



2018 Annual Groundwater Monitoring and Corrective Action Report

Sandow Steam Electric Station AX Landfill - Rockdale, Texas

Prepared for:

Luminant Generation Company LLC

Submitted by:

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January 31, 2019

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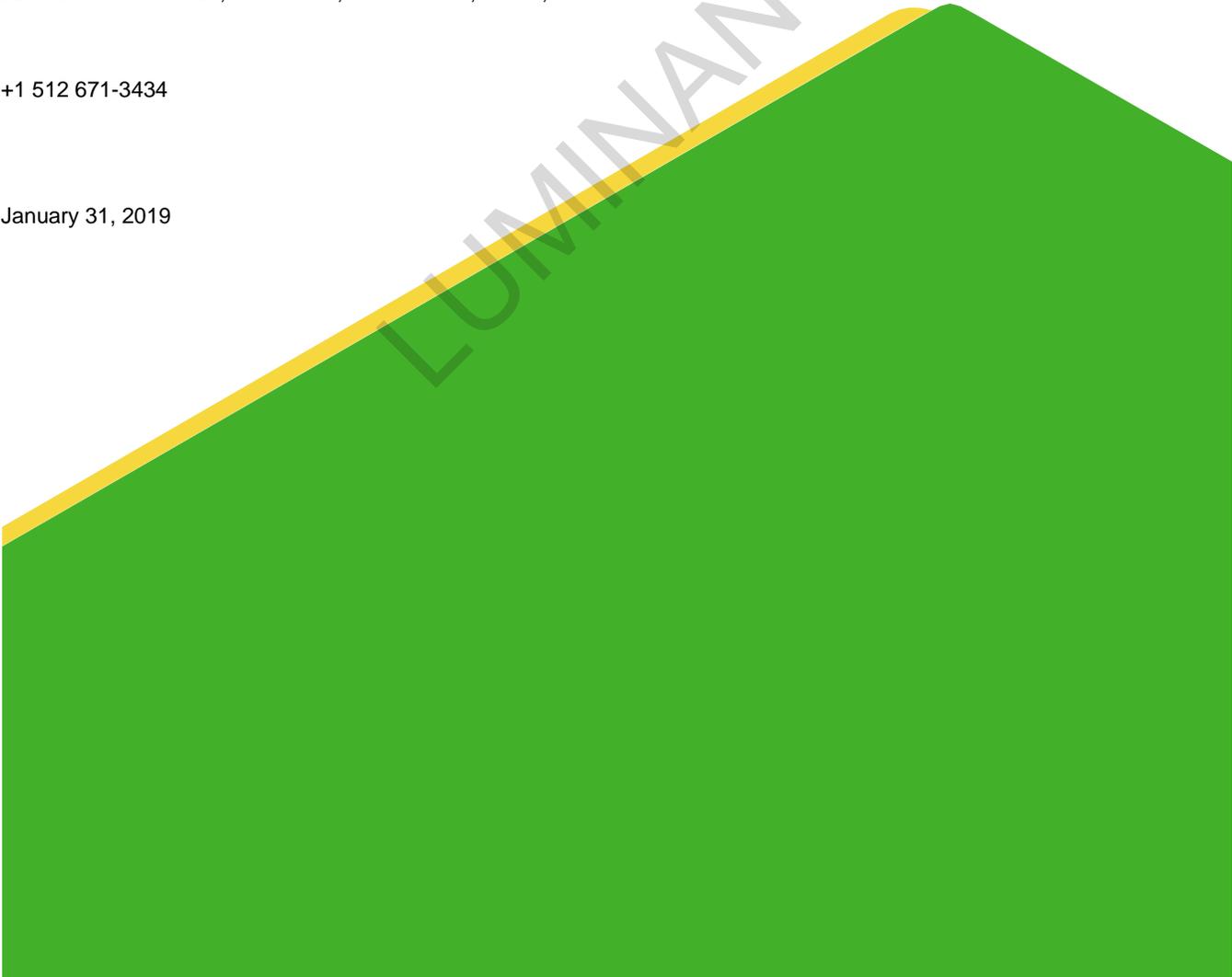


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ACRONYMS AND ABBREVIATIONS

CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
GWPS	Groundwater Protection Standard
MCL	Maximum Concentration Level
mg/L	Milligrams per Liter
NA	Not Applicable
SSI	Statistically Significant Increase
SSL	Statistically Significant Levels
USEPA	United States Environmental Protection Agency

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1.0 INTRODUCTION

Golder Associates, Inc. (Golder) has prepared this report on behalf of Luminant Generation Company LLC (Luminant) to satisfy annual groundwater monitoring and corrective action reporting requirements of the Coal Combustion Residuals (CCR) Rule for the AX Landfill at the former Sandow Steam Electric Station, Texas. The CCR units and CCR monitoring well network are shown on Figure 1.

The CCR Rule (40 CFR 257 Subpart D - *Standards for the Receipt of Coal Combustion Residuals in Landfills and Surface Impoundments*) has been promulgated by the United States Environmental Protection Agency (USEPA) to regulate the management and disposal of CCRs as solid waste under Resource Conservation and Recovery Act (RCRA) Subtitle D. For existing CCR landfills and surface impoundments, the CCR Rule requires that the owner or operator prepare an annual groundwater monitoring and corrective action report to document the status of the groundwater monitoring and corrective action program for the CCR unit for the previous calendar year. Per 40 CFR 257.90(e) of the CCR Rule, the report should contain the following information, to the extent available:

- (1) A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit;
- (2) Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken;
- (3) In addition to all the monitoring data obtained under §§ 257.90 through 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs;
- (4) A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels); and
- (5) Other information required to be included in the annual report as specified in §§ 257.90 through 257.98.

2.0 MONITORING AND CORRECTIVE ACTION PROGRAM STATUS

The AX Landfill CCR unit is currently in the Detection Monitoring Program. The initial Detection Monitoring Program groundwater samples were collected from the AX Landfill CCR monitoring well network in October 2017. In accordance with procedures described in the Statistical Analysis Plan (PBW, 2017), verification re-samples were collected from several wells on March 16, 2018 to verify the October 2017 sample results. The evaluation of the data was completed in 2018 using procedures described in the Statistical Analysis Plan (PBW, 2017) to identify statistically significant increases (SSIs) of Appendix III parameters over background concentrations. The Detection Monitoring Program sampling dates and parameters are summarized in the following table:

Detection Monitoring Program Summary

Sampling Dates	Parameters	SSIs	Assessment Monitoring Program Established
10/02/2017-10/03/2017 03/16/2018	Appendix III	Yes	No (Alternate Source Demonstration Completed)
03/21/2018-03/26/2018	Appendix III	Not Applicable	Not Applicable
10/08/2018-10/09/2018	Appendix III	To Be Determined	To Be Determined

The statistical background values and Appendix III analytical data are presented in Tables 1 and 2, respectively. SSIs of Appendix III parameters were identified for the October 2017 sampling event and March 2018 verification re-sample event. An alternate source demonstration was completed in 2018, which indicated that a source other than the CCR unit caused the SSIs. As such, the AX Landfill remained in the Detection Monitoring Program in 2018. A summary of the alternate source demonstration is presented in Attachment 1.

Subsequent Detection Monitoring Program groundwater samples were collected from the CCR groundwater monitoring network on a semi-annual basis in 2018, as required by the CCR Rule. The first 2018 semi-annual Detection Monitoring Program sampling event was conducted in March 2018. The second 2018 semi-annual Detection Monitoring Program sampling event was conducted in October 2018. The analytical data from the 2018 semi-annual Detection Monitoring Program sampling events were evaluated using procedures described in the Statistical Analysis Plan to identify SSIs of Appendix III parameters over background concentrations. Since the Detection Monitoring Program data evaluation was completed in January 2019, the results of that evaluation will be presented in the 2019 Annual Groundwater Monitoring and Corrective Action Report.

3.0 KEY ACTIONS COMPLETED IN 2018

Semi-annual Detection Monitoring Program groundwater monitoring events were completed in March and October 2018. Statistical background values for the Appendix III parameters are summarized in Table 1 and the analytical results for the groundwater samples collected in 2018 are summarized in Table 2. A map showing the AX Landfill and CCR monitoring wells is provided as Figure 1.

No CCR wells were installed or decommissioned in 2018.

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4.0 PROBLEMS ENCOUNTERED AND ACTIONS TO RESOLVE THE PROBLEMS

No problems were encountered with the CCR groundwater monitoring program in 2018.

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5.0 KEY ACTIVITIES PLANNED FOR 2019

The following key activities are planned for 2019:

- Continue the Detection Monitoring Program in accordance with 40 CFR § 257.94.
- Complete evaluation of Appendix III analytical data and compare results to statistical background values to determine whether an SSI has occurred.
- If an SSI is identified, potential alternate sources (i.e., a source other than the CCR unit caused the SSI or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality) will be evaluated. If an alternate source is identified to be the cause of the SSI, a written demonstration will be completed within 90 days of SSI determination and included in the 2019 Annual Groundwater Monitoring and Corrective Action Report.
- If an alternate source is not identified to be the cause of the SSI, an Assessment Monitoring Program will be established in accordance with 40 CFR § 257.94(e)(2).

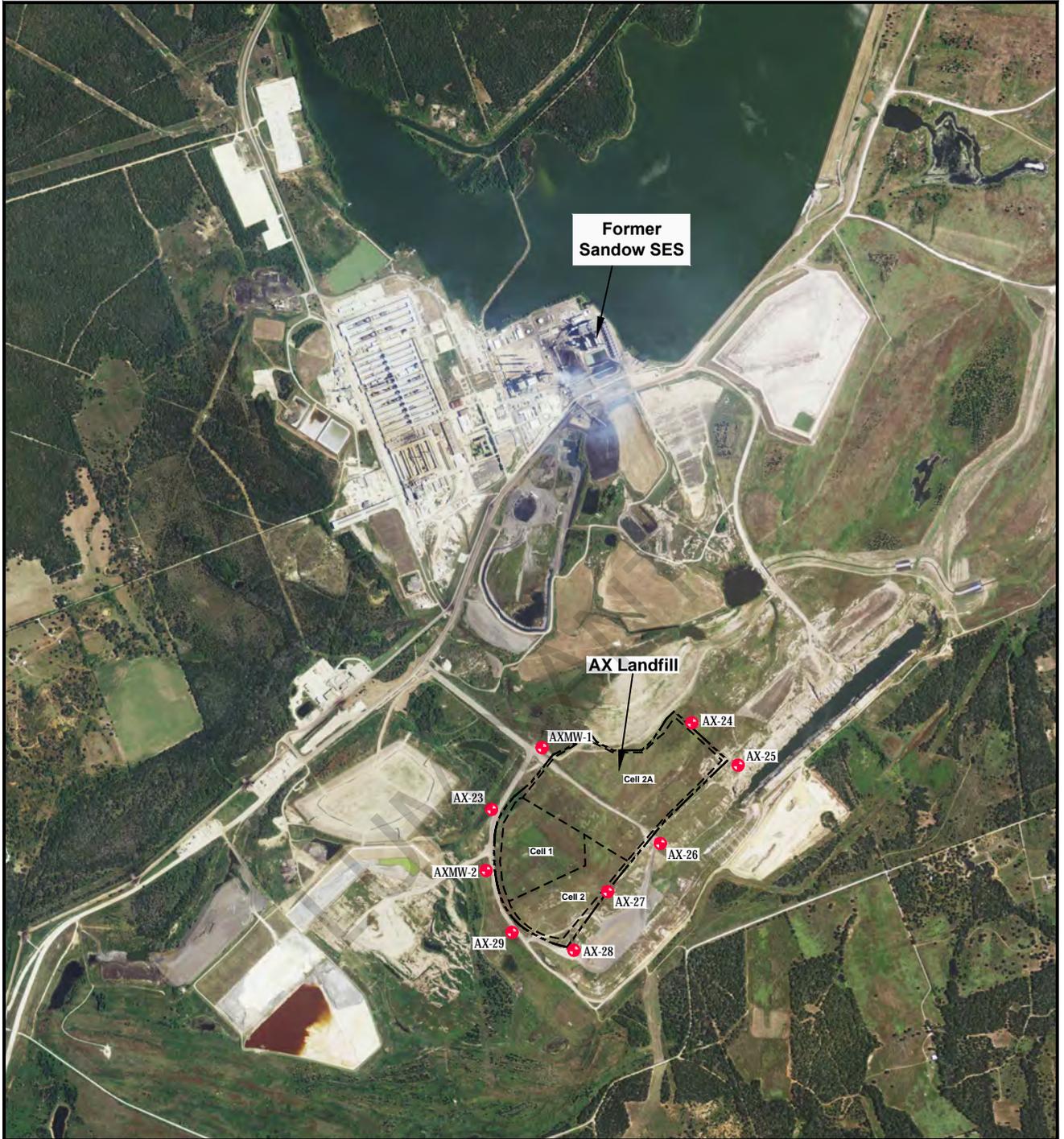
6.0 REFERENCES

Pastor, Behling & Wheeler, LLC, 2017. Coal Combustion Residual Rule Statistical Analysis Plan, Sandow Steam Electric Station, AX Landfill, Rockdale, Texas.

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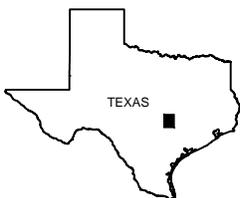
FIGURES

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EXPLANATION

 CCR Monitoring Well Location



PHOTOGRAPH LOCATION



Scale in Feet



SANDOW STEAM ELECTRIC STATION

AX LANDFILL

Figure 1

SITE PLAN

PROJECT: 5164E

BY: AJD

REVISIONS

DATE: SEPT., 2017

CHECKED: PJB

SOURCE:
Imagery from www.tnris.gov, Alcoa Lake, aerial photographs, 2012.

TABLES

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Table 1
Statistical Background Values
Sandow Steam Electric Station AX Landfill

Sample Location	Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Field pH (s.u.)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
Upgradient Wells							
AXMW-1	0.681	569	491	0.4	5.49 7.09	2,660	5,820
AXMW-2	3.62	943	391	1.88	4.6 7.63	3,040	4,940
AX-23	1.1	475	313	0.4	3.24 7.95	1,030	3,090
AX-29	0.432	791	306	0.4	2.73 7.01	1,440	3,370
Downgradient Wells							
AX-24	0.311	273	580	0.4	3.89 9.38	1,010	2,520
AX-25	0.298	262	1,140	0.507	4.69 9.2	795	3,980
AX-26	0.446	915	3,040	0.4	5.07 8.14	1,200	8,300
AX-27	0.281	366	1,020	0.4	6.08 7.3	478	3,620
AX-28	0.393	633	756	0.4	4.67 8.55	2,280	3,790

Table 2
Appendix III Analytical Results
Sandow Steam Electric Station AX Landfill

Sample Location	Date Sampled	Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Field pH (s.u.)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
Upgradient Wells								
AXMW-1	10/3/17	0.463	477	348	<0.1	5.75	1,990	3,620
	3/21/18	0.497	425	267	0.122 J	5.89	2,050	3,680
	10/9/18	0.512	473	229	0.371	6.31	2,260	3,730
AXMW-2	10/3/17	2.140	644	207	<0.1	5.93	1,990	3,640
	3/21/18	2.640	628	218	1.18	5.80	2,280	4,050
	10/9/18	1.470	562	179	0.84	6.66	1,960	3,280
AX-23	10/3/17	0.314	316	184	<0.1	6.43	631	1,620
	3/23/18	0.312	309	193	0.768	6.09	655	1,730
	10/9/18	0.381	305	210	0.449	7.00	636	1,700
AX-29	10/3/17	0.316	392	276	<0.1	6.2	1,110	2,480
	3/23/18	0.301	356	285	0.806	5.89	1,160	2,450
	10/9/18	0.361	339	274	0.446	6.99	1,060	2,390
Downgradient Wells								
AX-24	10/2/17	0.129	252	307	<0.1	6.12	632	1,810
	3/26/18	0.134	254	309	0.279 J	5.82	762	1,880
	10/8/18	0.178	260	283	0.593	6.82	759	1,840
AX-25	10/3/17	0.205	325	586	<0.1	6.37	504	2,400
	3/16/18	NA	302	NA	NA	NA	NA	NA
	3/26/18	0.199	281	583	0.748	6.38	526	2,420
	10/8/18	0.231	324	586	1.01	7.09	492	2,360
AX-26	10/2/17	0.352	666	1,100	<0.1	6.38	945	3,740
	3/26/18	0.342	912	1,820	<0.1	6.41	1,300	4,980
	10/8/18	0.403	905	1,720	<0.1	7.09	1,220	4,680
AX-27	10/2/17	0.206	462	652	<0.1	6.19	569	2,490
	3/16/18	NA	453	NA	NA	NA	659	NA
	3/16/2018 dup	NA	456	NA	NA	NA	648	NA
	3/26/18	0.209	438	584	<0.1	6.29	661	2,350
	10/8/18	0.247	422	540	0.144	7.17	554	2,220
AX-28	10/2/17	0.207	664	384	<0.1	6.25	1,670	3,350
	3/16/18	NA	634	NA	NA	NA	NA	NA
	3/23/18	0.204	621	354	<0.1	6.17	1,720	3,430
	10/8/18	0.305	578	230	0.465	6.87	1,710	3,300
	10/8/18 dup	0.316	577	233	0.505		1,780	3,370

Notes:

NA - not analyzed.

J - concentration detected below minimum quantitation limit; result is an estimate.

ATTACHMENT 1
ALTERNATE SOURCE DEMONSTRATION REPORT

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**COAL COMBUSTION RESIDUAL RULE
ALTERNATE SOURCE DEMONSTRATION REPORT**

**SANDOW 5 GENERATING PLANT
AX LANDFILL
ROCKDALE, TEXAS**

APRIL 15, 2018

Prepared For:

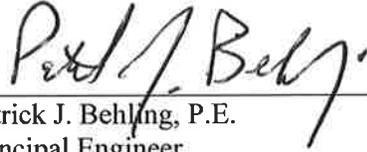
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Round Rock, Texas 78664
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PROFESSIONAL CERTIFICATION

This document and all attachments were prepared by Pastor, Behling & Wheeler, LLC under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I hereby certify that the alternative source demonstration at the referenced facility meets the requirements of Section 257.94(e)(2) of the CCR Rule.



Patrick J. Behling, P.E.
Principal Engineer
PASTOR, BEHLING & WHEELER, LLC



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1.0 INTRODUCTION

Luminant Generation Company, LLC (Luminant) formerly operated the Sandow 5 Generating Plant (Sandow) located approximately 7 miles southwest of Rockdale in Milam County, Texas Figure 1. The Sandow AX Landfill, located approximately 7,500 feet south of Unit No. 5 on former mined land that is part of the Sandow Lignite Mine (Figure 1), has been identified as a coal combustion residuals (CCR) unit that is subject to the requirements of the CCR Rule.

The purpose of this report is to document that a source other than AX Landfill (hereafter, the “Site”) caused the statistically significant increase (SSI) over background levels for the Appendix III samples collected during the initial detection monitoring event in 2017 as required in 40 CFR 257.94(e)(2).

1.1 CCR Unit Groundwater Monitoring Applicability

Pastor, Behling & Wheeler, LLC (PBW) was retained by Luminant to evaluate the CCR groundwater monitoring system and develop and implement a CCR groundwater sampling and analysis program at the Site. To document these activities, PBW prepared the following reports, which were placed in the facility’s operating record to comply with Section 257.105(h) of the CCR Rule:

- CCR Groundwater Monitoring System Certification (PBW, 2017a);
- CCR Monitoring Well Design, Installation, Development, and Decommissioning Report (PBW, 2017b);
- CCR Statistical Analysis Plan (PBW, 2017c); and
- 2017 Annual Groundwater Monitoring Report (PBW, 2018).

The initial detection monitoring event required under Section 257.94 of the CCR Rule was performed at the AX Landfill in October 2017. Potential SSIs over background levels for two Appendix III constituents (calcium and sulfate) were observed during evaluation of the detection monitoring event data. This Alternate Source Demonstration Report was prepared to demonstrate that a source other than the AX Landfill caused the SSIs for these constituents.

2.0 GROUNDWATER MONITORING SYSTEM

2.1 Description of AX Landfill

The AX Landfill consists of Cells 1 and 2 and covers an area of approximately 70 acres (Figure 2). Cell 2A of the AX Landfill was constructed adjacent to Cells 1 and 2, but was never used. Construction of Cell 1 was completed in July 2013 and construction of Cell 2 was completed in October 2015. Placement of Unit No. 5 CCR began in Cell 1 in May 2015 and Cell 2 in September 2016. CCR has never been placed in Cell 2A.

2.2 AX Landfill Groundwater Monitoring System

The CCR groundwater monitoring well system at the AX Landfill consists of nine monitoring wells (AXMW-1, AXMW-2, AX-23, AX-24, AX-25, AX-26, AX-27, AX-28, and AX-29) that are screened in the uppermost aquifer at the Site. The locations of the CCR monitoring wells are shown on Figure 2. Well construction information and survey data for the CCR wells are summarized in Table 1.

The AX Landfill is constructed within highly heterogeneous overburden spoil material that was previously excavated and backfilled during lignite mining operations at the Sandow Lignite Mine. The uppermost aquifer at the Site occurs under unconfined conditions within the overburden spoil and extends to the base of the spoil where lignite and/or clay confining units are encountered. A groundwater potentiometric surface map based on the groundwater elevations measured during the 2017 detection monitoring event is presented on Figure 3. Groundwater elevations were generally highest on the west side of the landfill, with an inferred groundwater flow direction to the east at an approximate hydraulic gradient of 0.015 feet/feet. An average linear flow velocity of 0.15 feet/day was calculated for the AX Landfill based on the approximate hydraulic gradient of 0.015 feet/feet, an aquifer hydraulic conductivity of 8.77×10^{-4} cm/sec (PBW, 2017a), and an assumed effective porosity of 0.25 for the highly heterogeneous overburden material.

3.0 GROUNDWATER MONITORING PROGRAM

3.1 Background Monitoring Program

Statistical analysis of groundwater monitoring data is required under Section 257.93 of the CCR Rule. Section 257.93 of the CCR Rule provides several options for statistically evaluating the groundwater data. In accordance with paragraph (f)(1) through (5) of Section 257.93, the following statistical evaluation approach was selected to demonstrate groundwater compliance for the Site under the CCR Rule (PBW, 2017c):

- Use of intrawell data evaluations, which compare new sample data to historical data at each groundwater monitoring well independently; and
- Use of prediction limits for data comparisons. This approach is a common statistical method used to evaluate groundwater compliance for Subtitle D landfill facilities and is one of the approved options for groundwater quality data statistical evaluation under the CCR Rule.

Eight background groundwater monitoring events were performed at the AX Landfill using the CCR monitoring well system from October 2015 to December 2016. Groundwater samples collected during the background monitoring events were evaluated for each Appendix III and Appendix IV parameter at each well to establish prediction limits in accordance with procedures outlined in the CCR Statistical Analysis Plan (PBW, 2017c). Development of the prediction limits and documentation on the collection and analysis of the background sample data were detailed in the 2017 Annual Groundwater Monitoring Report (PBW, 2018).

3.2 Detection Monitoring Program

Section 257.94 of the CCR Rule requires that detection monitoring of groundwater be performed at all CCR units. The following constituents are evaluated as part of the detection monitoring program (from Appendix III to the CCR Rule):

- Boron
- Calcium
- Chloride
- Fluoride
- pH
- Sulfate
- Total Dissolved Solids (TDS)

If an SSI over background is determined for one or more of the constituents listed above at any monitoring well at the CCR unit waste boundary, within 90 days the owner or operator must:

- Establish an assessment monitoring program as described in Section 257.95 of the Rule; or
- Demonstrate that a source other than the CCR unit caused the SSI over background levels for a constituent or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. If a successful demonstration is completed within the 90-day period, the owner or operator of the CCR unit may continue with the detection monitoring program.

3.2.1 AX Landfill Detection Monitoring Results

PBW collected the initial detection monitoring groundwater samples from the AX Landfill CCR monitoring wells in October 2017. The detection monitoring data are presented, along with the applicable prediction limits, in Table 2. Laboratory analytical reports for the detection monitoring data are included in Appendix A.

All detection monitoring constituent concentrations in all AX Landfill monitoring wells from the October 2017 monitoring event were below applicable prediction limits, with the exception of calcium in wells AX-25, AX-27, and AX-28 and sulfate in well AX-27. In accordance with the Statistical Analysis Plan (PBW, 2017c), re-samples were collected from each of these wells in March 2018. The re-samples were analyzed for the constituents that exceeded prediction limits during the initial detection monitoring event.

3.2.2 AX Landfill Calcium Re-Sample Results

Calcium concentrations in the March 2018 AX-25, AX-27, and AX-28 re-samples were similar to those observed in the October 2017 detection monitoring event samples from these wells (Table 2). Calcium results exceeded the applicable prediction limits in each of these wells in both the initial detection samples and re-samples; however, calcium concentrations were similar or higher in downgradient well AX-26 and upgradient well AXMW-2 compared to the calcium concentrations that exceeded prediction limits in AX-25, AX-27, and AX-28. Based on the high variability in calcium concentrations in wells upgradient and downgradient of the AX Landfill, the calcium prediction limit exceedances observed in AX-25, AX-27, and AX-28 are attributed to natural variation in groundwater quality related to heterogeneity of the mine spoil rather than a suspected release from the AX Landfill.

This conclusion is further supported by the location of the subject wells relative to Cells 1 and 2. Based on the timing of ash placement in the AX Landfill and the average linear groundwater velocity described in Section 2 (0.15 feet/day), AX-25, AX-27, and AX-28 are all located sufficiently far from Cells 1 and 2 that affected water theoretically released from the cells would not have reached any of the wells at the time that the initial detection monitoring samples were collected. Cell 2 is the closest active cell to AX-25, AX-27, and AX-28. Ash was first placed in Cell 2 in September 2016. Using the conservative assumptions that the wells are all located directly downgradient of Cell 2 and that chemical adsorption is negligible, the amount of time it would take groundwater below Cell 2 to reach AX-27 (approximately 70 feet from Cell 2) is 1.3 years, AX-28 (approximately 260 feet from Cell 2) is 4.7 years, and AX-25 (approximately 2,400 feet from Cell 2) is 44 years. Cell 1 is located an even greater distance from wells AX-25, AX-27, and AX-28, so the groundwater travel time from Cell 1 to these wells would be significantly greater.

3.2.3 AX Landfill Sulfate Re-Sample Results

The sulfate concentration in the March 2018 AX-27 re-sample was similar to the concentrations observed in the initial October 2017 detection monitoring sample from this well (Table 2). Sulfate results exceeded the applicable sulfate prediction limit for the well in both the initial detection sample and re-sample; however, the sulfate sample concentrations from AX-27 were some of the lowest observed Site-wide. Two CCR wells located upgradient from the unit (AXMW-1 and AXMW-2) had significantly higher sulfate sample concentrations (both were 1,990 mg/L), and the remaining Site CCR wells had similar or higher sulfate concentrations compared to AX-27. Additionally, as described in the previous section, affected water theoretically released from Cells 1 and 2 would not have reached AX-27 when the initial detection monitoring samples were collected. Based on the high variability in sulfate concentrations in wells upgradient and downgradient of the AX Landfill and the location of AX-27 relative to Cells 1 and 2, the sulfate prediction limit exceedances observed in AX-27 is attributed to natural variation in groundwater quality related to the heterogeneity of the mine spoil rather than a suspected release from the AX Landfill.

4.0 CONCLUSION

Calcium and sulfate concentrations exceeded applicable prediction limits in one or more wells during the initial October 2017 detection monitoring event and subsequent March 2018 re-sample event at the AX Landfill. Because other CCR Site wells exhibited similar or higher concentrations of calcium and sulfate, and because theoretically affected water from the active landfill cells could not have reached the wells where prediction limit exceedances were observed based on the average linear groundwater flow velocities for the unit, all of the observed prediction limit exceedances are attributed to natural variation in groundwater quality due to the heterogeneity of the spoil groundwater system and are not considered evidence of a release from the unit. In accordance with Section 257.94(e)(2), Luminant will continue the detection monitoring program at the unit. Initiation of an assessment monitoring program is not required at this time.

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5.0 REFERENCES

Pastor, Behling & Wheeler, LLC (PBW), 2017a. Coal Combustion Residual Rule Groundwater Monitoring System Certification, Sandow 5 Generating Plant, AX Landfill, Rockdale, Texas. October 16, 2017.

Pastor, Behling & Wheeler, LLC (PBW), 2017b. Coal Combustion Residual Rule Monitoring Well Design, Installation, Development, and Decommissioning Report, Sandow 5 Generating Plant, AX Landfill, Rockdale, Texas. October 13, 2017.

Pastor, Behling & Wheeler, LLC (PBW), 2017c. Coal Combustion Residual Rule Statistical Analysis Plan, Sandow 5 Generating Plant, AX Landfill, Rockdale, Texas. October 11, 2017.

Pastor, Behling & Wheeler, LLC (PBW), 2018. Coal Combustion Residual Rule 2017 Annual Groundwater Monitoring Report, Sandow 5 Generating Plant, AX Landfill, Rockdale, Texas. January 31, 2018.

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Tables

TABLE 1
CCR WELL CONSTRUCTION SUMMARY
SANDOW AX LANDFILL

Well ID	Date Installed	Northing	Easting	Ground Elevation (ft amsl)	TOC Elevation (ft amsl)	Top of Screen (ft bgs)	Bottom of (ft bgs)	Screen Length (ft)	Total Design Depth (ft bgs)	Casing Diameter (inches)
AX-23	10/15/15	335065	3028456	479.78	482.26	65	85	20	85	4
AX-24	10/15/15	336503	3031537	466.48	468.74	61	81	20	81	2
AX-25	10/16/15	335806	3032212	441.11	443.62	65	75	10	75	2
AX-26	10/14/15	334521	3031007	456.34	458.60	55	75	20	75	2
AX-27	10/14/15	333747	3030177	476.82	479.47	78	98	20	98	4
AX-28	10/13/15	332787	3029656	460.75	463.26	25	45	20	45	2
AX-29	10/13/15	333162	3028622	484.96	487.73	45	65	20	65	2
AXMW-1	11/28/12	336064	3029088	471.88	473.65	33	53	20	53	2
AXMW-2	11/28/12	334057	3028201	480.54	482.25	43	63	20	63	2

Notes:

1. Abbreviations: ft - feet; amsl - above mean sea level; bgs - below ground surface; TOC - top of casing.

**TABLE 2
CCR GROUNDWATER DETECTION MONITORING DATA SUMMARY
SANDOW AX LANDFILL**

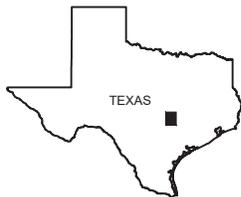
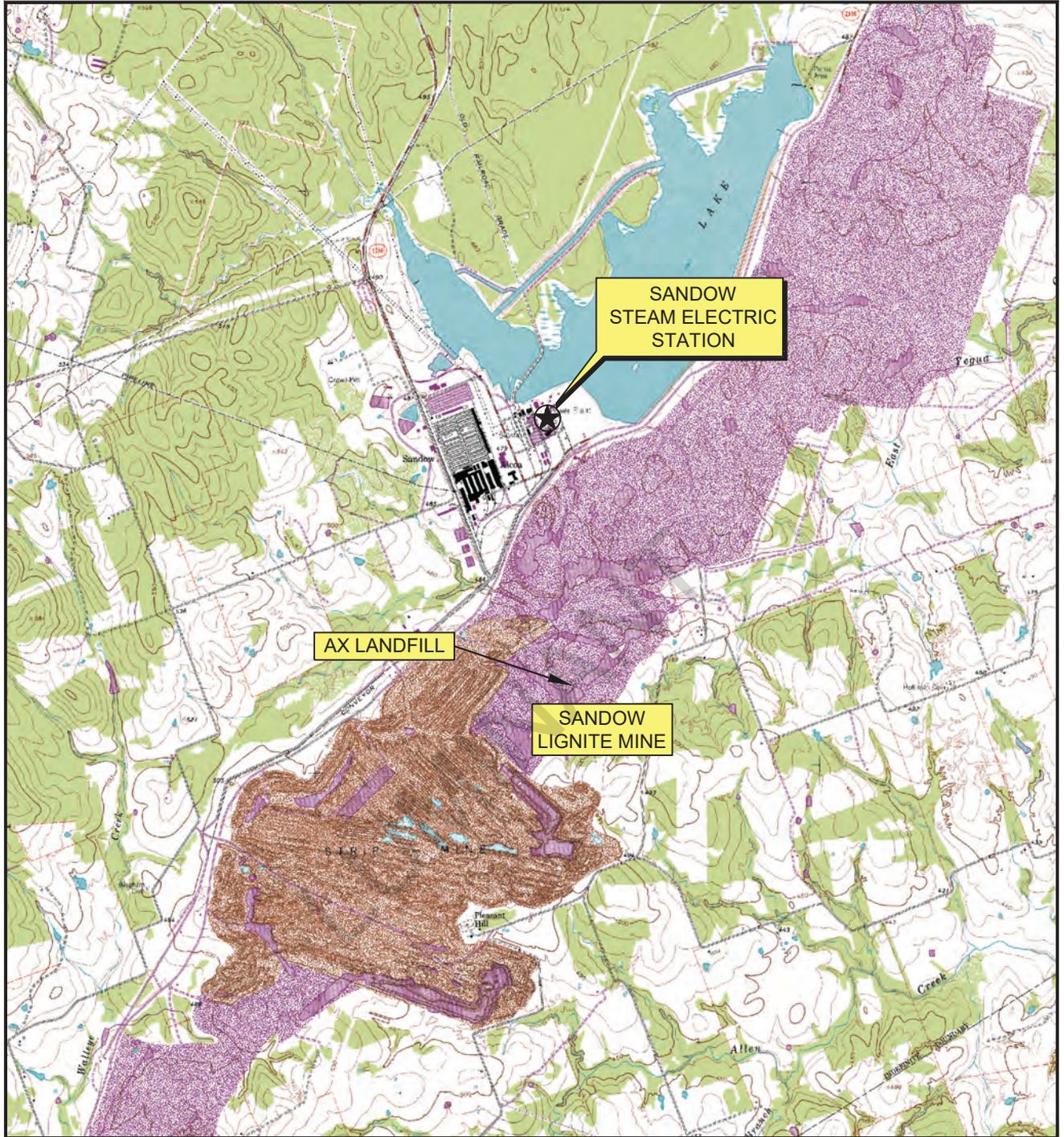
Sample Location	Date Sampled	B		Ca		Cl		FI		Field pH		SO ₄		TDS	
		Prediction Limit	Sample Data												
AX-23	10/3/17	1.1	0.314	475	316	313	184	0.4	<0.1	3.24 7.95	6.43	1,030	631	3,090	1,620
AX-24	10/2/17	0.311	0.129	273	252	580	307	0.4	<0.1	3.89 9.38	6.12	1,010	632	2,520	1,810
AX-25	10/3/17	0.298	0.205	262	325	1,140	586	0.507	<0.1	4.69 9.2	6.37	795	504	3,980	2,400
AX-25 Re-Sample	3/16/18	--	--	262	302	--	--	--	--	--	--	--	--	--	--
AX-26	10/2/17	0.446	0.352	915	666	3,040	1,100	0.4	<0.1	5.07 8.14	6.38	1,200	945	8,300	3,740
AX-27	10/2/17	0.281	0.206	366	462	1,020	652	0.4	<0.1	6.08 7.3	6.19	478	569	3,620	2,490
AX-27 Re-Sample	3/16/18	--	--	366	453	--	--	--	--	--	--	478	659	--	--
AX-27 Re-Sample Duplicate	3/16/18	--	--	366	456	--	--	--	--	--	--	478	648	--	--
AX-28	10/2/17	0.393	0.207	633	664	756	384	0.4	<0.1	4.67 8.55	6.25	2,280	1,670	3,790	3,350
AX-28 Re-Sample	3/16/18	--	--	633	634	--	--	--	--	--	--	--	--	--	--
AX-29	10/3/17	0.432	0.316	791	392	306	276	0.4	<0.1	2.73 7.01	6.2	1,440	1,110	3,370	2,480
AXMW-1	10/3/17	0.681	0.463	569	477	491	348	0.4	<0.1	5.49 7.09	5.75	2,660	1,990	5,820	3,620
AXMW-2	10/3/17	3.62	2.140	943	644	391	207	1.88	<0.1	4.6 7.63	5.93	3,040	1,990	4,940	3,640

Notes:

1. All concentrations in mg/L. pH in standard units.
2. Highlighted sample results exceed prediction limits.

LUMINANT

Figures



QUADRANGLE LOCATION



Scale in Feet



SANDOW STEAM ELECTRIC STATION
ROCKDALE, TEXAS

Figure 1

SITE LOCATION MAP

PROJECT: 5347E

BY: AJD

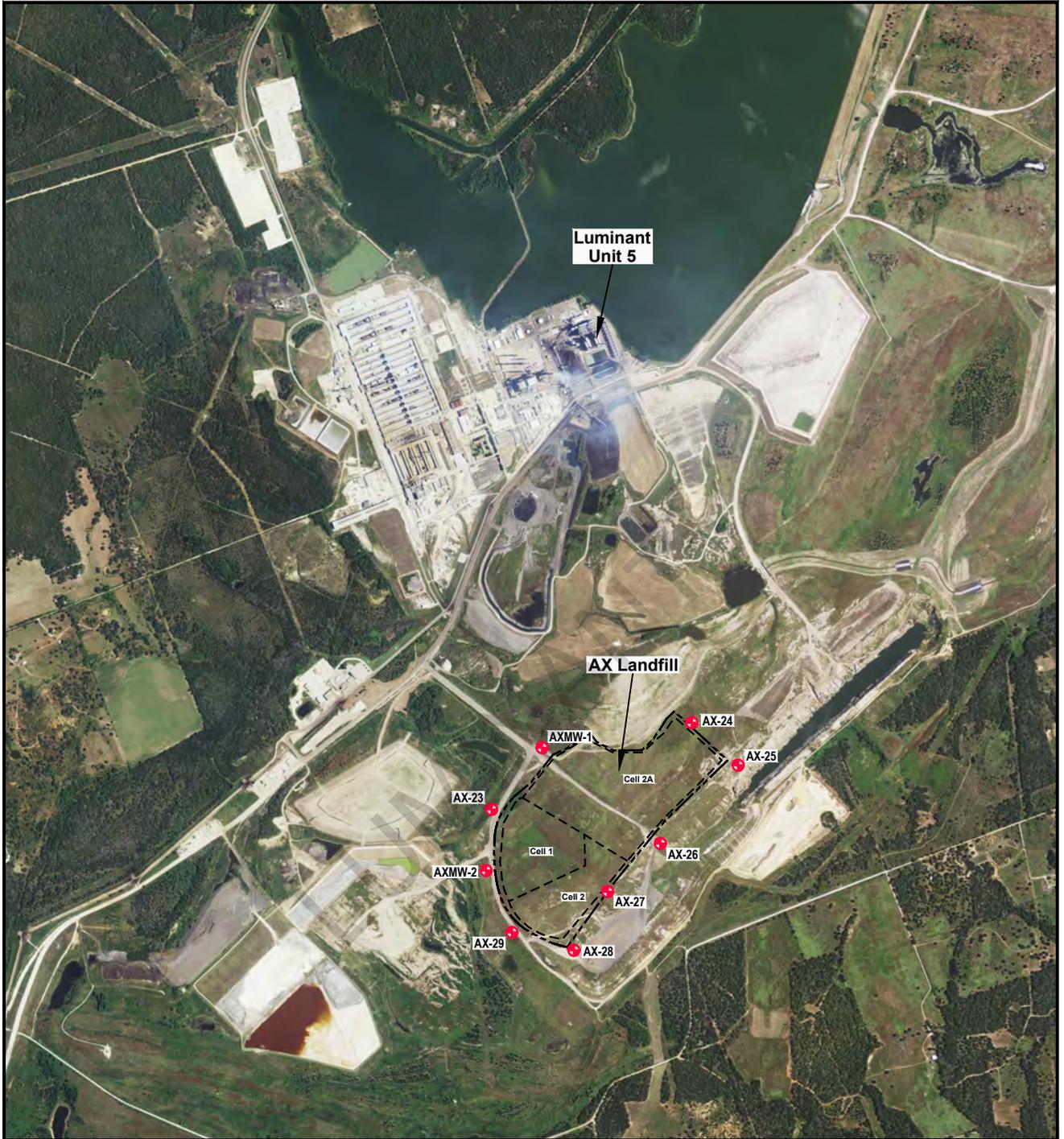
REVISIONS

DATE: MAR., 2018

CHECKED: PJB

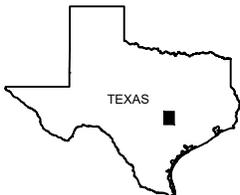
PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

SOURCE:
Base map from www.tnris.gov, Alcoa Lake, TX 7.5 min. USGS quadrangle dated 1963,
revised 1988.



EXPLANATION

 CCR Monitoring Well Location



PHOTOGRAPH LOCATION



Scale in Feet



**SANDOW STEAM ELECTRIC STATION
AX LANDFILL**

Figure 2

SITE PLAN

PROJECT: 5347E

BY: AJD

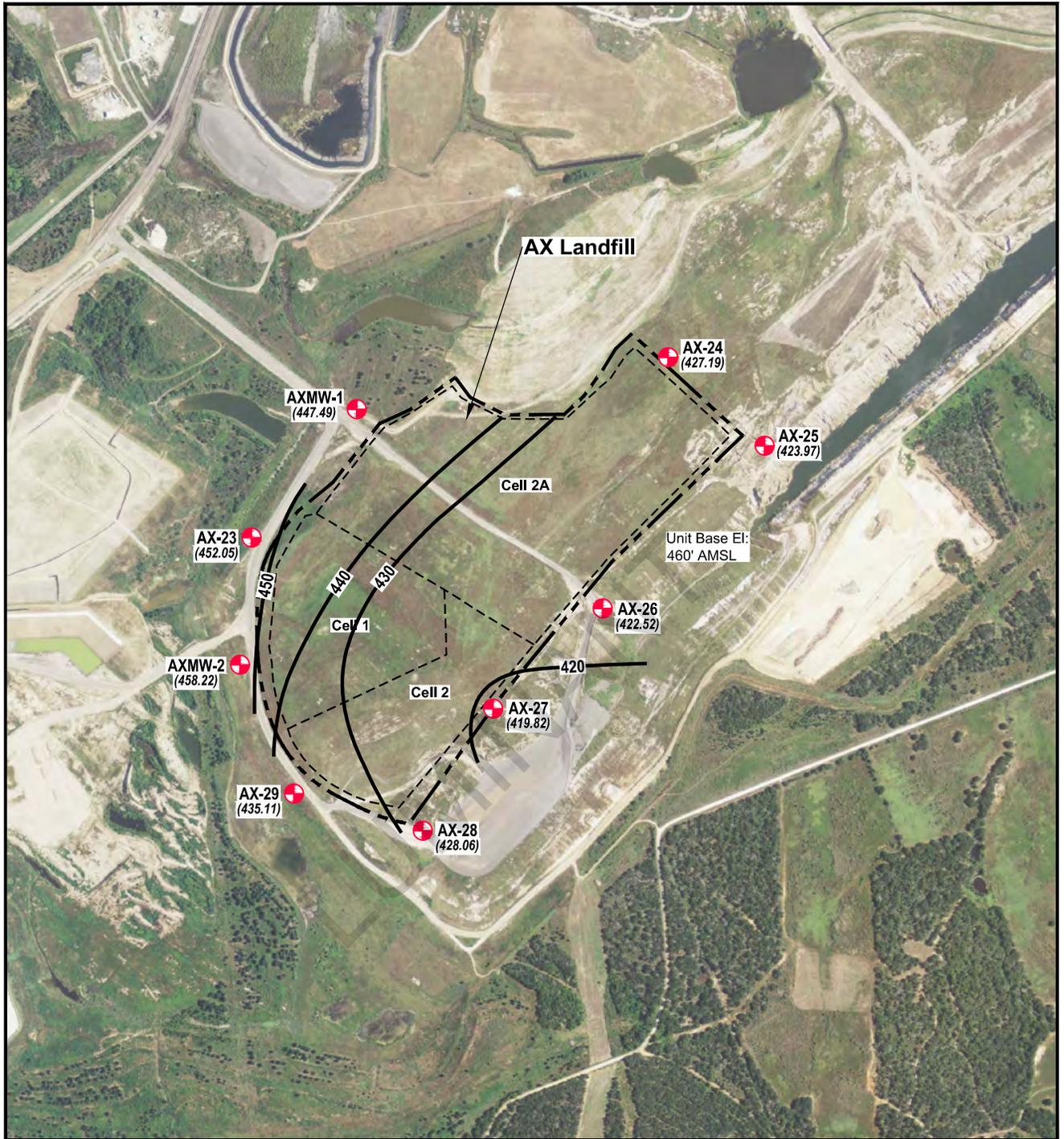
REVISIONS

DATE: MAR., 2018

CHECKED: PJB

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

SOURCE:
Imagery from www.tnris.gov, Alcoa Lake, aerial photographs, 2012.



EXPLANATION

-  CCR Monitoring Well
- (414.49)** Groundwater Potentiometric Surface (ft. MSL)
- 400 —** Groundwater Potentiometric Surface Contour (C.I. = 10 ft.)



SOURCE:
Imagery from www.tnris.gov, Alcoa Lake, aerial photographs, 2012.

SANDOW STEAM ELECTRIC STATION
ROCKDALE, TEXAS

Figure 3

**AX LANDFILL GROUNDWATER
POTENTIOMETRIC SURFACE MAP
OCTOBER 2-3, 2017**

PROJECT: 5347E	BY: AJD	REVISIONS
DATE: JAN., 2018	CHECKED: PJB	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

LUMINANT

Appendix A

Laboratory Analytical Reports



October 11, 2017

Will Vienne
Pastor, Behling & Wheeler
2201 Double Creek Dr #4004
Round Rock, Texas 78664
TEL: (512) 671-3434
FAX (512) 671-3446
RE: Sandow CCR

Order No.: 1710015

Dear Will Vienne:

DHL Analytical, Inc. received 9 sample(s) on 10/3/2017 for the analyses presented in the following report.

There were no problems with the analyses and all data met requirements of NELAC except where noted in the Case Narrative. All non-NELAC 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".

John DuPont
General Manager

This report was performed under the accreditation of the State of Texas Laboratory Certification Number: T104704211-17-19



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Analytical Report 1710015	12
AnalyticalQCSummaryReport 1710015	21

LUMINANT

John DuPont

From: Will Vienne <will.vienne@pbwllc.com>
Sent:
To: John DuPont
Cc: John Brayton; Keith Starek; Pat Behling
Subject: CCR Sampling

Follow Up Flag: Follow up
Flag Status: Completed

Hi John,

We are starting the second phase of sampling for the CCR project, which includes sampling the CCR wells on a semi-annual basis. Only Appendix III constituents will be analyzed:

Boron
Calcium
Chloride
Fluoride
Field pH
Sulfate
Total Dissolved
Solids

LUMINANT

Sample Receipt Checklist

Client Name Pastor, Behling & Wheeler

Date Received: 10/3/2017

Work Order Number 1710015

Received by JGD

Checklist completed by: [Signature] 10/4/2017
Signature Date

Reviewed by [Initials] 10/4/2017
Initials Date

Carrier name Hand Delivered

- 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 2.3 °C
- Water - VOA vials have zero headspace? Yes No No VOA vials submitted
- Water - pH<2 acceptable upon receipt? Yes No NA LOT # 8086
Adjusted? yes Checked by EL
- Water - pH>9 (S) or pH>12 (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: Sample AXE-24 received with pH > 2.

Corrective Action sample pH adjusted at begin w/ HNO₃ (Lot # 11750) to pH < 2

CLIENT: Pastor, Behling & Wheeler
Project: Sandow CCR
Lab Order: 1710015

CASE NARRATIVE

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

- Method SW6020A - Metals Analysis
- Method E300 - Anions Analysis
- Method M2540C - TDS Analysis

LOG IN

The samples were received and log-in performed on 10/3/17. A total of 9 samples were received. Nitric acid was added to sample AX-24 upon arrival at DHL Analytical. The samples arrived in good condition and were properly packaged.

METALS ANALYSIS

For Metals analysis performed on 10/9/17 the matrix spike and matrix spike duplicate recoveries were out of control limits for Calcium. These are flagged accordingly in the QC summary report. The sample selected for the matrix spike and matrix spike duplicate was from this work order. The LCS was within control limits for this analyte. No further corrective actions were taken.

For Metals analysis performed on 10/9/17 the PDS recovery was slightly above control limits for Calcium. This is flagged accordingly. The serial dilution was within control limits for this analyte. No further corrective actions were taken.

CLIENT: Pastor, Behling & Wheeler
Project: Sandow CCR
Lab Order: 1710015

Work Order Sample Summary

Lab Smp ID	Client Sample ID	Tag Number	Date Collected	Date Recved
1710015-01	AX-24		10/02/17 11:40 AM	10/3/2017
1710015-02	AX-27		10/02/17 02:50 PM	10/3/2017
1710015-03	AX-28		10/02/17 04:05 PM	10/3/2017
1710015-04	AX-26		10/02/17 05:35 PM	10/3/2017
1710015-05	AX-25		10/03/17 09:30 AM	10/3/2017
1710015-06	AXMW-1		10/03/17 11:20 AM	10/3/2017
1710015-07	AXMW-2		10/03/17 12:25 PM	10/3/2017
1710015-08	AX-29		10/03/17 02:05 PM	10/3/2017
1710015-09	AX-23		10/03/17 04:20 PM	10/3/2017

LUMINANT

Lab Order: 1710015
Client: Pastor, Behling & Wheeler
Project: Sandow CCR

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1710015-01A	AX-24	10/02/17 11:40 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
	AX-24	10/02/17 11:40 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
1710015-01B	AX-24	10/02/17 11:40 AM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AX-24	10/02/17 11:40 AM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AX-24	10/02/17 11:40 AM	Aqueous	M2540C	TDS Preparation	10/05/17 09:59 AM	82671
1710015-02A	AX-27	10/02/17 02:50 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
	AX-27	10/02/17 02:50 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
1710015-02B	AX-27	10/02/17 02:50 PM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AX-27	10/02/17 02:50 PM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AX-27	10/02/17 02:50 PM	Aqueous	M2540C	TDS Preparation	10/05/17 09:59 AM	82671
1710015-03A	AX-28	10/02/17 04:05 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
	AX-28	10/02/17 04:05 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
1710015-03B	AX-28	10/02/17 04:05 PM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AX-28	10/02/17 04:05 PM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AX-28	10/02/17 04:05 PM	Aqueous	M2540C	TDS Preparation	10/05/17 09:59 AM	82671
1710015-04A	AX-26	10/02/17 05:35 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
	AX-26	10/02/17 05:35 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
1710015-04B	AX-26	10/02/17 05:35 PM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AX-26	10/02/17 05:35 PM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AX-26	10/02/17 05:35 PM	Aqueous	M2540C	TDS Preparation	10/05/17 09:59 AM	82671
1710015-05A	AX-25	10/03/17 09:30 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
	AX-25	10/03/17 09:30 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
1710015-05B	AX-25	10/03/17 09:30 AM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AX-25	10/03/17 09:30 AM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AX-25	10/03/17 09:30 AM	Aqueous	M2540C	TDS Preparation	10/05/17 09:59 AM	82671
1710015-06A	AXMW-1	10/03/17 11:20 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
	AXMW-1	10/03/17 11:20 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
1710015-06B	AXMW-1	10/03/17 11:20 AM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668

Lab Order: 1710015
Client: Pastor, Behling & Wheeler
Project: Sandow CCR

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1710015-06B	AXMW-1	10/03/17 11:20 AM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AXMW-1	10/03/17 11:20 AM	Aqueous	M2540C	TDS Preparation	10/05/17 09:59 AM	82671
1710015-07A	AXMW-2	10/03/17 12:25 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
	AXMW-2	10/03/17 12:25 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
1710015-07B	AXMW-2	10/03/17 12:25 PM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AXMW-2	10/03/17 12:25 PM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AXMW-2	10/03/17 12:25 PM	Aqueous	M2540C	TDS Preparation	10/05/17 09:59 AM	82671
1710015-08A	AX-29	10/03/17 02:05 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
	AX-29	10/03/17 02:05 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
1710015-08B	AX-29	10/03/17 02:05 PM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AX-29	10/03/17 02:05 PM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AX-29	10/03/17 02:05 PM	Aqueous	M2540C	TDS Preparation	10/05/17 09:59 AM	82671
1710015-09A	AX-23	10/03/17 04:20 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
	AX-23	10/03/17 04:20 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	10/06/17 08:19 AM	82680
1710015-09B	AX-23	10/03/17 04:20 PM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AX-23	10/03/17 04:20 PM	Aqueous	E300	Anion Preparation	10/05/17 09:38 AM	82668
	AX-23	10/03/17 04:20 PM	Aqueous	M2540C	TDS Preparation	10/05/17 09:59 AM	82671

Lab Order: 1710015
 Client: Pastor, Behling & Wheeler
 Project: Sandow CCR

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1710015-01A	AX-24	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	50	10/09/17 01:51 PM	ICP-MS4_171009C
	AX-24	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	1	10/09/17 12:29 PM	ICP-MS4_171009C
1710015-01B	AX-24	Aqueous	E300	Anions by IC method - Water	82668	100	10/05/17 01:38 PM	IC4_171005A
	AX-24	Aqueous	E300	Anions by IC method - Water	82668	1	10/05/17 04:26 PM	IC4_171005A
	AX-24	Aqueous	M2540C	Total Dissolved Solids	82671	1	10/06/17 08:30 AM	WC_171005B
1710015-02A	AX-27	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	1	10/09/17 12:31 PM	ICP-MS4_171009C
	AX-27	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	50	10/09/17 01:53 PM	ICP-MS4_171009C
1710015-02B	AX-27	Aqueous	E300	Anions by IC method - Water	82668	100	10/05/17 02:14 PM	IC4_171005A
	AX-27	Aqueous	E300	Anions by IC method - Water	82668	1	10/05/17 04:38 PM	IC4_171005A
	AX-27	Aqueous	M2540C	Total Dissolved Solids	82671	1	10/06/17 08:30 AM	WC_171005B
1710015-03A	AX-28	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	1	10/09/17 12:33 PM	ICP-MS4_171009C
	AX-28	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	50	10/09/17 01:55 PM	ICP-MS4_171009C
1710015-03B	AX-28	Aqueous	E300	Anions by IC method - Water	82668	1	10/05/17 04:50 PM	IC4_171005A
	AX-28	Aqueous	E300	Anions by IC method - Water	82668	100	10/05/17 02:26 PM	IC4_171005A
	AX-28	Aqueous	M2540C	Total Dissolved Solids	82671	1	10/06/17 08:30 AM	WC_171005B
1710015-04A	AX-26	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	1	10/09/17 12:35 PM	ICP-MS4_171009C
	AX-26	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	50	10/09/17 01:57 PM	ICP-MS4_171009C
1710015-04B	AX-26	Aqueous	E300	Anions by IC method - Water	82668	100	10/05/17 02:38 PM	IC4_171005A
	AX-26	Aqueous	E300	Anions by IC method - Water	82668	1	10/05/17 05:02 PM	IC4_171005A
	AX-26	Aqueous	M2540C	Total Dissolved Solids	82671	1	10/06/17 08:30 AM	WC_171005B
1710015-05A	AX-25	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	50	10/09/17 01:59 PM	ICP-MS4_171009C
	AX-25	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	1	10/09/17 12:37 PM	ICP-MS4_171009C
1710015-05B	AX-25	Aqueous	E300	Anions by IC method - Water	82668	100	10/05/17 02:50 PM	IC4_171005A
	AX-25	Aqueous	E300	Anions by IC method - Water	82668	1	10/05/17 05:14 PM	IC4_171005A
	AX-25	Aqueous	M2540C	Total Dissolved Solids	82671	1	10/06/17 08:30 AM	WC_171005B
1710015-06A	AXMW-1	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	2	10/09/17 12:39 PM	ICP-MS4_171009C
	AXMW-1	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	50	10/09/17 02:01 PM	ICP-MS4_171009C
1710015-06B	AXMW-1	Aqueous	E300	Anions by IC method - Water	82668	100	10/05/17 03:02 PM	IC4_171005A

Lab Order: 1710015
Client: Pastor, Behling & Wheeler
Project: Sandow CCR

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1710015-06B	AXMW-1	Aqueous	E300	Anions by IC method - Water	82668	1	10/05/17 05:26 PM	IC4_171005A
	AXMW-1	Aqueous	M2540C	Total Dissolved Solids	82671	1	10/06/17 08:30 AM	WC_171005B
1710015-07A	AXMW-2	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	10	10/09/17 12:41 PM	ICP-MS4_171009C
	AXMW-2	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	50	10/09/17 02:03 PM	ICP-MS4_171009C
1710015-07B	AXMW-2	Aqueous	E300	Anions by IC method - Water	82668	100	10/05/17 03:14 PM	IC4_171005A
	AXMW-2	Aqueous	E300	Anions by IC method - Water	82668	1	10/05/17 05:38 PM	IC4_171005A
	AXMW-2	Aqueous	M2540C	Total Dissolved Solids	82671	1	10/06/17 08:30 AM	WC_171005B
1710015-08A	AX-29	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	1	10/09/17 12:43 PM	ICP-MS4_171009C
	AX-29	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	50	10/09/17 02:05 PM	ICP-MS4_171009C
1710015-08B	AX-29	Aqueous	E300	Anions by IC method - Water	82668	100	10/05/17 03:26 PM	IC4_171005A
	AX-29	Aqueous	E300	Anions by IC method - Water	82668	1	10/05/17 05:50 PM	IC4_171005A
	AX-29	Aqueous	M2540C	Total Dissolved Solids	82671	1	10/06/17 08:30 AM	WC_171005B
1710015-09A	AX-23	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	1	10/09/17 12:26 PM	ICP-MS4_171009C
	AX-23	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	82680	50	10/09/17 01:47 PM	ICP-MS4_171009C
1710015-09B	AX-23	Aqueous	E300	Anions by IC method - Water	82668	10	10/05/17 03:38 PM	IC4_171005A
	AX-23	Aqueous	E300	Anions by IC method - Water	82668	1	10/05/17 06:02 PM	IC4_171005A
	AX-23	Aqueous	M2540C	Total Dissolved Solids	82671	1	10/06/17 08:30 AM	WC_171005B

DHL Analytical, Inc.

Date: 11-Oct-17

CLIENT: Pastor, Behling & Wheeler
Project: Sandow CCR
Project No: 5164E
Lab Order: 1710015

Client Sample ID: AX-24
Lab ID: 1710015-01
Collection Date: 10/02/17 11:40 AM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A		Analyst: SP			
Boron	0.129	0.0100	0.0300		mg/L	1	10/09/17 12:29 PM
Calcium	252	5.00	15.0		mg/L	50	10/09/17 01:51 PM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	307	30.0	100		mg/L	100	10/05/17 01:38 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	10/05/17 04:26 PM
Sulfate	632	100	300		mg/L	100	10/05/17 01:38 PM
TOTAL DISSOLVED SOLIDS		M2540C		Analyst: BTJ			
Total Dissolved Solids (Residue, Filterable)	1810	50.0	50.0		mg/L	1	10/06/17 08:30 AM

LUMINANT

Qualifiers:	* Value exceeds TCLP Maximum Concentration Level	B Analyte detected in the associated Method Blank
	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 NELAC certified	

DHL Analytical, Inc.

Date: 11-Oct-17

CLIENT: Pastor, Behling & Wheeler
Project: Sandow CCR
Project No: 5164E
Lab Order: 1710015

Client Sample ID: AX-27
Lab ID: 1710015-02
Collection Date: 10/02/17 02:50 PM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A		Analyst: SP			
Boron	0.206	0.0100	0.0300		mg/L	1	10/09/17 12:31 PM
Calcium	462	5.00	15.0		mg/L	50	10/09/17 01:53 PM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	652	30.0	100		mg/L	100	10/05/17 02:14 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	10/05/17 04:38 PM
Sulfate	569	100	300		mg/L	100	10/05/17 02:14 PM
TOTAL DISSOLVED SOLIDS		M2540C		Analyst: BTJ			
Total Dissolved Solids (Residue, Filterable)	2490	50.0	50.0		mg/L	1	10/06/17 08:30 AM

LUMINANT

Qualifiers:	* Value exceeds TCLP Maximum Concentration Level	B Analyte detected in the associated Method Blank
	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 NELAC certified	

DHL Analytical, Inc.

Date: 11-Oct-17

CLIENT: Pastor, Behling & Wheeler
Project: Sandow CCR
Project No: 5164E
Lab Order: 1710015

Client Sample ID: AX-28
Lab ID: 1710015-03
Collection Date: 10/02/17 04:05 PM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A		Analyst: SP			
Boron	0.207	0.0100	0.0300		mg/L	1	10/09/17 12:33 PM
Calcium	664	5.00	15.0		mg/L	50	10/09/17 01:55 PM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	384	30.0	100		mg/L	100	10/05/17 02:26 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	10/05/17 04:50 PM
Sulfate	1670	100	300		mg/L	100	10/05/17 02:26 PM
TOTAL DISSOLVED SOLIDS		M2540C		Analyst: BTJ			
Total Dissolved Solids (Residue, Filterable)	3350	50.0	50.0		mg/L	1	10/06/17 08:30 AM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	B	Analyte detected in the associated Method Blank
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 NELAC certified		

DHL Analytical, Inc.

Date: 11-Oct-17

CLIENT: Pastor, Behling & Wheeler
Project: Sandow CCR
Project No: 5164E
Lab Order: 1710015

Client Sample ID: AX-26
Lab ID: 1710015-04
Collection Date: 10/02/17 05:35 PM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A		Analyst: SP			
Boron	0.352	0.0100	0.0300		mg/L	1	10/09/17 12:35 PM
Calcium	666	5.00	15.0		mg/L	50	10/09/17 01:57 PM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	1100	30.0	100		mg/L	100	10/05/17 02:38 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	10/05/17 05:02 PM
Sulfate	945	100	300		mg/L	100	10/05/17 02:38 PM
TOTAL DISSOLVED SOLIDS		M2540C		Analyst: BTJ			
Total Dissolved Solids (Residue, Filterable)	3740	50.0	50.0		mg/L	1	10/06/17 08:30 AM

LUMINANT

- Qualifiers:**
- * Value exceeds TCLP Maximum Concentration Level
 - 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 NELAC certified
 - B Analyte detected in the associated Method Blank
 - DF Dilution Factor
 - J Analyte detected between MDL and RL
 - ND Not Detected at the Method Detection Limit
 - S Spike Recovery outside control limits

DHL Analytical, Inc.

Date: 11-Oct-17

CLIENT: Pastor, Behling & Wheeler
Project: Sandow CCR
Project No: 5164E
Lab Order: 1710015

Client Sample ID: AX-25
Lab ID: 1710015-05
Collection Date: 10/03/17 09:30 AM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A		Analyst: SP			
Boron	0.205	0.0100	0.0300		mg/L	1	10/09/17 12:37 PM
Calcium	325	5.00	15.0		mg/L	50	10/09/17 01:59 PM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	586	30.0	100		mg/L	100	10/05/17 02:50 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	10/05/17 05:14 PM
Sulfate	504	100	300		mg/L	100	10/05/17 02:50 PM
TOTAL DISSOLVED SOLIDS		M2540C		Analyst: BTJ			
Total Dissolved Solids (Residue, Filterable)	2400	50.0	50.0		mg/L	1	10/06/17 08:30 AM

LUMINANT

- Qualifiers:**
- * Value exceeds TCLP Maximum Concentration Level
 - 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 NELAC certified
 - B Analyte detected in the associated Method Blank
 - DF Dilution Factor
 - J Analyte detected between MDL and RL
 - ND Not Detected at the Method Detection Limit
 - S Spike Recovery outside control limits

DHL Analytical, Inc.

Date: 11-Oct-17

CLIENT: Pastor, Behling & Wheeler
Project: Sandow CCR
Project No: 5164E
Lab Order: 1710015

Client Sample ID: AXMW-1
Lab ID: 1710015-06
Collection Date: 10/03/17 11:20 AM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A		Analyst: SP			
Boron	0.463	0.0200	0.0600		mg/L	2	10/09/17 12:39 PM
Calcium	477	5.00	15.0		mg/L	50	10/09/17 02:01 PM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	348	30.0	100		mg/L	100	10/05/17 03:02 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	10/05/17 05:26 PM
Sulfate	1990	100	300		mg/L	100	10/05/17 03:02 PM
TOTAL DISSOLVED SOLIDS		M2540C		Analyst: BTJ			
Total Dissolved Solids (Residue, Filterable)	3620	50.0	50.0		mg/L	1	10/06/17 08:30 AM

LUMINANT

Qualifiers:	* Value exceeds TCLP Maximum Concentration Level	B Analyte detected in the associated Method Blank
	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 NELAC certified	

DHL Analytical, Inc.

Date: 11-Oct-17

CLIENT: Pastor, Behling & Wheeler
Project: Sandow CCR
Project No: 5164E
Lab Order: 1710015

Client Sample ID: AXMW-2
Lab ID: 1710015-07
Collection Date: 10/03/17 12:25 PM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A		Analyst: SP			
Boron	2.14	0.100	0.300		mg/L	10	10/09/17 12:41 PM
Calcium	644	5.00	15.0		mg/L	50	10/09/17 02:03 PM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	207	30.0	100		mg/L	100	10/05/17 03:14 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	10/05/17 05:38 PM
Sulfate	1990	100	300		mg/L	100	10/05/17 03:14 PM
TOTAL DISSOLVED SOLIDS		M2540C		Analyst: BTJ			
Total Dissolved Solids (Residue, Filterable)	3640	50.0	50.0		mg/L	1	10/06/17 08:30 AM

LUMINANT

Qualifiers:	* Value exceeds TCLP Maximum Concentration Level	B Analyte detected in the associated Method Blank
	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 NELAC certified	

DHL Analytical, Inc.

Date: 11-Oct-17

CLIENT: Pastor, Behling & Wheeler
Project: Sandow CCR
Project No: 5164E
Lab Order: 1710015

Client Sample ID: AX-29
Lab ID: 1710015-08
Collection Date: 10/03/17 02:05 PM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A		Analyst: SP			
Boron	0.316	0.0100	0.0300		mg/L	1	10/09/17 12:43 PM
Calcium	392	5.00	15.0		mg/L	50	10/09/17 02:05 PM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	276	30.0	100		mg/L	100	10/05/17 03:26 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	10/05/17 05:50 PM
Sulfate	1110	100	300		mg/L	100	10/05/17 03:26 PM
TOTAL DISSOLVED SOLIDS		M2540C		Analyst: BTJ			
Total Dissolved Solids (Residue, Filterable)	2480	50.0	50.0		mg/L	1	10/06/17 08:30 AM

LUMINANT

- Qualifiers:**
- * Value exceeds TCLP Maximum Concentration Level
 - 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 NELAC certified
 - B Analyte detected in the associated Method Blank
 - DF Dilution Factor
 - J Analyte detected between MDL and RL
 - ND Not Detected at the Method Detection Limit
 - S Spike Recovery outside control limits

DHL Analytical, Inc.

Date: 11-Oct-17

CLIENT: Pastor, Behling & Wheeler
Project: Sandow CCR
Project No: 5164E
Lab Order: 1710015

Client Sample ID: AX-23
Lab ID: 1710015-09
Collection Date: 10/03/17 04:20 PM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A		Analyst: SP			
Boron	0.314	0.0100	0.0300		mg/L	1	10/09/17 12:26 PM
Calcium	316	5.00	15.0		mg/L	50	10/09/17 01:47 PM
ANIONS BY IC METHOD - WATER		E300		Analyst: JL			
Chloride	184	3.00	10.0		mg/L	10	10/05/17 03:38 PM
Fluoride	<0.100	0.100	0.400		mg/L	1	10/05/17 06:02 PM
Sulfate	631	10.0	30.0		mg/L	10	10/05/17 03:38 PM
TOTAL DISSOLVED SOLIDS		M2540C		Analyst: BTJ			
Total Dissolved Solids (Residue, Filterable)	1620	50.0	50.0		mg/L	1	10/06/17 08:30 AM

LUMINANT

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	B	Analyte detected in the associated Method Blank
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 NELAC certified		

CLIENT: Pastor, Behling & Wheeler
Work Order: 1710015
Project: Sandow CCR

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_171009C

The QC data in batch 82680 applies to the following samples: 1710015-01A, 1710015-02A, 1710015-03A, 1710015-04A, 1710015-05A, 1710015-06A, 1710015-07A, 1710015-08A, 1710015-09A

Sample ID MB-82680	Batch ID: 82680	TestNo: SW6020A	Units: mg/L
SampType: MBLK	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 12:18:00 PM	Prep Date: 10/6/2017

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-82680	Batch ID: 82680	TestNo: SW6020A	Units: mg/L
SampType: LCS	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 12:20:00 PM	Prep Date: 10/6/2017

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.203	0.0300	0.200	0	101	80	120			
Calcium	5.18	0.300	5.00	0	104	80	120			

Sample ID LCSD-82680	Batch ID: 82680	TestNo: SW6020A	Units: mg/L
SampType: LCSD	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 12:22:00 PM	Prep Date: 10/6/2017

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.209	0.0300	0.200	0	104	80	120	2.84	15	
Calcium	5.18	0.300	5.00	0	104	80	120	0.014	15	

Sample ID 1710015-09A SD	Batch ID: 82680	TestNo: SW6020A	Units: mg/L
SampType: SD	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 12:28:00 PM	Prep Date: 10/6/2017

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.342	0.150	0	0.314				8.46	10	

Sample ID 1710015-09A PDS	Batch ID: 82680	TestNo: SW6020A	Units: mg/L
SampType: PDS	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 12:47:00 PM	Prep Date: 10/6/2017

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.501	0.0300	0.200	0.314	93.2	80	120			

Sample ID 1710015-09A MS	Batch ID: 82680	TestNo: SW6020A	Units: mg/L
SampType: MS	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 12:48:00 PM	Prep Date: 10/6/2017

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.511	0.0300	0.200	0.314	98.5	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 NELAC certified

CLIENT: Pastor, Behling & Wheeler
Work Order: 1710015
Project: Sandow CCR

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_171009C

Sample ID 1710015-09A MSD	Batch ID: 82680	TestNo: SW6020A	Units: mg/L							
SampType: MSD	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 12:50:00 PM	Prep Date: 10/6/2017							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Boron	0.515	0.0300	0.200	0.314	100	80	120	0.713	15	
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Sample ID 1710015-09A SD	Batch ID: 82680	TestNo: SW6020A	Units: mg/L							
SampType: SD	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 1:49:00 PM	Prep Date: 10/6/2017							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	320	75.0	0	316				1.28	10	
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Sample ID 1710015-09A PDS	Batch ID: 82680	TestNo: SW6020A	Units: mg/L							
SampType: PDS	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 2:09:00 PM	Prep Date: 10/6/2017							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	626	15.0	250	316	124	80	120			S
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Sample ID 1710015-09A MS	Batch ID: 82680	TestNo: SW6020A	Units: mg/L							
SampType: MS	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 2:11:00 PM	Prep Date: 10/6/2017							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	314	15.0	5.00	316	-30.9	80	120			S
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Sample ID 1710015-09A MSD	Batch ID: 82680	TestNo: SW6020A	Units: mg/L							
SampType: MSD	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 2:13:00 PM	Prep Date: 10/6/2017							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	318	15.0	5.00	316	40.1	80	120	1.12	15	S
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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 NELAC certified

CLIENT: Pastor, Behling & Wheeler
Work Order: 1710015
Project: Sandow CCR

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_171009C

Sample ID ICV-171009	Batch ID: R94582	TestNo: SW6020A	Units: mg/L							
SampType: ICV	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 10:07:00 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.0991	0.0300	0.100	0	99.1	90	110			
Calcium	2.55	0.300	2.50	0	102	90	110			

Sample ID LCVL-171009	Batch ID: R94582	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 10:14:00 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.0208	0.0300	0.0200	0	104	70	130			
Calcium	0.105	0.300	0.100	0	105	70	130			

Sample ID CCV2-171009	Batch ID: R94582	TestNo: SW6020A	Units: mg/L							
SampType: CCV	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 11:22:00 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.212	0.0300	0.200	0	106	90	110			
Calcium	5.18	0.300	5.00	0	104	90	110			

Sample ID LCVL2-171009	Batch ID: R94582	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 11:26:00 AM	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	0.107	0.300	0.100	0	107	70	130			

Sample ID CCV3-171009	Batch ID: R94582	TestNo: SW6020A	Units: mg/L							
SampType: CCV	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 12:57:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.218	0.0300	0.200	0	109	90	110			
Calcium	5.14	0.300	5.00	0	103	90	110			

Sample ID LCVL3-171009	Batch ID: R94582	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 1:09:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.0246	0.0300	0.0200	0	123	70	130			
Calcium	0.102	0.300	0.100	0	102	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 NELAC certified

CLIENT: Pastor, Behling & Wheeler
Work Order: 1710015
Project: Sandow CCR

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_171009C

Sample ID CCV4-171009	Batch ID: R94582	TestNo: SW6020A	Units: mg/L							
SampType: CCV	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 1:22:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	5.14	0.300	5.00	0	103	90	110			
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Sample ID LCVL4-171009	Batch ID: R94582	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 1:28:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	0.0999	0.300	0.100	0	99.9	70	130			
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Sample ID CCV5-171009	Batch ID: R94582	TestNo: SW6020A	Units: mg/L							
SampType: CCV	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 2:15:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	5.07	0.300	5.00	0	101	90	110			
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Sample ID LCVL5-171009	Batch ID: R94582	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_171009C	Analysis Date: 10/9/2017 2:19:00 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	0.0965	0.300	0.100	0	96.5	70	130			
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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 NELAC certified

CLIENT: Pastor, Behling & Wheeler
Work Order: 1710015
Project: Sandow CCR

ANALYTICAL QC SUMMARY REPORT

RunID: IC4_171005A

The QC data in batch 82668 applies to the following samples: 1710015-01B, 1710015-02B, 1710015-03B, 1710015-04B, 1710015-05B, 1710015-06B, 1710015-07B, 1710015-08B, 1710015-09B

Sample ID MB-82668	Batch ID: 82668	TestNo: E300	Units: mg/L							
SampType: MBLK	Run ID: IC4_171005A	Analysis Date: 10/5/2017 12:13:44 PM	Prep Date: 10/5/2017							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Chloride	<0.300	1.00								
Fluoride	<0.100	0.400								
Sulfate	<1.00	3.00								

Sample ID LCS-82668	Batch ID: 82668	TestNo: E300	Units: mg/L							
SampType: LCS	Run ID: IC4_171005A	Analysis Date: 10/5/2017 12:25:44 PM	Prep Date: 10/5/2017							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Chloride	9.89	1.00	10.00	0	98.9	90	110			
Fluoride	3.98	0.400	4.000	0	99.5	90	110			
Sulfate	29.5	3.00	30.00	0	98.3	90	110			

Sample ID LCS-82668	Batch ID: 82668	TestNo: E300	Units: mg/L							
SampType: LCS	Run ID: IC4_171005A	Analysis Date: 10/5/2017 12:37:44 PM	Prep Date: 10/5/2017							
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	0.453	20	
Fluoride	3.97	0.400	4.000	0	99.4	90	110	0.129	20	
Sulfate	29.3	3.00	30.00	0	97.7	90	110	0.601	20	

Sample ID 1710015-01BMS	Batch ID: 82668	TestNo: E300	Units: mg/L							
SampType: MS	Run ID: IC4_171005A	Analysis Date: 10/5/2017 1:50:18 PM	Prep Date: 10/5/2017							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Chloride	2400	100	2000	307.0	104	90	110			
Fluoride	2040	40.0	2000	0	102	90	110			
Sulfate	2700	300	2000	632.2	103	90	110			

Sample ID 1710015-01BMSD	Batch ID: 82668	TestNo: E300	Units: mg/L							
SampType: MSD	Run ID: IC4_171005A	Analysis Date: 10/5/2017 2:02:18 PM	Prep Date: 10/5/2017							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Chloride	2400	100	2000	307.0	105	90	110	0.098	20	
Fluoride	2030	40.0	2000	0	102	90	110	0.345	20	
Sulfate	2650	300	2000	632.2	101	90	110	1.79	20	

<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 NELAC certified</p>
---	--

CLIENT: Pastor, Behling & Wheeler
Work Order: 1710015
Project: Sandow CCR

ANALYTICAL QC SUMMARY REPORT

RunID: IC4_171005A

Sample ID ICV-171005	Batch ID: R94547	TestNo: E300	Units: mg/L
SampType: ICV	Run ID: IC4_171005A	Analysis Date: 10/5/2017 11:49:44 AM	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	24.9	1.00	25.00	0	99.6	90	110			
Fluoride	9.87	0.400	10.00	0	98.7	90	110			
Sulfate	75.4	3.00	75.00	0	101	90	110			

Sample ID CCV1-171005	Batch ID: R94547	TestNo: E300	Units: mg/L
SampType: CCV	Run ID: IC4_171005A	Analysis Date: 10/5/2017 4:02:18 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	4.02	0.400	4.000	0	101	90	110			
Sulfate	29.5	3.00	30.00	0	98.3	90	110			

Sample ID CCV2-171005	Batch ID: R94547	TestNo: E300	Units: mg/L
SampType: CCV	Run ID: IC4_171005A	Analysis Date: 10/5/2017 6:26:18 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	4.05	0.400	4.000	0	101	90	110			
Sulfate	31.0	3.00	30.00	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 NELAC certified

CLIENT: Pastor, Behling & Wheeler
Work Order: 1710015
Project: Sandow CCR

ANALYTICAL QC SUMMARY REPORT

RunID: WC_171005B

The QC data in batch 82671 applies to the following samples: 1710015-01B, 1710015-02B, 1710015-03B, 1710015-04B, 1710015-05B, 1710015-06B, 1710015-07B, 1710015-08B, 1710015-09B

Sample ID MB-82671	Batch ID: 82671	TestNo: M2540C	Units: mg/L							
SampType: MBLK	Run ID: WC_171005B	Analysis Date: 10/6/2017 8:30:00 AM	Prep Date: 10/5/2017							
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-82671	Batch ID: 82671	TestNo: M2540C	Units: mg/L							
SampType: LCS	Run ID: WC_171005B	Analysis Date: 10/6/2017 8:30:00 AM	Prep Date: 10/5/2017							
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 1710036-03B-DUP	Batch ID: 82671	TestNo: M2540C	Units: mg/L							
SampType: DUP	Run ID: WC_171005B	Analysis Date: 10/6/2017 8:30:00 AM	Prep Date: 10/5/2017							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera										
	2510	50.0	0	2545				1.38	5	

Sample ID 1710028-01A-DUP	Batch ID: 82671	TestNo: M2540C	Units: mg/L							
SampType: DUP	Run ID: WC_171005B	Analysis Date: 10/6/2017 8:30:00 AM	Prep Date: 10/5/2017							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera										
	584	10.0	0	588.0				0.683	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 NELAC certified | |



March 23, 2018

Craig Bennett
BBA Engineering
165 N. Lampasas St.
Bertram, TX 78605
TEL: (512) 355-9198
FAX (512) 355-9197
RE: Alcoa AX LF

Order No.: 1803163

Dear Craig Bennett:

DHL Analytical, Inc. received 5 sample(s) on 3/16/2018 for the analyses presented in the following report.

There were no problems with the analyses and all data met requirements of NELAC except where noted in the Case Narrative. All non-NELAC 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 'LUMINA'. The signature is written in a cursive style.

John DuPont
General Manager

This report was performed under the accreditation of the State of Texas Laboratory Certification Number: T104704211-17-19



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LUMINANT



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 Phone (512) 388-8222 ■ FAX (512) 388-8229
 Web: www.dhlanalytical.com
 E-Mail: login@dhlanalytical.com



No 78472
CHAIN-OF-CUSTODY

CLIENT: BULLOCK BENNETT & ASSOCIATES, LLC
 ADDRESS: 165 N. LAMPASAS ST, BERGARAM, TX 78605
 PHONE: 512.355.9198 FAX/E-MAIL: 512.355.9197
 DATA REPORTED TO: CRAG BENNETT, JEFF JONES/VICTRA ENERGY
 ADDITIONAL REPORT COPIES TO: Jeff A. Jones@victraenergy.com

DATE: 3.16.2018 PAGE 1 OF 1
 PO #: 17254-418 DHL WORK ORDER #: 1803163
 PROJECT LOCATION OR NAME: ALDA AX 25
 CLIENT PROJECT #: 17254-418 COLLECTOR: C. A. WINHUSE

Field Sample I.D.	DHL Lab #	Date	Time	Matrix	Container Type	# of Containers	PRESERVATION					ANALYSES	FIELD NOTES
							HCl	HNO ₃	H ₂ SO ₄	NaOH	ICE		
MW-1V	01	3.16.18	0800	W	250ul P	2	/	/	/	/			
AX-25	02		1056			1	/	/	/	/			
AX-27	03		1151			2	/	/	/	/			
AX-28	04		1221			1	/	/	/	/			
RINSE	05		1232			2	/	/	/	/			

RELINQUISHED BY: (Signature)	DATE/TIME <u>3.16.18/1337</u>	RECEIVED BY: (Signature)	TURN AROUND TIME RUSH <input type="checkbox"/> CALL FIRST 1 DAY <input type="checkbox"/> CALL FIRST 2 DAY <input type="checkbox"/> NORMAL <input checked="" type="checkbox"/> OTHER <input type="checkbox"/>	LABORATORY USE ONLY: RECEIVING TEMP: <u>2.0</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 type="checkbox"/> FEDEX <input type="checkbox"/> UPS <input type="checkbox"/> OTHER <input checked="" type="checkbox"/> COURIER DELIVERY <input checked="" type="checkbox"/> HAND DELIVERED
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)		
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)		

Sample Receipt Checklist

Client Name BBA Engineering

Date Received: 3/16/2018

Work Order Number 1803163

Received by EL

Checklist completed by: [Signature] 3/16/2018
Signature Date

Reviewed by: [Initials] 3/16/2018
Initials Date

Carrier name Hand Delivered

- 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 2.0 °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: BBA Engineering
Project: Alcoa AX LF
Lab Order: 1803163

CASE NARRATIVE

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

- Method SW6020A - Metals Analysis
- Method E300 - Anions Analysis

LOG IN

The samples were received and log-in performed on 3/16/2018. A total of 5 samples were received and analyzed. The samples arrived in good condition and were properly packaged.

ANIONS ANALYSIS

For Anions Analysis, the recovery of Sulfate for the Matrix Spike (1803163-05 MS) was slightly above the method control limits. This is flagged accordingly in the QC Summary Report. This anion was within method control limits in the associated LCS/MSD. The reference sample selected for the Batch QC was from this workorder. No further corrective action was taken.

METALS ANALYSIS

For Metals Analysis, the recovery of Calcium for the Matrix Spike and Matrix Spike Duplicate (1803145-07 MS/MSD) were below the method control limits. These are flagged accordingly in the QC Summary Report. This analyte was within method control limits in the associated LCS. The reference sample selected for the Batch QC was not from this workorder. No further corrective action was taken.

CLIENT: BBA Engineering
Project: Alcoa AX LF
Lab Order: 1803163

Work Order Sample Summary

Lab Smp ID	Client Sample ID	Tag Number	Date Collected	Date Recved
1803163-01	MW-IV		03/16/18 08:00 AM	3/16/2018
1803163-02	AX-25		03/16/18 10:56 AM	3/16/2018
1803163-03	AX-27		03/16/18 11:51 AM	3/16/2018
1803163-04	AX-28		03/16/18 12:21 PM	3/16/2018
1803163-05	Rinsate		03/16/18 12:30 PM	3/16/2018

LUMINANT

Lab Order: 1803163
Client: BBA Engineering
Project: Alcoa AX LF

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1803163-01A	MW-IV	03/16/18 08:00 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	03/20/18 08:42 AM	84781
	MW-IV	03/16/18 08:00 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	03/20/18 08:42 AM	84781
1803163-01B	MW-IV	03/16/18 08:00 AM	Aqueous	E300	Anion Preparation	03/19/18 09:29 AM	84764
1803163-02A	AX-25	03/16/18 10:56 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	03/20/18 08:42 AM	84781
	AX-25	03/16/18 10:56 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	03/20/18 08:42 AM	84781
1803163-03A	AX-27	03/16/18 11:51 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	03/20/18 08:42 AM	84781
	AX-27	03/16/18 11:51 AM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	03/20/18 08:42 AM	84781
1803163-03B	AX-27	03/16/18 11:51 AM	Aqueous	E300	Anion Preparation	03/19/18 09:29 AM	84764
1803163-04A	AX-28	03/16/18 12:21 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	03/20/18 08:42 AM	84781
	AX-28	03/16/18 12:21 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	03/20/18 08:42 AM	84781
1803163-05A	Rinsate	03/16/18 12:30 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	03/20/18 08:42 AM	84781
1803163-05B	Rinsate	03/16/18 12:30 PM	Aqueous	E300	Anion Preparation	03/20/18 09:10 AM	84770
	Rinsate	03/16/18 12:30 PM	Aqueous	E300	Anion Preparation	03/19/18 09:29 AM	84764

Lab Order: 1803163
 Client: BBA Engineering
 Project: Alcoa AX LF

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1803163-01A	MW-IV	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	84781	50	03/21/18 11:36 AM	ICP-MS4_180321B
	MW-IV	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	84781	1	03/21/18 11:14 AM	ICP-MS4_180321B
1803163-01B	MW-IV	Aqueous	E300	Anions by IC method - Water	84764	10	03/19/18 07:52 PM	IC4_180319A
1803163-02A	AX-25	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	84781	50	03/21/18 11:38 AM	ICP-MS4_180321B
	AX-25	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	84781	1	03/21/18 11:15 AM	ICP-MS4_180321B
1803163-03A	AX-27	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	84781	50	03/21/18 11:40 AM	ICP-MS4_180321B
	AX-27	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	84781	1	03/21/18 11:17 AM	ICP-MS4_180321B
1803163-03B	AX-27	Aqueous	E300	Anions by IC method - Water	84764	10	03/19/18 08:09 PM	IC4_180319A
1803163-04A	AX-28	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	84781	50	03/21/18 11:42 AM	ICP-MS4_180321B
	AX-28	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	84781	1	03/21/18 11:19 AM	ICP-MS4_180321B
1803163-05A	Rinsate	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	84781	1	03/21/18 11:21 AM	ICP-MS4_180321B
1803163-05B	Rinsate	Aqueous	E300	Anions by IC method - Water	84770	1	03/20/18 11:34 AM	IC4_180320A
	Rinsate	Aqueous	E300	Anions by IC method - Water	84764	10	03/19/18 08:26 PM	IC4_180319A

DHL Analytical, Inc.

Date: 23-Mar-18

CLIENT: BBA Engineering
Project: Alcoa AX LF
Project No: 17254-18U
Lab Order: 1803163

Client Sample ID: MW-IV
Lab ID: 1803163-01
Collection Date: 03/16/18 08:00 AM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A					Analyst: SP
Calcium	456	5.00	15.0		mg/L	50	03/21/18 11:36 AM
ANIONS BY IC METHOD - WATER		E300					Analyst: JL
Sulfate	648	10.0	30.0		mg/L	10	03/19/18 07:52 PM

LUMINANT

- Qualifiers:**
- * Value exceeds TCLP Maximum Concentration Level
 - 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 NELAC certified
 - B Analyte detected in the associated Method Blank
 - DF Dilution Factor
 - J Analyte detected between MDL and RL
 - ND Not Detected at the Method Detection Limit
 - S Spike Recovery outside control limits

DHL Analytical, Inc.

Date: 23-Mar-18

CLIENT: BBA Engineering
Project: Alcoa AX LF
Project No: 17254-18U
Lab Order: 1803163

Client Sample ID: AX-25
Lab ID: 1803163-02
Collection Date: 03/16/18 10:56 AM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A		Analyst: SP			
Calcium	302	5.00	15.0		mg/L	50	03/21/18 11:38 AM

LUMINANT

- | | | |
|--------------------|---|---|
| Qualifiers: | * Value exceeds TCLP Maximum Concentration Level | B Analyte detected in the associated Method Blank |
| | 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 NELAC certified | |

DHL Analytical, Inc.

Date: 23-Mar-18

CLIENT: BBA Engineering
Project: Alcoa AX LF
Project No: 17254-18U
Lab Order: 1803163

Client Sample ID: AX-27
Lab ID: 1803163-03
Collection Date: 03/16/18 11:51 AM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A					Analyst: SP
Calcium	453	5.00	15.0		mg/L	50	03/21/18 11:40 AM
ANIONS BY IC METHOD - WATER		E300					Analyst: JL
Sulfate	659	10.0	30.0		mg/L	10	03/19/18 08:09 PM

LUMINANT

- Qualifiers:**
- * Value exceeds TCLP Maximum Concentration Level
 - 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 NELAC certified
 - B Analyte detected in the associated Method Blank
 - DF Dilution Factor
 - J Analyte detected between MDL and RL
 - ND Not Detected at the Method Detection Limit
 - S Spike Recovery outside control limits

DHL Analytical, Inc.

Date: 23-Mar-18

CLIENT: BBA Engineering
Project: Alcoa AX LF
Project No: 17254-18U
Lab Order: 1803163

Client Sample ID: AX-28
Lab ID: 1803163-04
Collection Date: 03/16/18 12:21 PM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A					Analyst: SP
Calcium	634	5.00	15.0		mg/L	50	03/21/18 11:42 AM

LUMINANT

- Qualifiers:**
- * Value exceeds TCLP Maximum Concentration Level
 - 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 NELAC certified
 - B Analyte detected in the associated Method Blank
 - DF Dilution Factor
 - J Analyte detected between MDL and RL
 - ND Not Detected at the Method Detection Limit
 - S Spike Recovery outside control limits

DHL Analytical, Inc.

Date: 23-Mar-18

CLIENT: BBA Engineering
Project: Alcoa AX LF
Project No: 17254-18U
Lab Order: 1803163

Client Sample ID: Rinsate
Lab ID: 1803163-05
Collection Date: 03/16/18 12:30 PM
Matrix: AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
TRACE METALS: ICP-MS - WATER		SW6020A					Analyst: SP
Calcium	0.340	0.100	0.300		mg/L	1	03/21/18 11:21 AM
ANIONS BY IC METHOD - WATER		E300					Analyst: JL
Sulfate	<1.00	1.00	3.00		mg/L	1	03/20/18 11:34 AM

LUMINANT

- Qualifiers:**
- * Value exceeds TCLP Maximum Concentration Level
 - 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 NELAC certified
 - B Analyte detected in the associated Method Blank
 - DF Dilution Factor
 - J Analyte detected between MDL and RL
 - ND Not Detected at the Method Detection Limit
 - S Spike Recovery outside control limits

CLIENT: BBA Engineering
Work Order: 1803163
Project: Alcoa AX LF

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_180321B

The QC data in batch 84781 applies to the following samples: 1803163-01A, 1803163-02A, 1803163-03A, 1803163-04A, 1803163-05A

Sample ID MB-84781	Batch ID: 84781	TestNo: SW6020A	Units: mg/L							
SampType: MBLK	Run ID: ICP-MS4_180321B	Analysis Date: 3/21/2018 10:28:00 AM	Prep Date: 3/20/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium <0.100 0.300

Sample ID LCS-84781	Batch ID: 84781	TestNo: SW6020A	Units: mg/L							
SampType: LCS	Run ID: ICP-MS4_180321B	Analysis Date: 3/21/2018 10:30:00 AM	Prep Date: 3/20/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium 5.17 0.300 5.00 0 103 80 120

Sample ID LCSD-84781	Batch ID: 84781	TestNo: SW6020A	Units: mg/L							
SampType: LCSD	Run ID: ICP-MS4_180321B	Analysis Date: 3/21/2018 10:32:00 AM	Prep Date: 3/20/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium 5.21 0.300 5.00 0 104 80 120 0.772 15

Sample ID 1803145-07A MS	Batch ID: 84781	TestNo: SW6020A	Units: mg/L							
SampType: MS	Run ID: ICP-MS4_180321B	Analysis Date: 3/21/2018 11:00:00 AM	Prep Date: 3/20/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium 239 0.300 5.00 243 -74.7 80 120 S

Sample ID 1803145-07A MSD	Batch ID: 84781	TestNo: SW6020A	Units: mg/L							
SampType: MSD	Run ID: ICP-MS4_180321B	Analysis Date: 3/21/2018 11:02:00 AM	Prep Date: 3/20/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium 245 0.300 5.00 243 38.6 80 120 2.34 15 S

Sample ID 1803145-07A SD	Batch ID: 84781	TestNo: SW6020A	Units: mg/L							
SampType: SD	Run ID: ICP-MS4_180321B	Analysis Date: 3/21/2018 11:34:00 AM	Prep Date: 3/20/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium 252 75.0 0 251 0.383 10

Sample ID 1803145-07A PDS	Batch ID: 84781	TestNo: SW6020A	Units: mg/L							
SampType: PDS	Run ID: ICP-MS4_180321B	Analysis Date: 3/21/2018 11:44:00 AM	Prep Date: 3/20/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium 517 15.0 250 251 106 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 NELAC certified

CLIENT: BBA Engineering
Work Order: 1803163
Project: Alcoa AX LF

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_180321B

Sample ID ICV-180321	Batch ID: R97005	TestNo: SW6020A	Units: mg/L							
SampType: ICV	Run ID: ICP-MS4_180321B	Analysis Date: 3/21/2018 10:17:00 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	2.66	0.300	2.50	0	106	90	110			
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Sample ID LCVL-180321	Batch ID: R97005	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_180321B	Analysis Date: 3/21/2018 10:21:00 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	0.108	0.300	0.100	0	108	70	130			
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Sample ID CCV1-180321	Batch ID: R97005	TestNo: SW6020A	Units: mg/L							
SampType: CCV	Run ID: ICP-MS4_180321B	Analysis Date: 3/21/2018 11:03:00 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	5.46	0.300	5.00	0	109	90	110			
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Sample ID LCVL1-180321	Batch ID: R97005	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_180321B	Analysis Date: 3/21/2018 11:07:00 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	0.113	0.300	0.100	0	113	70	130			
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Sample ID CCV2-180321	Batch ID: R97005	TestNo: SW6020A	Units: mg/L							
SampType: CCV	Run ID: ICP-MS4_180321B	Analysis Date: 3/21/2018 11:24:00 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	5.28	0.300	5.00	0	106	90	110			
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Sample ID LCVL2-180321	Batch ID: R97005	TestNo: SW6020A	Units: mg/L							
SampType: LCVL	Run ID: ICP-MS4_180321B	Analysis Date: 3/21/2018 11:28:00 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	0.111	0.300	0.100	0	111	70	130			
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Sample ID CCV3-180321	Batch ID: R97005	TestNo: SW6020A	Units: mg/L							
SampType: CCV	Run ID: ICP-MS4_180321B	Analysis Date: 3/21/2018 11:46:00 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Calcium	5.29	0.300	5.00	0	106	90	110			
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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 NELAC certified

CLIENT: BBA Engineering
Work Order: 1803163
Project: Alcoa AX LF

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS4_180321B

Sample ID	LCVL3-180321	Batch ID:	R97005	TestNo:	SW6020A	Units:	mg/L			
SampType:	LCVL	Run ID:	ICP-MS4_180321B	Analysis Date:	3/21/2018 11:50:00 AM	Prep Date:				
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	0.104	0.300	0.100	0	104	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 NELAC certified

CLIENT: BBA Engineering
Work Order: 1803163
Project: Alcoa AX LF

ANALYTICAL QC SUMMARY REPORT

RunID: IC4_180319A

The QC data in batch 84764 applies to the following samples: 1803163-01B, 1803163-03B, 1803163-05B

Sample ID MB-84764	Batch ID: 84764	TestNo: E300	Units: mg/L							
SampType: MBLK	Run ID: IC4_180319A	Analysis Date: 3/19/2018 11:20:43 AM	Prep Date: 3/19/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	<1.00	3.00								

Sample ID LCS-84764	Batch ID: 84764	TestNo: E300	Units: mg/L							
SampType: LCS	Run ID: IC4_180319A	Analysis Date: 3/19/2018 11:37:43 AM	Prep Date: 3/19/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	29.8	3.00	30.00	0	99.4	90	110			

Sample ID LCSD-84764	Batch ID: 84764	TestNo: E300	Units: mg/L							
SampType: LCSD	Run ID: IC4_180319A	Analysis Date: 3/19/2018 11:54:43 AM	Prep Date: 3/19/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	30.3	3.00	30.00	0	101	90	110	1.53	20	

Sample ID 1803153-04GMS	Batch ID: 84764	TestNo: E300	Units: mg/L							
SampType: MS	Run ID: IC4_180319A	Analysis Date: 3/19/2018 2:39:55 PM	Prep Date: 3/19/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	27.3	3.00	20.00	5.796	108	90	110			

Sample ID 1803153-04GMSD	Batch ID: 84764	TestNo: E300	Units: mg/L							
SampType: MSD	Run ID: IC4_180319A	Analysis Date: 3/19/2018 2:56:55 PM	Prep Date: 3/19/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	27.2	3.00	20.00	5.796	107	90	110	0.360	20	

Sample ID 1803153-05GMS	Batch ID: 84764	TestNo: E300	Units: mg/L							
SampType: MS	Run ID: IC4_180319A	Analysis Date: 3/19/2018 3:37:45 PM	Prep Date: 3/19/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	37.7	3.00	20.00	16.46	106	90	110			

Sample ID 1803153-05GMSD	Batch ID: 84764	TestNo: E300	Units: mg/L							
SampType: MSD	Run ID: IC4_180319A	Analysis Date: 3/19/2018 3:54:45 PM	Prep Date: 3/19/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	37.8	3.00	20.00	16.46	107	90	110	0.192	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 NELAC certified

CLIENT: BBA Engineering
Work Order: 1803163
Project: Alcoa AX LF

ANALYTICAL QC SUMMARY REPORT

RunID: IC4_180319A

Sample ID CCV1-180319	Batch ID: R96967	TestNo: E300	Units: mg/L							
SampType: CCV	Run ID: IC4_180319A	Analysis Date: 3/19/2018 7:01:45 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	30.6	3.00	30.00	0	102	90	110			

Sample ID CCV2-180319	Batch ID: R96967	TestNo: E300	Units: mg/L							
SampType: CCV	Run ID: IC4_180319A	Analysis Date: 3/19/2018 10:59:45 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	30.9	3.00	30.00	0	103	90	110			

Sample ID ICV-180319	Batch ID: R96967	TestNo: E300	Units: mg/L							
SampType: ICV	Run ID: IC4_180319A	Analysis Date: 3/19/2018 10:46:43 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	76.8	3.00	75.00	0	102	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 NELAC certified</p>
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CLIENT: BBA Engineering
Work Order: 1803163
Project: Alcoa AX LF

ANALYTICAL QC SUMMARY REPORT

RunID: IC4_180320A

The QC data in batch 84770 applies to the following samples: 1803163-05B

Sample ID MB-84770	Batch ID: 84770	TestNo: E300	Units: mg/L							
SampType: MBLK	Run ID: IC4_180320A	Analysis Date: 3/20/2018 10:39:48 AM	Prep Date: 3/20/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	<1.00	3.00								

Sample ID LCS-84770	Batch ID: 84770	TestNo: E300	Units: mg/L							
SampType: LCS	Run ID: IC4_180320A	Analysis Date: 3/20/2018 10:56:48 AM	Prep Date: 3/20/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	30.9	3.00	30.00	0	103	90	110			

Sample ID LCSD-84770	Batch ID: 84770	TestNo: E300	Units: mg/L							
SampType: LCSD	Run ID: IC4_180320A	Analysis Date: 3/20/2018 11:13:48 AM	Prep Date: 3/20/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	31.2	3.00	30.00	0	104	90	110	0.930	20	

Sample ID 1803163-05BMS	Batch ID: 84770	TestNo: E300	Units: mg/L							
SampType: MS	Run ID: IC4_180320A	Analysis Date: 3/20/2018 11:51:39 AM	Prep Date: 3/20/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	22.9	3.00	20.00	0	114	90	110			S

Sample ID 1803163-05BMSD	Batch ID: 84770	TestNo: E300	Units: mg/L							
SampType: MSD	Run ID: IC4_180320A	Analysis Date: 3/20/2018 12:08:39 PM	Prep Date: 3/20/2018							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	21.5	3.00	20.00	0	108	90	110	6.00	20	

<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 NELAC certified</p>
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CLIENT: BBA Engineering
Work Order: 1803163
Project: Alcoa AX LF

ANALYTICAL QC SUMMARY REPORT

RunID: IC4_180320A

Sample ID ICV-180320	Batch ID: R96985	TestNo: E300	Units: mg/L							
SampType: ICV	Run ID: IC4_180320A	Analysis Date: 3/20/2018 10:05:48 AM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	78.8	3.00	75.00	0	105	90	110			

Sample ID CCV1-180320	Batch ID: R96985	TestNo: E300	Units: mg/L							
SampType: CCV	Run ID: IC4_180320A	Analysis Date: 3/20/2018 1:33:39 PM	Prep Date:							
Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	30.9	3.00	30.00	0	103	90	110			

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 NELAC certified
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LUMINANT



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