19 17:31	1
Manganese	150		0.75	0.052	mg/Kg			07/16/19 17:31	1
Mo	0.17	J	2.0	0.082	mg/Kg			07/16/19 17:31	1
Selenium	0.85		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 13:44	1
Chromium	6.1		1.7	0.25	mg/Kg	☼	06/26/19 08:00	07/10/19 13:44	1
Lead	5.2		1.7	0.31	mg/Kg	☼	06/26/19 08:00	07/10/19 13:44	1
Phosphorus	110		34	2.7	mg/Kg	☼	06/26/19 08:00	07/10/19 13:44	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	35000		120	20	mg/Kg	☼	06/11/19 08:00	07/15/19 16:50	10
Antimony	ND		3.7	0.17	mg/Kg	☼	06/11/19 08:00	07/15/19 15:34	1
Arsenic	3.1		0.61	0.16	mg/Kg	☼	06/11/19 08:00	07/15/19 15:34	1
Barium	590		31	1.5	mg/Kg	☼	06/11/19 08:00	07/15/19 16:50	10
Beryllium	0.70		0.31	0.0092	mg/Kg	☼	06/11/19 08:00	07/15/19 15:34	1
Cobalt	3.7		3.1	0.18	mg/Kg	☼	06/11/19 08:00	07/15/19 15:34	1
Iron	10000		6.1	5.0	mg/Kg	☼	06/11/19 08:00	07/15/19 15:34	1
Lithium	8.6		3.1	0.18	mg/Kg	☼	06/11/19 08:00	07/15/19 15:34	1
Manganese	120		0.92	0.064	mg/Kg	☼	06/11/19 08:00	07/15/19 15:34	1
Molybdenum	0.24	J	2.5	0.10	mg/Kg	☼	06/11/19 08:00	07/15/19 15:34	1
Selenium	ND		0.61	0.21	mg/Kg	☼	06/11/19 08:00	07/15/19 15:34	1
Thallium	0.46	J	2.1	0.22	mg/Kg	☼	06/11/19 08:00	07/15/19 15:34	1

Method: 7470A - SEP Mercury (CVAA) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.12	0.049	mg/Kg	☼	06/11/19 08:00	06/16/19 14:34	1

Client Sample Results

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: ADA-2019-1 (51-53)

Lab Sample ID: 140-15518-3

Date Collected: 06/05/19 10:45

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 81.7

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		49	7.8	mg/Kg	☼	06/29/19 08:00	07/11/19 14:00	4
Antimony	ND		15	1.4	mg/Kg	☼	06/29/19 08:00	07/11/19 14:00	4
Arsenic	ND		2.4	0.64	mg/Kg	☼	06/29/19 08:00	07/11/19 14:00	4
Barium	0.71	J	12	0.59	mg/Kg	☼	06/29/19 08:00	07/11/19 14:00	4
Beryllium	ND		1.2	0.38	mg/Kg	☼	06/29/19 08:00	07/11/19 14:00	4
Cobalt	ND		12	0.22	mg/Kg	☼	06/29/19 08:00	07/11/19 14:00	4
Iron	ND		24	14	mg/Kg	☼	06/29/19 08:00	07/11/19 14:00	4
Li	ND		12	0.73	mg/Kg	☼	06/29/19 08:00	07/11/19 14:00	4
Manganese	10		3.7	0.15	mg/Kg	☼	06/29/19 08:00	07/11/19 14:00	4
Mo	ND		9.8	0.40	mg/Kg	☼	06/29/19 08:00	07/11/19 14:00	4
Selenium	ND		2.4	0.83	mg/Kg	☼	06/29/19 08:00	07/11/19 14:00	4
Thallium	ND		8.6	1.0	mg/Kg	☼	06/29/19 08:00	07/11/19 14:00	4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND	*	37	5.9	mg/Kg	☼	06/30/19 08:00	07/11/19 15:45	3
Antimony	ND		11	1.0	mg/Kg	☼	06/30/19 08:00	07/11/19 15:45	3
Arsenic	ND		1.8	0.48	mg/Kg	☼	06/30/19 08:00	07/11/19 15:45	3
Barium	0.46	J *	9.2	0.44	mg/Kg	☼	06/30/19 08:00	07/11/19 15:45	3
Beryllium	ND	*	0.92	0.059	mg/Kg	☼	06/30/19 08:00	07/11/19 15:45	3
Cobalt	ND		9.2	0.23	mg/Kg	☼	06/30/19 08:00	07/11/19 15:45	3
Iron	ND	*	18	11	mg/Kg	☼	06/30/19 08:00	07/11/19 15:45	3
Li	ND		9.2	0.55	mg/Kg	☼	06/30/19 08:00	07/11/19 15:45	3
Manganese	2.0	J	2.8	1.0	mg/Kg	☼	06/30/19 08:00	07/11/19 15:45	3
Mo	ND		7.3	0.30	mg/Kg	☼	06/30/19 08:00	07/11/19 15:45	3
Selenium	0.86	J B	1.8	0.62	mg/Kg	☼	06/30/19 08:00	07/11/19 15:45	3
Thallium	ND		6.4	0.77	mg/Kg	☼	06/30/19 08:00	07/11/19 15:45	3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	56		12	2.6	mg/Kg	☼	07/02/19 08:00	07/11/19 17:19	1
Antimony	ND		3.7	0.34	mg/Kg	☼	07/02/19 08:00	07/11/19 17:19	1
Arsenic	0.34	J	0.61	0.16	mg/Kg	☼	07/02/19 08:00	07/11/19 17:19	1
Barium	8.9	B	3.1	0.15	mg/Kg	☼	07/02/19 08:00	07/11/19 17:19	1
Beryllium	0.043	J	0.31	0.018	mg/Kg	☼	07/02/19 08:00	07/11/19 17:19	1
Cobalt	1.4	J	3.1	0.055	mg/Kg	☼	07/02/19 08:00	07/11/19 17:19	1
Iron	95		6.1	3.6	mg/Kg	☼	07/02/19 08:00	07/11/19 17:19	1
Li	ND		3.1	0.18	mg/Kg	☼	07/02/19 08:00	07/11/19 17:19	1
Manganese	33	B	0.92	0.033	mg/Kg	☼	07/02/19 08:00	07/11/19 17:19	1
Mo	ND		2.4	0.10	mg/Kg	☼	07/02/19 08:00	07/11/19 17:19	1
Selenium	0.24	J B	0.61	0.21	mg/Kg	☼	07/02/19 08:00	07/11/19 17:19	1
Thallium	ND		2.1	0.26	mg/Kg	☼	07/02/19 08:00	07/11/19 17:19	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	980		12	2.0	mg/Kg	☼	07/03/19 08:00	07/11/19 19:00	1
Antimony	ND		3.7	0.55	mg/Kg	☼	07/03/19 08:00	07/11/19 19:00	1
Arsenic	1.3	B	0.61	0.27	mg/Kg	☼	07/03/19 08:00	07/11/19 19:00	1
Barium	24		3.1	0.15	mg/Kg	☼	07/03/19 08:00	07/11/19 19:00	1
Beryllium	0.20	J	0.31	0.020	mg/Kg	☼	07/03/19 08:00	07/11/19 19:00	1

Eurofins TestAmerica, Knoxville

Client Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: ADA-2019-1 (51-53)

Lab Sample ID: 140-15518-3

Date Collected: 06/05/19 10:45

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 81.7

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cobalt	1.7	J	3.1	0.065	mg/Kg	☼	07/03/19 08:00	07/11/19 19:00	1
Iron	4800		6.1	3.6	mg/Kg	☼	07/03/19 08:00	07/11/19 19:00	1
Li	0.73	J	3.1	0.18	mg/Kg	☼	07/03/19 08:00	07/11/19 19:00	1
Manganese	37		0.92	0.16	mg/Kg	☼	07/03/19 08:00	07/11/19 19:00	1
Mo	ND		2.4	0.10	mg/Kg	☼	07/03/19 08:00	07/11/19 19:00	1
Selenium	ND	*	0.61	0.58	mg/Kg	☼	07/03/19 08:00	07/11/19 19:00	1
Thallium	ND		2.1	0.36	mg/Kg	☼	07/03/19 08:00	07/11/19 19:00	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	74	J*	180	29	mg/Kg	☼	07/10/19 08:00	07/12/19 13:09	5
Antimony	ND		55	5.1	mg/Kg	☼	07/10/19 08:00	07/12/19 13:09	5
Arsenic	ND		9.2	2.3	mg/Kg	☼	07/10/19 08:00	07/12/19 13:09	5
Barium	6.0	J*	46	2.2	mg/Kg	☼	07/10/19 08:00	07/12/19 13:09	5
Beryllium	ND	*	4.6	0.39	mg/Kg	☼	07/10/19 08:00	07/12/19 13:09	5
Cobalt	ND	*	46	0.73	mg/Kg	☼	07/10/19 08:00	07/12/19 13:09	5
Iron	ND	*	92	54	mg/Kg	☼	07/10/19 08:00	07/12/19 13:09	5
Li	ND		46	2.7	mg/Kg	☼	07/10/19 08:00	07/12/19 13:09	5
Manganese	ND	*	14	2.3	mg/Kg	☼	07/10/19 08:00	07/12/19 13:09	5
Mo	ND		37	1.5	mg/Kg	☼	07/10/19 08:00	07/12/19 13:09	5
Selenium	ND		9.2	3.2	mg/Kg	☼	07/10/19 08:00	07/12/19 13:09	5
Thallium	ND	*	32	4.3	mg/Kg	☼	07/10/19 08:00	07/12/19 13:09	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	1900		12	2.0	mg/Kg	☼	07/10/19 08:00	07/12/19 14:52	1
Antimony	ND		3.7	0.34	mg/Kg	☼	07/10/19 08:00	07/12/19 14:52	1
Arsenic	0.69		0.61	0.18	mg/Kg	☼	07/10/19 08:00	07/12/19 14:52	1
Barium	7.1		3.1	0.15	mg/Kg	☼	07/10/19 08:00	07/12/19 14:52	1
Beryllium	0.093	J	0.31	0.015	mg/Kg	☼	07/10/19 08:00	07/12/19 14:52	1
Cobalt	0.89	J	3.1	0.056	mg/Kg	☼	07/10/19 08:00	07/12/19 14:52	1
Iron	2800		6.1	3.6	mg/Kg	☼	07/10/19 08:00	07/12/19 14:52	1
Li	1.0	J	3.1	0.18	mg/Kg	☼	07/10/19 08:00	07/12/19 14:52	1
Manganese	18		0.92	0.31	mg/Kg	☼	07/10/19 08:00	07/12/19 14:52	1
Mo	ND		2.4	0.12	mg/Kg	☼	07/10/19 08:00	07/12/19 14:52	1
Selenium	ND		0.61	0.21	mg/Kg	☼	07/10/19 08:00	07/12/19 14:52	1
Thallium	ND		2.1	0.26	mg/Kg	☼	07/10/19 08:00	07/12/19 14:52	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	13000		120	20	mg/Kg	☼	07/12/19 09:08	07/15/19 14:19	10
Antimony	ND		3.7	0.17	mg/Kg	☼	07/12/19 09:08	07/15/19 13:03	1
Arsenic	0.82		0.61	0.16	mg/Kg	☼	07/12/19 09:08	07/15/19 13:03	1
Barium	390		31	1.5	mg/Kg	☼	07/12/19 09:08	07/15/19 14:19	10
Beryllium	0.39		0.31	0.0092	mg/Kg	☼	07/12/19 09:08	07/15/19 13:03	1
Cobalt	0.66	J	6.1	0.37	mg/Kg	☼	07/12/19 09:08	07/15/19 18:23	2
Iron	4100		6.1	5.0	mg/Kg	☼	07/12/19 09:08	07/15/19 13:03	1
Li	6.5		3.1	0.18	mg/Kg	☼	07/12/19 09:08	07/15/19 13:03	1
Manganese	29		0.92	0.064	mg/Kg	☼	07/12/19 09:08	07/15/19 13:03	1
Mo	0.14	J	2.4	0.10	mg/Kg	☼	07/12/19 09:08	07/15/19 13:03	1

Eurofins TestAmerica, Knoxville

Client Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: ADA-2019-1 (51-53)

Lab Sample ID: 140-15518-3

Date Collected: 06/05/19 10:45

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 81.7

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		0.61	0.21	mg/Kg	☼	07/12/19 09:08	07/15/19 13:03	1
Thallium	ND		4.3	0.44	mg/Kg	☼	07/12/19 09:08	07/15/19 18:23	2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	16000		10	1.6	mg/Kg			07/16/19 17:33	1
Antimony	ND		3.0	0.14	mg/Kg			07/16/19 17:33	1
Arsenic	3.2		0.50	0.13	mg/Kg			07/16/19 17:33	1
Barium	440		2.5	0.12	mg/Kg			07/16/19 17:33	1
Beryllium	0.73		0.25	0.0075	mg/Kg			07/16/19 17:33	1
Cobalt	4.6		2.5	0.023	mg/Kg			07/16/19 17:33	1
Iron	12000		5.0	4.1	mg/Kg			07/16/19 17:33	1
Li	8.3		2.5	0.15	mg/Kg			07/16/19 17:33	1
Manganese	130		0.75	0.052	mg/Kg			07/16/19 17:33	1
Mo	0.14	J	2.0	0.082	mg/Kg			07/16/19 17:33	1
Selenium	1.1		0.50	0.17	mg/Kg			07/16/19 17:33	1
Thallium	ND		1.8	0.18	mg/Kg			07/16/19 17:33	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		23	12	mg/Kg	☼	06/26/19 08:00	07/10/19 13:49	1
Chromium	6.9		1.7	0.25	mg/Kg	☼	06/26/19 08:00	07/10/19 13:49	1
Lead	6.2		1.7	0.32	mg/Kg	☼	06/26/19 08:00	07/10/19 13:49	1
Phosphorus	79		35	2.8	mg/Kg	☼	06/26/19 08:00	07/10/19 13:49	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	42000		120	20	mg/Kg	☼	06/11/19 08:00	07/15/19 16:55	10
Antimony	ND		3.7	0.17	mg/Kg	☼	06/11/19 08:00	07/15/19 15:40	1
Arsenic	3.0		0.61	0.16	mg/Kg	☼	06/11/19 08:00	07/15/19 15:40	1
Barium	680		31	1.5	mg/Kg	☼	06/11/19 08:00	07/15/19 16:55	10
Beryllium	0.72		0.31	0.0092	mg/Kg	☼	06/11/19 08:00	07/15/19 15:40	1
Cobalt	5.8	J	6.1	0.37	mg/Kg	☼	06/11/19 08:00	07/15/19 19:34	2
Iron	11000		6.1	5.0	mg/Kg	☼	06/11/19 08:00	07/15/19 15:40	1
Lithium	9.4		3.1	0.18	mg/Kg	☼	06/11/19 08:00	07/15/19 15:40	1
Manganese	140		0.92	0.064	mg/Kg	☼	06/11/19 08:00	07/15/19 15:40	1
Molybdenum	0.29	J	2.4	0.10	mg/Kg	☼	06/11/19 08:00	07/15/19 15:40	1
Selenium	ND		0.61	0.21	mg/Kg	☼	06/11/19 08:00	07/15/19 15:40	1
Thallium	ND		4.3	0.44	mg/Kg	☼	06/11/19 08:00	07/15/19 19:34	2

Method: 7470A - SEP Mercury (CVAA) - Total

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.12	0.049	mg/Kg	☼	06/11/19 08:00	06/16/19 14:36	1

Default Detection Limits

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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

Eurofins TestAmerica, Knoxville

Default Detection Limits

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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

Eurofins TestAmerica, Knoxville

Default Detection Limits

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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
Phosphorus	30	2.4	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

Default Detection Limits

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Method: 7470A - SEP Mercury (CVAA) - Total
Prep: Total

Analyte	RL	MDL	Units
Hg	0.10	0.040	mg/Kg

LUMINANT

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

QC Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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
Phosphorus	ND		30	2.4	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
Phosphorus	500	497		mg/Kg		99	80 - 120

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

Eurofins TestAmerica, Knoxville

QC Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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
Molybdenum	25.0	26.6		mg/Kg		106	75 - 125
Selenium	7.50	7.55		mg/Kg		101	75 - 125
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

Eurofins TestAmerica, Knoxville

QC Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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
Barium	5.00	4.35	J	mg/Kg		87	75 - 125
Beryllium	2.50	2.58		mg/Kg		103	75 - 125
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

QC Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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	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

Eurofins TestAmerica, Knoxville

QC Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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	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

Eurofins TestAmerica, Knoxville

QC Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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	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

Eurofins TestAmerica, Knoxville

QC Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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	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

Eurofins TestAmerica, Knoxville

QC Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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	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

Eurofins TestAmerica, Knoxville

QC Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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

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

QC Sample Results

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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

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QC Association Summary

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Metals

Prep Batch: 30683

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15518-1	AMW24 (24-26)	Total/NA	Solid	Total	
140-15518-2	AMW25 (55-57)	Total/NA	Solid	Total	
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Total/NA	Solid	7470A	30683
140-15518-2	AMW25 (55-57)	Total/NA	Solid	7470A	30683
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Total/NA	Solid	7470A	30859
140-15518-2	AMW25 (55-57)	Total/NA	Solid	7470A	30859
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Total/NA	Solid	3050B	
140-15518-2	AMW25 (55-57)	Total/NA	Solid	3050B	
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Step 1	Solid	Exchangeable	
140-15518-2	AMW25 (55-57)	Step 1	Solid	Exchangeable	
140-15518-3	ADA-2019-1 (51-53)	Step 1	Solid	Exchangeable	
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
140-15518-1	AMW24 (24-26)	Step 1	Solid	3010A	31148
140-15518-2	AMW25 (55-57)	Step 1	Solid	3010A	31148
140-15518-3	ADA-2019-1 (51-53)	Step 1	Solid	3010A	31148
MB 140-31148/13-B ^4	Method Blank	Step 1	Solid	3010A	31148

Eurofins TestAmerica, Knoxville

QC Association Summary

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Metals (Continued)

Prep Batch: 31252 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
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
140-15518-1	AMW24 (24-26)	Step 2	Solid	Carbonate	
140-15518-2	AMW25 (55-57)	Step 2	Solid	Carbonate	
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Step 2	Solid	3010A	31253
140-15518-2	AMW25 (55-57)	Step 2	Solid	3010A	31253
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Step 3	Solid	Non-Crystalline	
140-15518-2	AMW25 (55-57)	Step 3	Solid	Non-Crystalline	
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Step 3	Solid	3010A	31257
140-15518-2	AMW25 (55-57)	Step 3	Solid	3010A	31257
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Step 4	Solid	Metal Hydroxide	
140-15518-2	AMW25 (55-57)	Step 4	Solid	Metal Hydroxide	
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Step 4	Solid	3010A	31341

QC Association Summary

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Metals (Continued)

Prep Batch: 31360 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15518-2	AMW25 (55-57)	Step 4	Solid	3010A	31341
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Step 5	Solid	Organic-Bound	
140-15518-2	AMW25 (55-57)	Step 5	Solid	Organic-Bound	
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Step 5	Solid	3010A	31436
140-15518-2	AMW25 (55-57)	Step 5	Solid	3010A	31436
140-15518-3	ADA-2019-1 (51-53)	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

SEP Batch: 31502

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15518-1	AMW24 (24-26)	Step 6	Solid	Acid/Sulfide	
140-15518-2	AMW25 (55-57)	Step 6	Solid	Acid/Sulfide	
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Total/NA	Solid	6010B	31128
140-15518-2	AMW25 (55-57)	Total/NA	Solid	6010B	31128
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Step 1	Solid	6010B SEP	31252
140-15518-1	AMW24 (24-26)	Step 2	Solid	6010B SEP	31256
140-15518-1	AMW24 (24-26)	Step 3	Solid	6010B SEP	31338
140-15518-1	AMW24 (24-26)	Step 4	Solid	6010B SEP	31360
140-15518-2	AMW25 (55-57)	Step 1	Solid	6010B SEP	31252
140-15518-2	AMW25 (55-57)	Step 2	Solid	6010B SEP	31256
140-15518-2	AMW25 (55-57)	Step 3	Solid	6010B SEP	31338
140-15518-2	AMW25 (55-57)	Step 4	Solid	6010B SEP	31360

Eurofins TestAmerica, Knoxville

QC Association Summary

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Metals (Continued)

Analysis Batch: 31604 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15518-3	ADA-2019-1 (51-53)	Step 1	Solid	6010B SEP	31252
140-15518-3	ADA-2019-1 (51-53)	Step 2	Solid	6010B SEP	31256
140-15518-3	ADA-2019-1 (51-53)	Step 3	Solid	6010B SEP	31338
140-15518-3	ADA-2019-1 (51-53)	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
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
140-15518-1	AMW24 (24-26)	Step 7	Solid	Residual	
140-15518-2	AMW25 (55-57)	Step 7	Solid	Residual	
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Step 5	Solid	6010B SEP	31500
140-15518-1	AMW24 (24-26)	Step 6	Solid	6010B SEP	31502
140-15518-2	AMW25 (55-57)	Step 5	Solid	6010B SEP	31500
140-15518-2	AMW25 (55-57)	Step 6	Solid	6010B SEP	31502
140-15518-3	ADA-2019-1 (51-53)	Step 5	Solid	6010B SEP	31500
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Step 7	Solid	6010B SEP	31615
140-15518-1	AMW24 (24-26)	Step 7	Solid	6010B SEP	31615
140-15518-1	AMW24 (24-26)	Step 7	Solid	6010B SEP	31615
140-15518-1	AMW24 (24-26)	Total/NA	Solid	6010B	30683
140-15518-1	AMW24 (24-26)	Total/NA	Solid	6010B	30683
140-15518-1	AMW24 (24-26)	Total/NA	Solid	6010B	30683
140-15518-2	AMW25 (55-57)	Step 7	Solid	6010B SEP	31615
140-15518-2	AMW25 (55-57)	Step 7	Solid	6010B SEP	31615

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QC Association Summary

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Metals (Continued)

Analysis Batch: 31713 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15518-2	AMW25 (55-57)	Step 7	Solid	6010B SEP	31615
140-15518-2	AMW25 (55-57)	Total/NA	Solid	6010B	30683
140-15518-2	AMW25 (55-57)	Total/NA	Solid	6010B	30683
140-15518-3	ADA-2019-1 (51-53)	Step 7	Solid	6010B SEP	31615
140-15518-3	ADA-2019-1 (51-53)	Step 7	Solid	6010B SEP	31615
140-15518-3	ADA-2019-1 (51-53)	Step 7	Solid	6010B SEP	31615
140-15518-3	ADA-2019-1 (51-53)	Total/NA	Solid	6010B	30683
140-15518-3	ADA-2019-1 (51-53)	Total/NA	Solid	6010B	30683
140-15518-3	ADA-2019-1 (51-53)	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
140-15518-1	AMW24 (24-26)	Sum of Steps 1-7	Solid	6010B SEP	
140-15518-2	AMW25 (55-57)	Sum of Steps 1-7	Solid	6010B SEP	
140-15518-3	ADA-2019-1 (51-53)	Sum of Steps 1-7	Solid	6010B SEP	

General Chemistry

Analysis Batch: 30901

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-15518-1	AMW24 (24-26)	Total/NA	Solid	Moisture	
140-15518-2	AMW25 (55-57)	Total/NA	Solid	Moisture	
140-15518-3	ADA-2019-1 (51-53)	Total/NA	Solid	Moisture	

Lab Chronicle

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: AMW24 (24-26)

Lab Sample ID: 140-15518-1

Date Collected: 06/04/19 14:15

Matrix: Solid

Date Received: 06/07/19 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			31744	07/16/19 17:31	CLJ	TAL KNX
		Instrument ID: NOEQUIP								
Total/NA	Analysis	Moisture		1			30901	06/17/19 18:17	KW1	TAL KNX
		Instrument ID: W3								

Client Sample ID: AMW24 (24-26)

Lab Sample ID: 140-15518-1

Date Collected: 06/04/19 14:15

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 83.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.534 g	50 mL	31128	06/26/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31553	07/10/19 13:23	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 15:29	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 16:45	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 19:29	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 13:50	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 15:19	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 17:08	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 18:50	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 12:58	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 14:26	KNC	TAL KNX
		Instrument ID: DUO								

Eurofins TestAmerica, Knoxville

Lab Chronicle

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: AMW24 (24-26)

Lab Sample ID: 140-15518-1

Date Collected: 06/04/19 14:15

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 83.3

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 12:43	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 14:09	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 18:13	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 14:31	DKW	TAL KNX
Instrument ID: HG										

Client Sample ID: AMW25 (55-57)

Lab Sample ID: 140-15518-2

Date Collected: 06/04/19 16:35

Matrix: Solid

Date Received: 06/07/19 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			31744	07/16/19 17:31	CLJ	TAL KNX
Instrument ID: NOEQUIP										
Total/NA	Analysis	Moisture		1			30901	06/17/19 18:17	KW1	TAL KNX
Instrument ID: W3										

Client Sample ID: AMW25 (55-57)

Lab Sample ID: 140-15518-2

Date Collected: 06/04/19 16:35

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 81.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.546 g	50 mL	31128	06/26/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31553	07/10/19 13:44	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 15:34	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 16:50	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 13:55	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 15:40	KNC	TAL KNX
Instrument ID: DUO										

Eurofins TestAmerica, Knoxville

Lab Chronicle

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: AMW25 (55-57)

Lab Sample ID: 140-15518-2

Date Collected: 06/04/19 16:35

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 81.5

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 17:14	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 18:55	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 13:03	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 14:46	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 12:48	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 14:14	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 18:18	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	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 14:34	DKW	TAL KNX
Instrument ID: HG										

Client Sample ID: ADA-2019-1 (51-53)

Lab Sample ID: 140-15518-3

Date Collected: 06/05/19 10:45

Matrix: Solid

Date Received: 06/07/19 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			31744	07/16/19 17:33	CLJ	TAL KNX
Instrument ID: NOEQUIP										
Total/NA	Analysis	Moisture		1			30901	06/17/19 18:17	KW1	TAL KNX
Instrument ID: W3										

Lab Chronicle

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: ADA-2019-1 (51-53)

Lab Sample ID: 140-15518-3

Date Collected: 06/05/19 10:45

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 81.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.529 g	50 mL	31128	06/26/19 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			31553	07/10/19 13:49	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 15:40	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		10			31713	07/15/19 16:55	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 19:34	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 14:00	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 15:45	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 17:19	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 19:00	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 13:09	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 14:52	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 13:03	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 14:19	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 18:23	KNC	TAL KNX
Instrument ID: DUO										

Lab Chronicle

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: ADA-2019-1 (51-53)

Lab Sample ID: 140-15518-3

Date Collected: 06/05/19 10:45

Matrix: Solid

Date Received: 06/07/19 10:00

Percent Solids: 81.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	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 14:36	DKW	TAL KNX
Instrument ID: HG										

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										

Lab Chronicle

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

Client Sample ID: Method Blank

Date Collected: N/A

Date Received: N/A

Lab Sample ID: MB 140-31253/13-B ^3

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.000 g	25 mL	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										

Client Sample ID: Method Blank

Date Collected: N/A

Date Received: N/A

Lab Sample ID: MB 140-31257/13-B

Matrix: Solid

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

Date Collected: N/A

Date Received: N/A

Lab Sample ID: MB 140-31341/13-B

Matrix: Solid

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

Date Collected: N/A

Date Received: N/A

Lab Sample ID: MB 140-31436/13-B ^5

Matrix: Solid

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

Date Collected: N/A

Date Received: N/A

Lab Sample ID: MB 140-31502/13-A

Matrix: Solid

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										

Lab Chronicle

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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										

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										

Lab Chronicle

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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										

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										

Lab Chronicle

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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										

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										

Lab Chronicle

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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										

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

Eurofins TestAmerica, Knoxville

Method Summary

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - SEP & Totals

Job ID: 140-15518-1

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

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Sample Summary

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - SEP & Totals

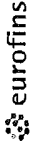
Job ID: 140-15518-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-15518-1	AMW24 (24-26)	Solid	06/04/19 14:15	06/07/19 10:00	
140-15518-2	AMW25 (55-57)	Solid	06/04/19 16:35	06/07/19 10:00	
140-15518-3	ADA-2019-1 (51-53)	Solid	06/05/19 10:45	06/07/19 10:00	

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Chain of Custody Record



Client Information		Lab PM: Walker Wasmund, Terry		Carrier Tracking No(s):		COC No: 140-6681-2227.1				
Client Contact: Will Vienne		E-Mail: terry.wasmund@testamericainc.com		Page: Page 1 of 1		Job #:				
Company: Golder Associates Inc.		Address: 2201 Double Creek Dr Suite 4004		City: Round Rock		State, Zip: TX, 78664				
Phone: 512-671-3434(Tel)		PO #: 19122434-A		WO #: 19122434-A		Project #: 14005264				
Email: William_Vienne@golder.com		SSOW#: Big Brown SES		Project Name: Big Brown Disposal Area 1 - SEP & Totals		Site: Big Brown SES				
Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (Water, Solid, Overstuffed, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Performance/SPD (Yes or No)	6010B - Total B, Cr, Pb, P	6010B - SEP - 7-Step SEP (12 Metals)	Total Number of Containers	Special Instructions/Note:
Amw 24 (24-26)	6-4-19	1415	G	S	X	X	X	X		
Amw 25 (55-57)	6-4-19	1635	G	S	X	X	X	X		
ADA-2019-1(51-53)	6-5-19	1045	G	S	X	X	X	X		
										AT CT
										REC @ 0.5c 0.5c
										CUSTODY SEAL INTACT
										1 COOLER RN 6-7-19
										Fed Ex# 787731855096
<p>Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological</p> <p>Deliverable Requested: I, II, III, IV, Other (specify)</p> <p>Empty Kit Relinquished by: _____ Date: _____</p> <p>Relinquished by: <i>Will Vienne</i> Date/Time: 6-6-19 1816 Company: _____</p> <p>Relinquished by: _____ Date/Time: _____ Company: _____</p> <p>Relinquished by: _____ Date/Time: _____ Company: _____</p> <p>Custody Seals Intact: _____ Custody Seal No.: _____ Δ Yes Δ No</p>										
<p>Analysis Requested</p> <p>140-15518 Chain of Custody</p> <p>Preservation Codes: 1 - HCL M - Hexane 2 - NaOH N - None 3 - Zn Acetate O - AsNaO2 4 - Nitric Acid P - Na2O4S 5 - NaHSO4 Q - Na2SO3 6 - MeOH R - Na2S2O3 7 - Amchlor S - H2SO4 8 - Ascorbic Acid T - TSP Dodecahydrate 9 - Ice U - Acetone 10 - DI Water V - MCAA 11 - EDTA W - pH 4-5 12 - EDA X - Other (Specify) Other: _____</p> <p>Special Instructions/Note:</p>										
<p>Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months</p> <p>Special Instructions/QC Requirements:</p> <p>Received by: <i>Ryan Henry</i> Date/Time: 6/7/19 1000 Company: TA/CAUX</p> <p>Received by: _____ Date/Time: _____ Company: _____</p> <p>Received by: _____ Date/Time: _____ Company: _____</p> <p>Cooler Temperature(s) °C and Other Remarks:</p>										



TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Are the shipping containers intact?	✓			<input type="checkbox"/> Containers, Broken	
2. Were ambient air containers received intact?			✓	<input type="checkbox"/> Checked in lab	
3. The coolers/containers custody seal if present, is it intact?	✓			<input type="checkbox"/> Yes <input type="checkbox"/> NA	
4. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C) Thermometer ID : <u>5C68</u> Correction factor: <u>0</u>	✓			<input type="checkbox"/> Cooler Out of Temp, Client Contacted, Proceed/Cancel <input type="checkbox"/> Cooler Out of Temp, Same Day Receipt	
5. Were all of the sample containers received intact?	✓			<input type="checkbox"/> Containers, Broken	
6. Were samples received in appropriate containers?	✓			<input type="checkbox"/> Containers, Improper; Client Contacted; Proceed/Cancel	
7. Do sample container labels match COC? (IDs, Dates, Times)	✓			<input type="checkbox"/> COC & Samples Do Not Match <input type="checkbox"/> COC Incorrect/Incomplete <input type="checkbox"/> COC Not Received	
8. Were all of the samples listed on the COC received?	✓			<input type="checkbox"/> Sample Received, Not on COC <input type="checkbox"/> Sample on COC, Not Received	
9. Is the date/time of sample collection noted?	✓			<input type="checkbox"/> COC; No Date/Time; Client Contacted	Labeling Verified by: _____ Date: _____
10. Was the sampler identified on the COC?	✓			<input type="checkbox"/> Sampler Not Listed on COC	pH test strip lot number: _____
11. Is the client and project name/# identified?	✓			<input type="checkbox"/> COC Incorrect/Incomplete	
12. Are tests/parameters listed for each sample?	✓			<input type="checkbox"/> COC No tests on COC	
13. Is the matrix of the samples noted?	✓			<input type="checkbox"/> COC Incorrect/Incomplete	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			<input type="checkbox"/> COC Incorrect/Incomplete	Box 16A: pH Preservation Box 18A: Residual Chlorine
15. Were samples received within holding time?	✓			<input type="checkbox"/> Holding Time - Receipt	Preservative: _____
16. Were samples received with correct chemical preservative (excluding Encore)?			✓	<input type="checkbox"/> pH Adjusted, pH Included (See box 16A) <input type="checkbox"/> Incorrect Preservative	Lot Number: _____ Exp Date: _____ Analyst: _____
17. Were VOA samples received without headspace?			✓	<input type="checkbox"/> Headspace (VOA only)	Date: _____ Time: _____
18. Did you check for residual chlorine, if necessary? (e.g. 1613B, 1668)			✓	<input type="checkbox"/> Residual Chlorine	
19. For 1613B water samples is pH<9? Chlorine test strip lot number:			✓		
20. For rad samples was sample activity info. Provided?			✓	<input type="checkbox"/> If no, notify lab to adjust <input type="checkbox"/> Project missing info	
Project #: _____				PM Instructions: _____	

Sample Receiving Associate: Ryan Henry Date: 6/7/19



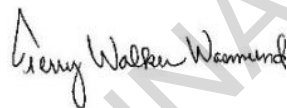
ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-34488-1
Client Project/Site: Big Brown Disposal Area I - RAD

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

Attn: Will Vienne



Authorized for release by:
8/27/2019 9:46:12 AM

Terry Walker Wasmund, Project Manager II
(865)291-3000
terry.wasmund@testamericainc.com

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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.



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LUMINANT

Case Narrative

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Job ID: 160-34488-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

Job Narrative 160-34488-1

Receipt

The samples were received on 6/7/2019 at 9:40 AM. The samples arrived in good condition, properly preserved, and on ice. The temperature of the cooler at receipt was 2.7° C.

RAD

Method DPS STD Radium 226 Prep Batch 160-431736

The sample results for AMW24(24-26) (160-34488-1), AMW25(55-57) (160-34488-2), ADA-2019-1(51-53) (160-34488-3) and (160-34488-A-1 DU) are based upon sample as received (i.e. wet weight).

Samples AMW24(24-26) (160-34488-1), AMW25(55-57) (160-34488-2), ADA-2019-1(51-53) (160-34488-3) and (160-34488-A-1 DU) could not be thoroughly homogenized before sub-sampling was performed due to sample matrix. The samples contained large amounts of sand.

Method DPS-0

The sample results for AMW24(24-26) (160-34488-1), AMW25(55-57) (160-34488-2), ADA-2019-1(51-53) (160-34488-3) and (160-34488-A-1 DU) are based upon sample as received (i.e. wet weight).

Samples AMW24(24-26) (160-34488-1), AMW25(55-57) (160-34488-2), ADA-2019-1(51-53) (160-34488-3) and (160-34488-A-1 DU) could not be thoroughly homogenized before sub-sampling was performed due to sample matrix. The samples contained large amounts of sand.

Method 9315: Ra-226 Prep Batch 160-431736

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results for samples AMW24(24-26) (160-34488-1), AMW25(55-57) (160-34488-2), ADA-2019-1(51-53) (160-34488-3), (LCS 160-431736/1-A), (MB 160-431736/6-A) and (160-34488-A-1-E DU) are reported with the count date/time applied as the Activity Reference Date.

Method 9320: Ra-228 Prep Batch 160-431744

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results for samples AMW24(24-26) (160-34488-1), AMW25(55-57) (160-34488-2), ADA-2019-1(51-53) (160-34488-3), (LCS 160-431744/1-A), (MB 160-431744/6-A) and (160-34488-A-1-G DU) are reported with the count date/time applied as the Activity Reference Date.

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

Metals

The sample duplicate (DUP) precision for preparation batch 160-439630 and analytical batch 160-439852 was outside control limits for Barium. Sample matrix interference is suspected for sample (460-181756-E-7-B DU).

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

General Chemistry

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

Comments

No additional comments.

Chain of Custody Record

Client Information		Sampler: Jacob Jarvis		Lab PM: Walker Wasmund, Terry		COC No: 140-6679-2225.1	
Client Contact: Will Vienne		Phone: 361-877-5533		E-Mail: terry.wasmund@testamericainc.com		Page: 1 of 1	
Company: Golder Associates Inc.		Address: 2201 Double Creek Dr Suite 4004		City: Round Rock		Carner Tracking No(s):	
State, Zip: TX, 78664		PO #: 19122434-A		TAT Requested (days):		Job #:	
Phone: 512-671-3434(Tel)		WO #: 19122434-A		Project #: 14005264		Preservation Codes:	
Email: William_Vienne@golder.com		Project Name: Big Brown SES		Site: Big Brown SES		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 Other:	
Site: Big Brown SES		Due Date Requested:		Field Filtered Sample (Yes or No)		Special Instructions/Note:	
Sample Identification		Sample Date		Sample Time		Sample Type (C=Comp, G=grab)	
AMW24 (24-26)		6-4-19		1415		G S	
AMW25 (SS-S7)		6-4-19		1635		G S	
ADA-2019-1(S1-S3)		6-5-19		1045		G S	
Perform MS/MSD (Yes or No)		9315, Ra226, 9320, Ra228 - Radium-228		60208 - Total Uranium		Total Number of containers	
Field Filtered Sample (Yes or No)		N		Y		Y	
Matrix (W=Water, S=solid, O=wastewater, BT=Blood, Ar=Air)		S		S		S	
Preservation Code:		G		G		G	
Possible Hazard Identification		<input type="checkbox"/> Non-Hazard		<input type="checkbox"/> Flammable		<input type="checkbox"/> Skin Irritant	
Deliverable Requested: I, II, III, IV, Other (specify)		<input type="checkbox"/> Poison B		<input type="checkbox"/> Unknown		<input type="checkbox"/> Radiological	
Empty Kit Relinquished by:		Date:		Time:		Method of Shipment:	
Relinquished by: <i>Jacob Jarvis</i>		6-10-19		1816		Received by: <i>Wasmund Terry</i>	
Relinquished by:		Date/Time:		Date/Time:		Date/Time:	
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Company: Company		Company: Company	
Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)		<input type="checkbox"/> Return To Client		<input type="checkbox"/> Disposal By Lab		<input type="checkbox"/> Archive For _____ Months	
Special Instructions/QC Requirements:		160-34488 Chain of Custody		Barcode		Barcode	



Login Sample Receipt Checklist

Client: Golder Associates Inc.

Job Number: 160-34488-1

Login Number: 34488

List Source: Eurofins TestAmerica, St. Louis

List Number: 1

Creator: Press, Nicholas B

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Definitions/Glossary

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	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)

Method Summary

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Method	Method Description	Protocol	Laboratory
6020B	Metals (ICP/MS)	SW846	TAL SL
Moisture	Percent Moisture	EPA	TAL SL
9315	Radium-226 (GFPC)	SW846	TAL SL
9320	Radium-228 (GFPC)	SW846	TAL SL
3050B	Preparation, Metals	SW846	TAL SL
DPS STD	Preparation, Digestion/Precipitate Separation (Standard)	None	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL

Protocol References:

EPA = US Environmental Protection Agency

None = None

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

LUMINANT

Sample Summary

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-34488-1	AMW24(24-26)	Solid	06/04/19 14:15	06/07/19 09:40	
160-34488-2	AMW25(55-57)	Solid	06/04/19 16:35	06/07/19 09:40	
160-34488-3	ADA-2019-1(51-53)	Solid	06/05/19 10:45	06/07/19 09:40	

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Detection Summary

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Client Sample ID: AMW24(24-26)

Lab Sample ID: 160-34488-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Uranium	0.36		0.11	0.044	mg/Kg	2	☼	6020B	Total/NA

Client Sample ID: AMW25(55-57)

Lab Sample ID: 160-34488-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Uranium	0.48		0.11	0.045	mg/Kg	2	☼	6020B	Total/NA

Client Sample ID: ADA-2019-1(51-53)

Lab Sample ID: 160-34488-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Uranium	0.46		0.12	0.048	mg/Kg	2	☼	6020B	Total/NA

LUMINANT

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Client Sample ID: AMW24(24-26)

Lab Sample ID: 160-34488-1

Date Collected: 06/04/19 14:15

Matrix: Solid

Date Received: 06/07/19 09:40

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.210	U	0.200	0.201	1.00	0.311	pCi/g	06/14/19 09:52	08/22/19 07:17	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	85.8		40 - 110					06/14/19 09:52	08/22/19 07:17	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.527		0.273	0.278	1.00	0.404	pCi/g	06/14/19 10:26	08/21/19 13:53	1

LUMINANT

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Client Sample Results

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Client Sample ID: AMW24(24-26)

Lab Sample ID: 160-34488-1

Date Collected: 06/04/19 14:15

Matrix: Solid

Date Received: 06/07/19 09:40

Percent Solids: 77.4

Method: 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Uranium	0.36		0.11	0.044	mg/Kg	☼	06/11/19 12:42	06/17/19 18:42	2

LUMINANT

Client Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Client Sample ID: AMW25(55-57)

Lab Sample ID: 160-34488-2

Date Collected: 06/04/19 16:35

Matrix: Solid

Date Received: 06/07/19 09:40

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.146	U	0.198	0.198	1.00	0.332	pCi/g	06/14/19 09:52	08/22/19 07:18	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	85.2		40 - 110					06/14/19 09:52	08/22/19 07:18	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.15		0.360	0.375	1.00	0.490	pCi/g	06/14/19 10:26	08/21/19 13:54	1

LUMINANT

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Client Sample Results

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Client Sample ID: AMW25(55-57)

Lab Sample ID: 160-34488-2

Date Collected: 06/04/19 16:35

Matrix: Solid

Date Received: 06/07/19 09:40

Percent Solids: 79.2

Method: 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Uranium	0.48		0.11	0.045	mg/Kg	☼	06/11/19 12:42	06/17/19 19:03	2

LUMINANT

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Client Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Client Sample ID: ADA-2019-1(51-53)

Lab Sample ID: 160-34488-3

Date Collected: 06/05/19 10:45

Matrix: Solid

Date Received: 06/07/19 09:40

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0847	U	0.208	0.208	1.00	0.374	pCi/g	06/14/19 09:52	08/22/19 07:18	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	88.6		40 - 110					06/14/19 09:52	08/22/19 07:18	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.306	U	0.257	0.259	1.00	0.411	pCi/g	06/14/19 10:26	08/21/19 13:54	1

LUMINANT

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Client Sample Results

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Client Sample ID: ADA-2019-1(51-53)

Lab Sample ID: 160-34488-3

Date Collected: 06/05/19 10:45

Matrix: Solid

Date Received: 06/07/19 09:40

Percent Solids: 79.4

Method: 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Uranium	0.46		0.12	0.048	mg/Kg	☼	06/11/19 12:42	06/17/19 19:07	2

LUMINANT

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QC Sample Results

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 160-431361/1-A
Matrix: Solid
Analysis Batch: 431928

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 431361

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Uranium	ND		0.094	0.038	mg/Kg		06/11/19 12:42	06/17/19 18:20	2

Lab Sample ID: LCS 160-431361/2-A
Matrix: Solid
Analysis Batch: 431928

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 431361

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Uranium	93.5	89.8		mg/Kg		96	80 - 120

Lab Sample ID: 160-34488-1 MS
Matrix: Solid
Analysis Batch: 431928

Client Sample ID: AMW24(24-26)
Prep Type: Total/NA
Prep Batch: 431361

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Uranium	0.36		114	110		mg/Kg	☼	97	75 - 125

Lab Sample ID: 160-34488-1 MSD
Matrix: Solid
Analysis Batch: 431928

Client Sample ID: AMW24(24-26)
Prep Type: Total/NA
Prep Batch: 431361

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Uranium	0.36		121	119		mg/Kg	☼	98	75 - 125	7	30

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-431736/6-A
Matrix: Solid
Analysis Batch: 440198

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 431736

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.06192	U	0.169	0.169	1.00	0.358	pCi/g	06/14/19 09:52	08/22/19 07:19	1

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	89.8		40 - 110	06/14/19 09:52	08/22/19 07:19	1

Lab Sample ID: LCS 160-431736/1-A
Matrix: Solid
Analysis Batch: 440197

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 431736

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	Limits
Radium-226	11.4	10.18		1.30	1.00	0.344	pCi/g	90	75 - 125

Carrier	LCS %Yield	LCS Qualifier	Limits
Ba Carrier	80.8		40 - 110

QC Sample Results

Client: Golder Associates Inc.
 Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Method: 9315 - Radium-226 (GFPC) (Continued)

Lab Sample ID: 160-34488-1 DU
Matrix: Solid
Analysis Batch: 440197

Client Sample ID: AMW24(24-26)
Prep Type: Total/NA
Prep Batch: 431736

Analyte	Sample		DU		Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
	Result	Qual	Result	Qual						
Radium-226	0.210	U	0.2782	U	0.206	1.00	0.300	pCi/g	0.17	1
DU DU										
Carrier	%Yield	Qualifier	Limits							
Ba Carrier	94.6		40 - 110							

Method: 9320 - Radium-228 (GFPC)

Lab Sample ID: MB 160-431744/6-A
Matrix: Solid
Analysis Batch: 440167

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 431744

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Radium-228	0.1168	U	0.269	0.269	1.00	0.460	pCi/g	06/14/19 10:26	08/21/19 13:54	1

Lab Sample ID: LCS 160-431744/1-A
Matrix: Solid
Analysis Batch: 440167

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 431744

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	
										Radium-228
LCS LCS										
Carrier	%Yield	Qualifier	Limits							
Ba Carrier	80.8		40 - 110							
Y Carrier	84.9		40 - 110							

Lab Sample ID: 160-34488-1 DU
Matrix: Solid
Analysis Batch: 440167

Client Sample ID: AMW24(24-26)
Prep Type: Total/NA
Prep Batch: 431744

Analyte	Sample		DU		Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
	Result	Qual	Result	Qual						
Radium-228	0.527		0.8526		0.306	1.00	0.394	pCi/g	0.56	1

QC Association Summary

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Metals

Prep Batch: 431361

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-34488-1	AMW24(24-26)	Total/NA	Solid	3050B	
160-34488-2	AMW25(55-57)	Total/NA	Solid	3050B	
160-34488-3	ADA-2019-1(51-53)	Total/NA	Solid	3050B	
MB 160-431361/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 160-431361/2-A	Lab Control Sample	Total/NA	Solid	3050B	
160-34488-1 MS	AMW24(24-26)	Total/NA	Solid	3050B	
160-34488-1 MSD	AMW24(24-26)	Total/NA	Solid	3050B	

Analysis Batch: 431928

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-34488-1	AMW24(24-26)	Total/NA	Solid	6020B	431361
160-34488-2	AMW25(55-57)	Total/NA	Solid	6020B	431361
160-34488-3	ADA-2019-1(51-53)	Total/NA	Solid	6020B	431361
MB 160-431361/1-A	Method Blank	Total/NA	Solid	6020B	431361
LCS 160-431361/2-A	Lab Control Sample	Total/NA	Solid	6020B	431361
160-34488-1 MS	AMW24(24-26)	Total/NA	Solid	6020B	431361
160-34488-1 MSD	AMW24(24-26)	Total/NA	Solid	6020B	431361

General Chemistry

Analysis Batch: 431210

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-34488-1	AMW24(24-26)	Total/NA	Solid	Moisture	
160-34488-2	AMW25(55-57)	Total/NA	Solid	Moisture	
160-34488-3	ADA-2019-1(51-53)	Total/NA	Solid	Moisture	
160-34488-1 DU	AMW24(24-26)	Total/NA	Solid	Moisture	

Analysis Batch: 439538

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-34488-1	AMW24(24-26)	Total/NA	Solid	Moisture	
160-34488-2	AMW25(55-57)	Total/NA	Solid	Moisture	
160-34488-3	ADA-2019-1(51-53)	Total/NA	Solid	Moisture	

Rad

Prep Batch: 431736

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-34488-1	AMW24(24-26)	Total/NA	Solid	DPS STD	
160-34488-2	AMW25(55-57)	Total/NA	Solid	DPS STD	
160-34488-3	ADA-2019-1(51-53)	Total/NA	Solid	DPS STD	
MB 160-431736/6-A	Method Blank	Total/NA	Solid	DPS STD	
LCS 160-431736/1-A	Lab Control Sample	Total/NA	Solid	DPS STD	
160-34488-1 DU	AMW24(24-26)	Total/NA	Solid	DPS STD	

Prep Batch: 431744

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-34488-1	AMW24(24-26)	Total/NA	Solid	DPS-0	
160-34488-2	AMW25(55-57)	Total/NA	Solid	DPS-0	
160-34488-3	ADA-2019-1(51-53)	Total/NA	Solid	DPS-0	
MB 160-431744/6-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-431744/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	
160-34488-1 DU	AMW24(24-26)	Total/NA	Solid	DPS-0	

Eurofins TestAmerica, St. Louis

Tracer/Carrier Summary

Client: Golder Associates Inc.
Project/Site: Big Brown Disposal Area I - RAD

Job ID: 160-34488-1

Method: 9315 - Radium-226 (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba Carrier (40-110)
160-34488-1	AMW24(24-26)	85.8
160-34488-1 DU	AMW24(24-26)	94.6
160-34488-2	AMW25(55-57)	85.2
160-34488-3	ADA-2019-1(51-53)	88.6
LCS 160-431736/1-A	Lab Control Sample	80.8
MB 160-431736/6-A	Method Blank	89.8

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Method: 9320 - Radium-228 (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba Carrier (40-110)	Y Carrier (40-110)
160-34488-1 DU	AMW24(24-26)	94.6	79.3
LCS 160-431744/1-A	Lab Control Sample	80.8	84.9
MB 160-431744/6-A	Method Blank	89.8	84.5

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Y Carrier = Y Carrier

APPENDIX C

**GROUNDWATER SAMPLING
RECORDS**

LUMINANT

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222 62-A Project Name: LUMINANT - RBSES Date: 5-6-19

Sample Number: <u>AMW-10</u>	Starting Water Level (ft. BMP): <u>37.52</u>
Sampling Location (well ID, etc.): <u>AMW-10</u>	Casing Stickup (ft.): <u>-</u>
Sampled by: <u>MB</u>	Starting Water Level (ft. BGL): <u>37.52</u>
Measuring Point (MP) of Well: <u>TOC/PVC</u>	Total Depth (ft. BGL): <u>-</u>
Screened Interval (ft. BGL): <u>-</u>	Casing Diameter (In ID): <u>2.0</u>
Filter Pack Interval (ft. BGL): <u>-</u>	Casing Volume (gal.): <u>-</u>

QUALITY ASSURANCE

METHODS (describe): _____
 Cleaning Equipment: _____
 Purging: peristaltic / bladder Sampling: QMS
 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. (°C)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
1241	-	2	21.2	6.63	2060	1.34	-18	8.6	37.79
1247		↓	21.4	6.67	2070	1.17	-16	9.7	37.81
1252		↓	21.5	6.67	2070	1.16	-16	9.1	37.81

Water Level (ft. BMP) at End of Purge: _____ Sample Intake Depth (ft. BMP): _____

SAMPLE INVENTORY

Time	Bottles Collected			Filtration (Y/N)	Preservation	Remarks (quality control sample, other)
	Volume	Composition (G, P)	No.			
1300	250ML	P	1	N	-	GEN CHEM
1300	500ML	P	1	N	HNO3	METALS
1300	1L	P	2	N	HNO3	-
1300	40ml	G	3	N	HNO3	-

Comments: _____

Pastor, Behling & Wheeler, LLC
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 Round Rock, TX 78664
 (512) 671-3434 Fax (512) 671-3446

GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222 62-A Project Name: LUMINAUT - BBSES Date: 5-6-19

Sample Number: AMW-13 Starting Water Level (ft. BMP): 34.82

Sampling Location (well ID, etc.): AMW-13 Casing Stickup (ft.): -

Sampled by: JTB Starting Water Level (ft. BGL): 34.82

Measuring Point (MP) of Well: TOC/IVC 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: _____

Purging: peristaltic / bladder Sampling: QAMP

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. (°C)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
0717	-	2	21.1	6.74	2126	0.79	-31	16	35.17
0726	-	2	21.2	6.71	2130	0.56	-36	9.3	35.18
0731	-	2	21.2	6.72	2130	0.57	-37	9.1	35.18
0737	-	2							

Water Level (ft. BMP) at End of Purge: _____ Sample Intake Depth (ft. BMP): _____

SAMPLE INVENTORY

Time	Bottles Collected			Filtration (Y/N)	Preservation	Remarks (quality control sample, other)
	Volume	Composition (G, P)	No.			
0750	250ml	P	1	N	-	GEN CHEM
0750	500ml	P	1	N	HNO3	METALS
0750	1L	P	2	N	HNO3	-
0750	40ml	G	3	N	HNO3	-

Comments: _____

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GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: 191222 62-A Project Name: LUMINAUT - RBSES Date: 5-6-19

Sample Number: <u>AMW-14</u>	Starting Water Level (ft. BMP): <u>46.33</u>
Sampling Location (well ID, etc.): <u>AMW-14</u>	Casing Stickup (ft.): <u>-</u>
Sampled by: <u>JTB</u>	Starting Water Level (ft. BGL): <u>46.33</u>
Measuring Point (MP) of Well: <u>TOC/PVC</u>	Total Depth (ft. BGL): <u>-</u>
Screened Interval (ft. BGL): <u>-</u>	Casing Diameter (In ID): <u>2.0</u>
Filter Pack Interval (ft. BGL): <u>-</u>	Casing Volume (gal.): <u>-</u>

QUALITY ASSURANCE

METHODS (describe): _____
 Cleaning Equipment: _____
 Purging: peristaltic / bladder Sampling: QAME
 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

0823 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)
0832	-	.2	20.9	6.71	1790	1.06	-37	6.7	46.42
0837		↓	20.7	6.64	1770	0.81	-41	7.4	46.43
0844		↓	20.7	6.63	1760	0.82	-42	7.1	46.43

Water Level (ft. BMP) at End of Purge: _____ Sample Intake Depth (ft. BMP): _____

SAMPLE INVENTORY

Time	Bottles Collected			Filtration (Y/N)	Preservation	Remarks (quality control sample, other)
	Volume	Composition (G, P)	No.			
0855	250mL	P	1	N	-	GEN CHEM
	500mL	P	1	N	HNO3	METALS
	1L	P	2	N	HNO3	-
⊕	40mL	G	3	N	HNO3	-

Comments: _____

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GROUNDWATER SAMPLING RECORD

PAGE 1 of 1

Project Number: **19122262-A** Project Name: **LUMINANT-BBSES** Date: **6-10-19**
 Sampling Location (well ID, etc.): **AMW-15** Starting Water Level (ft. BMP): **44.16**
 Sample Number: **AMW-15** Casing Stickup (ft.): _____
 Sampled by: **JTB** WL (ft. BMP): **44.16** (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 **1 bladder** Sampling: Peristaltic Pump / SS Pump / Bailer **1 bladder**
 Disposal of Discharged Water: **ON SITE**

INSTRUMENTS (Indicate make, model, I.d.)
 Water Level: **KECK** Other: **-**
 Multi Meter: **HORIBA**
 Field Calibration: **AUTO CAL**
 Filter / Filter Size: **-**

SAMPLING MEASUREMENTS Begin Purge:


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
1117	44.32	-	.2	22.6	0.93	2260	6.63	-27	3.6	neutral
1121	44.31		↓	22.7	0.77	2290	6.67	-31	6.2	↓
1127	44.31		↓	22.6	0.78	2290	6.64	-32	5.6	↓

WL (ft. BMP) at End of Purge: _____ Sample Intake Depth (ft. BMP): _____

SAMPLE INVENTORY

Time	Bottles Collected			Filtration (Y / N)	Preservation (type)	Remarks (quality control sample, other)
	Volume	Composition (G, P)	No.			
1135	500ML	P	2	N		
1135	1L	P	3	N		
1135	250ML	P	1	N		

Comments: _____



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GROUNDWATER SAMPLING RECORD

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Project Number: 191222 62-A Project Name: LUMINAUT - RBSES Date: 5-6-19

Sample Number: <u>AMW-20</u>	Starting Water Level (ft. BMP): <u>46.11</u>
Sampling Location (well ID, etc.): <u>AMW-20</u>	Casing Stickup (ft.): <u>-</u>
Sampled by: <u>JTB</u>	Starting Water Level (ft. BGL): <u>46.11</u>
Measuring Point (MP) of Well: <u>TOC/PVC</u>	Total Depth (ft. BGL): <u>-</u>
Screened Interval (ft. BGL): <u>-</u>	Casing Diameter (In ID): <u>2.0</u>
Filter Pack Interval (ft. BGL): <u>-</u>	Casing Volume (gal.): <u>-</u>

QUALITY ASSURANCE

METHODS (describe): _____

Cleaning Equipment: _____

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 (°C)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
1126	-	.2	21.1	6.82	1920	0.91	-46	3.7	46.31
1132		↓	20.9	6.81	1960	0.62	-49	5.7	46.32
1138		↓	20.8	6.81	1970	0.63	-49	5.1	46.31

Water Level (ft. BMP) at End of Purge: _____ Sample Intake Depth (ft. BMP): _____

SAMPLE INVENTORY

Time	Bottles Collected			Filtration (Y/N)	Preservation	Remarks (quality control sample, other)
	Volume	Composition (G, P)	No.			
1145	250ML	P	1	N	-	GEN CHEM
1145	500ML	P	1	N	HNO3	METALS
1145	1L	P	2	N	HNO3	-
1145	400ML	G	3	N	HNO3	-

Comments: _____

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GROUNDWATER SAMPLING RECORD

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Project Number: 191222 62-A Project Name: LUMINANT - BBSES Date: 5-6-19

Sample Number: <u>AMW-21</u>	Starting Water Level (ft. BMP): <u>40.82</u>
Sampling Location (well ID, etc.): <u>AMW-21</u>	Casing Stickup (ft.): <u>-</u>
Sampled by: <u>JTB</u>	Starting Water Level (ft. BGL): <u>40.82</u>
Measuring Point (MP) of Well: <u>TOC/PC</u>	Total Depth (ft. BGL): <u>-</u>
Screened Interval (ft. BGL): <u>-</u>	Casing Diameter (In ID): <u>2.0</u>
Filter Pack Interval (ft. BGL): <u>-</u>	Casing Volume (gal.): <u>-</u>

QUALITY ASSURANCE

METHODS (describe): _____
 Cleaning Equipment: _____
 Purging: peristaltic / bladder Sampling: QMS
 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 (°C)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
1334	-	2	20.8	6.79	2160	0.91	-71	3.7	41.17
1348	-	1	20.7	6.77	2130	0.73	-76	6.1	41.16
1355	-	1	20.7	6.76	2140	0.74	-77	5.2	41.16

Water Level (ft. BMP) at End of Purge: _____ Sample Intake Depth (ft. BMP): _____

SAMPLE INVENTORY

Time	Bottles Collected			Filtration (Y/N)	Preservation	Remarks (quality control sample, other)
	Volume	Composition (G, P)	No.			
1405	250mL	P	1	N	-	GEN CHEM
1405	500mL	P	1	N	HNO3	METALS
1405	1L	P	2	N	HNO3	-
1405	40mL	G	3	N	HNO3	-

Comments: _____

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GROUNDWATER SAMPLING RECORD

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Project Number: 191222 62-A Project Name: LUMINAUT - RBSES Date: 5-6-19

Sample Number: AMW-22 Starting Water Level (ft. BMP): 42.03

Sampling Location (well ID, etc.): AMW-22 Casing Stickup (ft.): -

Sampled by: JTB Starting Water Level (ft. BGL): 42.03

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 water

Purging: peristaltic/bladder Sampling: QMS

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

101L 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)
1027	-	2	21.7	6.67	2310	1.31	-29	4.7	42.26
1032		1	21.4	6.64	2330	1.07	-27	6.1	42.28
1037		6	21.5	6.63	2340	1.06	-26	6.7	42.29

Water Level (ft. BMP) at End of Purge: _____ Sample Intake Depth (ft. BMP): _____

SAMPLE INVENTORY

Time	Bottles Collected			Filtration (Y/N)	Preservation	Remarks (quality control sample, other)
	Volume	Composition (G, P)	No.			
1045	250mL	P	1	N	-	GEN CHEM
1045	500mL	P	1	N	HNO3	METALS
1045	1L	P	2	N	HNO3	-
1045	40mL	G	3	N	HNO3	-

Comments:

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GROUNDWATER SAMPLING RECORD

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Project Number: 191222 62-A Project Name: LUMINAUT - RBSES Date: 5-6-19

Sample Number: AMW-23 Starting Water Level (ft. BMP): 41.09

Sampling Location (well ID, etc.): AMW-23 Casing Stickup (ft.): -

Sampled by: JTB Starting Water Level (ft. BGL): 41.09

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: _____

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

0921 Time	Cum. Vol. (gal. or L)	Purge Rate (gal. or L/m)	Temp (°C)	pH	Spec. Cond. (mmhos/cm)	D.O	Redox (mV)	Turbidity & Color	Water Depth (ft BMP)
0929	-	.2	21.6	6.81	2260	0.71	-21	13	41.32
0931		↓	21.1	6.82	2280	0.51	-27	6.2	41.33
0936		↓	21.2	6.79	2280	0.49	-27	7.1	41.32

Water Level (ft. BMP) at End of Purge: _____ Sample Intake Depth (ft. BMP): _____

SAMPLE INVENTORY

Time	Bottles Collected			Filtration (Y/N)	Preservation	Remarks (quality control sample, other)
	Volume	Composition (G, P)	No.			
0950	250ML	P	1	N	-	GEN CHEM
0950	600ML	P	1	N	HNO3	METALS
0950	1L	P	2	N	HNO3	-
0950	40ML	G	3	N	HNO3	-

Comments: _____

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GROUNDWATER SAMPLING RECORD PAGE 1 of 1

Project Number: 19122262-A Project Name: LUMINANT-BBSES Date: 6-10-19
 Sampling Location (well ID, etc.): Amw-24 Starting Water Level (ft. BMP): 28.89
 Sample Number: AMW-24 Casing Stickup (ft.): _____
 Sampled by: JTB WL (ft. BMP): 28.89 (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 Sampling: Peristaltic Pump SS Pump / Bailer
 Disposal of Discharged Water: ON SITE

INSTRUMENTS (Indicate make, model, I.d.)
 Water Level: KECK Other: -
 Multi Meter: HORIBA
 Field Calibration: AUTO CAL
 Filter / Filter Size: -

SAMPLING MEASUREMENTS Begin Purge:


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
<u>0841</u>										
<u>0851</u>	<u>29.17</u>	<u>-</u>	<u>.2</u>	<u>22.7</u>	<u>0.71</u>	<u>3160</u>	<u>6.72</u>	<u>-17</u>	<u>4.7</u>	<u>neutral</u>
<u>0854</u>	<u>29.18</u>		<u>↓</u>	<u>22.9</u>	<u>0.52</u>	<u>2070</u>	<u>6.77</u>	<u>-20</u>	<u>6.2</u>	<u>↓</u>
<u>0902</u>	<u>29.18</u>		<u>↓</u>	<u>22.9</u>	<u>0.53</u>	<u>2080</u>	<u>6.79</u>	<u>-19</u>	<u>6.1</u>	<u>↓</u>

WL (ft. BMP) at End of Purge: _____ Sample Intake Depth (ft. BMP): _____

SAMPLE INVENTORY

Time	Bottles Collected			Filtration (Y / N)	Preservation (type)	Remarks (quality control sample, other)
	Volume	Composition (G, P)	No.			
<u>0915</u>	<u>500ML</u>	<u>P</u>	<u>2</u>	<u>N</u>		
<u>0915</u>	<u>1L</u>	<u>P</u>	<u>3</u>	<u>N</u>		
<u>0915</u>	<u>250ML</u>	<u>P</u>	<u>1</u>	<u>N</u>		

Comments: _____

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GROUNDWATER SAMPLING RECORD PAGE 1 of 1

Project Number: 19122262-A Project Name: LUMINANT-BBSES Date: 6-10-19
 Sampling Location (well ID, etc.): AMW-25 Starting Water Level (ft. BMP): 33.83
 Sample Number: AMW-25 Casing Stickup (ft.): _____
 Sampled by: JTB WL (ft. BMP): 33.83 (ft. BGL): _____
 Measuring Point (MP) of Well (TOO) - 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 Sampling: Peristaltic Pump / SS Pump / Bailer / bladder
 Disposal of Discharged Water: ON SITE

INSTRUMENTS (Indicate make, model, I.d.)
 Water Level: KECK Other: —
 Multi Meter: HORIBA
 Field Calibration: AUTO CAL
 Filter / Filter Size: —

SAMPLING MEASUREMENTS Begin Purge:


Time	DTW (ft BTOC)	Cum. Vol. (gal. or <u>l</u>)	Purge Rate (gal. or <u>l/min</u>)	Temp. (oC)	DO (mg/L)	Spec. Cond. (µs/cm)	pH	ORP (mV)	Turbidity (NTU)	Color & Sediment
<u>0948</u>										
<u>0959</u>	<u>34.19</u>	<u>—</u>	<u>.2</u>	<u>21.9</u>	<u>1.09</u>	<u>1860</u>	<u>6.81</u>	<u>-6</u>	<u>7.4</u>	<u>neutral</u>
<u>1004</u>	<u>34.18</u>		<u>↓</u>	<u>21.6</u>	<u>0.92</u>	<u>1870</u>	<u>6.84</u>	<u>-11</u>	<u>8.9</u>	<u>↓</u>
<u>1009</u>	<u>34.18</u>		<u>↓</u>	<u>21.7</u>	<u>0.91</u>	<u>1870</u>	<u>6.83</u>	<u>-12</u>	<u>8.6</u>	<u>↓</u>

WL (ft. BMP) at End of Purge: _____ Sample Intake Depth (ft. BMP): _____

SAMPLE INVENTORY

Time	Bottles Collected			Filtration (Y / N)	Preservation (type)	Remarks (quality control sample, other)
	Volume	Composition (G, P)	No.			
<u>1015</u>	<u>500ML</u>	<u>P</u>	<u>2</u>	<u>N</u>		
<u>1015</u>	<u>1L</u>	<u>P</u>	<u>3</u>	<u>N</u>		
<u>1015</u>	<u>250ML</u>	<u>P</u>	<u>1</u>	<u>N</u>		

Comments: _____


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GROUNDWATER SAMPLING RECORD

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Project Number: 191222 62-A Project Name: LUMINAUT - RBSES Date: 5-7-19

Sample Number: <u>FMW4R</u>	Starting Water Level (ft. BMP): <u>21.72</u>
Sampling Location (well ID, etc.): <u>FMW-4R</u>	Casing Stickup (ft.): <u>-</u>
Sampled by: <u>ITB</u>	Starting Water Level (ft. BGL): <u>21.72</u>
Measuring Point (MP) of Well: <u>TOC/PVC</u>	Total Depth (ft. BGL): <u>-</u>
Screened Interval (ft. BGL): <u>-</u>	Casing Diameter (In ID): <u>2.0</u>
Filter Pack Interval (ft. BGL): <u>-</u>	Casing Volume (gal.): <u>-</u>

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment:

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)
1221	-	2	22.2	6.67	2130	0.61	-17	11	21.91
1229	-	1	21.9	6.69	2140	0.49	-21	9.2	21.92
1236	-	1	21.8	6.69	2140	0.48	-19	9.3	21.91
1242	-	1							

Water Level (ft. BMP) at End of Purge:

Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Time	Bottles Collected			Filtration (Y/N)	Preservation	Remarks (quality control sample, other)
	Volume	Composition (G, P)	No.			
1250	250mL	P	1	N	-	GEN CHEM
1250	500mL	P	1	N	HNO3	METALS
1250	1L	P	2	N	HNO3	-
1250	40mL	G	3	N	-	-

Comments:

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