



2019 Annual Groundwater Monitoring and Corrective Action Report

Oak Grove Steam Electric Station Ash Landfill 1 - Robertson County, Texas

Prepared for:

Oak Grove Management Company LLC

Submitted by:

Golder Associates Inc.

2201 Double Creek Dr, Suite 4004, Round Rock, Texas, USA 78664

+1 512 671-3434

January 31, 2020

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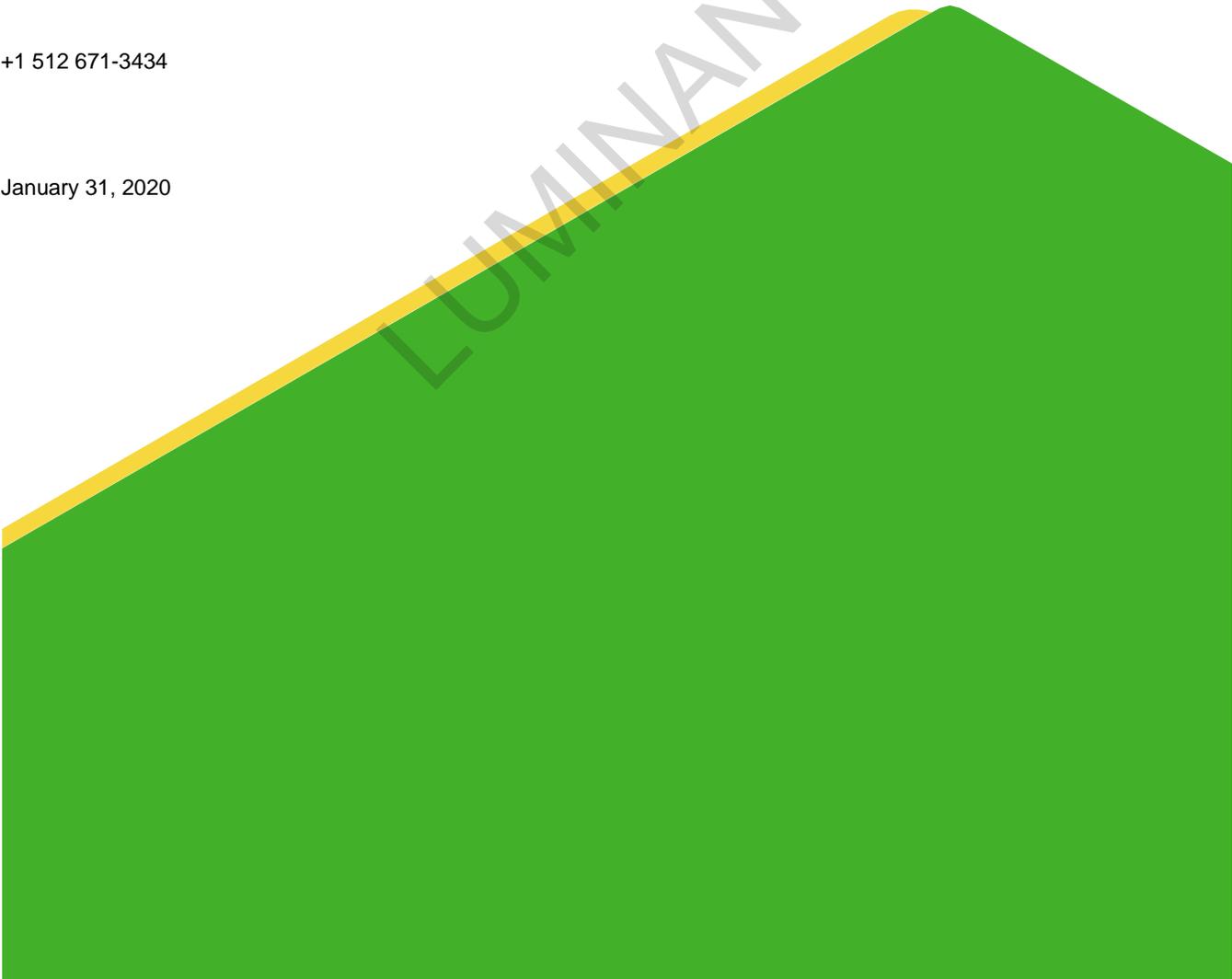


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ACRONYMS AND ABBREVIATIONS

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
OGSES	Oak Grove Steam Electric Station
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 Oak Grove Management Company LLC to satisfy annual groundwater monitoring and corrective action reporting requirements of the Coal Combustion Residuals (CCR) Rule for the Ash Landfill 1 at the Oak Grove Steam Electric Station (OGSES) in Robertson County, Texas. The CCR unit 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 Ash Landfill 1 is currently in the Detection Monitoring Program. Golder collected the initial Detection Monitoring Program groundwater samples from the Ash Landfill 1 CCR monitoring well network in October 2017. Detection groundwater samples were also collected from the CCR groundwater monitoring network on a semi-annual basis in 2018 and 2019, as required by the CCR Rule. The data evaluation was completed 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
October 2017	Appendix III	No	No
June 2018 September 2018 November 2018 (re-samples)	Appendix III	Yes	No (Alternate Source Demonstration Completed)
May 2019 August 2019	Appendix III	Yes	To Be Determined (Alternate Source Currently Being Assessed)

The statistical background values and Appendix III analytical data are presented in Tables 1 and 2, respectively. SSIs of Appendix III parameters were identified based on the 2018 sampling data. An initial Alternate Source Demonstration was completed in 2019, which indicated that a source other than the CCR unit caused the SSIs observed in the 2018 sample data. As such, the Ash Landfill 1 has remained in the Detection Monitoring Program. A summary of the 2019 Alternate Source Demonstration is presented in Attachment 1.

Detection Monitoring Program groundwater samples were collected from the CCR groundwater monitoring network on a semi-annual basis in 2019, as required by the CCR Rule. The first 2019 semi-annual Detection Monitoring Program sampling event was conducted in May 2019. The second 2019 semi-annual Detection Monitoring Program sampling event was conducted in November 2019. The analytical data from the 2019 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. SSIs of Appendix III parameters over background concentrations were identified for one constituent (boron) for which

SSIs had previously been attributed to alternate sources and one constituent (sulfate) for which SSIs had not previously been observed. Alternate sources for the SSIs identified in the 2019 sample data are being evaluated in accordance with 40 CFR § 257.94. If an alternate source is not identified to be the cause of the SSIs, an Assessment Monitoring Program will be established in accordance with 40 CFR § 257.94(e)(2).

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3.0 KEY ACTIONS COMPLETED IN 2019

Semi-annual Detection Monitoring Program groundwater monitoring events were conducted in May and November 2019. The number of groundwater samples that were collected for analysis of each background and downgradient well, the dates the samples were collected, and the analytical results for the groundwater samples are summarized in Table 2. A map showing the CCR units and monitoring wells is provided as Figure 1.

No CCR wells were installed or decommissioned in 2019.

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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 2019.

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5.0 KEY ACTIVITIES PLANNED FOR 2020

The following key activities are planned for 2020:

- 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 2020 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, Oak Grove Steam Electric Station, Ash Landfill, Robertson County, Texas.

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Signature Page

Golder Associates Inc.



Pat Behling
Principal Engineer



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FIGURES

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LEGEND

-  DOWNGRADIENT CCR MONITORING WELL
-  UPGRADIENT CCR MONITORING WELL

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PROJECT
**OAK GROVE STEAM ELECTRIC STATION
ROBERTSON COUNTY, TEXAS**

TITLE
DETAILED SITE PLAN - ASH LANDFILL

CONSULTANT



YYYY-MM-DD	2020-01-23
DESIGNED	AJD
PREPARED	AJD
REVIEWED	WVW
APPROVED	WVW

REFERENCE(S)

BASE MAP TAKEN FROM GOOGLE EARTH, IMAGERY DATED 12/9/18.

PROJECT NO.
19122262

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FIGURE
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TABLES

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Table 1
Statistical Background Value
OGSES Ash Landfill I

Parameter	Statistical Background Value
Boron (mg/L)	0.124
Calcium (mg/L)	74.9
Chloride (mg/L)	353
Fluoride (mg/L)	0.4
field pH (s.u.)	6.31 7.09
Sulfate (mg/L)	97.4
Total Dissolved Solids (mg/L)	948

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TABLE 2
APPENDIX III ANALYTICAL RESULTS
OGSES - ASH LANDFILL 1

Sample Location	Date Sampled	B (mg/L)	Ca (mg/L)	Cl (mg/L)	Fl (mg/L)	pH (s.u.)	SO ₄ (mg/L)	TDS (mg/L)
Upgradient Wells								
AL-10	11/04/15	0.0682	34.5	149	0.149 J	6.86	72.6	590
	12/18/15	0.0539	37.5	81	0.15 J	6.45	20.6	414
	02/10/16	0.0637	48.6	108	0.197 J	6.75	34.9	599
	04/15/16	0.0573	44.8	86	0.133	6.51	23.6	549
	06/16/16	0.0915	34.7	66.7	0.155 J	6.44	23.5	436
	08/25/16	0.105	87.5	444	<0.1	6.61	96.3	1,120
	10/04/16	0.0756	35.1	57.3	0.278 J	6.92	20.1	507
	12/22/16	0.0759	32.5	57.2	0.195 J	6.78	21.5	527
	10/02/17	0.0973	27	50.6	0.120 J	6.85	12.2	398
	06/04/18	0.0875	21.9	62.1	0.183 J	6.67	11.6	362
	09/06/18	0.113	21.9	56.7	0.260 J	6.66	11.8	371
05/17/19	0.114	16.8	67.9	0.262 J	6.64	12.4	340	
08/20/19	0.115	18.8	66.2	0.363 J	6.87	11.8	333	
MW-02	11/04/15	0.064	32.5	138	0.135 J	6.92	71.4	539
	12/18/15	0.0476	29	61.7	0.118 J	6.83	15.9	308
	02/10/16	0.0853	25.4	83.5	0.229 J	6.63	34	320
	04/15/16	0.0597	39.6	68	0.102	6.51	18.1	440
	06/16/16	0.106	26.5	87.8	0.161 J	6.89	34.8	343
	08/25/16	0.0492	12.9	21.9	0.164 J	6.58	22.4	163
	10/04/16	0.113	61.4	222	0.185 J	6.69	97.4	667
	12/21/16	0.11	47.8	185	0.293 J	6.78	83.4	590
	10/02/17	0.0567	22.2	42.4	<0.100	6.68	9.67	310
	06/04/18	0.144	82.4	275	0.139 J	6.28	121	740
	09/06/18	0.148	70.9	259	0.221 J	6.02	116	872
	05/17/19	0.0981	20	67.6	0.321 J	6.63	31.1	306
	08/20/19	0.0875	19.9	53.8	0.558	6.59	20.1	260
Downgradient Wells								
MW-05	11/04/15	0.0628	15.4	64.8	0.272 J	7.11	13.6	285
	12/18/15	0.0621	13	60.2	0.476	6.52	10.5	232
	02/10/16	0.0447	14	59.7	0.397 J	6.67	11.9	235
	04/15/16	0.0458	14.3	55.4	0.284	6.42	10.7	288
	06/15/16	0.058	14.2	60.4	0.306 J	6.61	11.8	269
	08/24/16	0.0877	13.1	63	0.262 J	6.75	11.8	287
	10/04/16	0.059	15.4	57.9	0.477	6.87	10.9	253
	12/22/16	0.0759	61.4	264	0.446	6.63	55.6	778
	10/02/17	0.0665	17.5	58.6	0.295 J	6.89	10.4	246
	06/05/18	0.0739	16.8	60	0.391 J	6.43	12.1	253
	09/07/18	0.077	15.8	63.3	0.392 J	6.11	10.6	249
	05/17/19	0.0686	13.5	66.4	0.462	6.57	11.2	257
	08/20/19	0.079	16	66.7	0.514	6.78	10.8	263
MW-07	11/03/15	0.0483	8.57	20.2	0.289 J	6.42	11.5	276
	12/17/15	0.0539	8.75	17.7	0.319 J	6.86	14.7	243
	02/09/16	0.0547	13.3	28.9	0.276 J	7.18	25.3	283
	04/15/16	0.0567	10	20.9	0.187	6.71	16	341
	06/15/16	0.0639	10.5	22.9	0.226 J	6.75	23.2	294
	08/24/16	0.0691	9.58	20.4	0.159 J	6.89	21.8	290
	10/04/16	0.0549	10.3	15.6	0.277 J	6.82	17.1	256
	12/22/16	0.054	12.5	22.9	0.229 J	6.29	34.7	262
	10/02/17	0.0733	13.9	15.8	0.178 J	6.59	38.4	298
	06/05/18	0.105	17.5	15.7	0.169 J	5.98	61.1	316
	09/07/18	0.151	19.7	21.5	0.250 J	6.18	80.3	357
	11/06/18	0.154	--	--	--	--	--	--
	05/17/19	0.132	17.1	20.2	0.244 J	6.83	84.1	355
08/19/19	0.215	22.8	19.7	0.367 J	6.77	100	385	

TABLE 2
APPENDIX III ANALYTICAL RESULTS
OGSES - ASH LANDFILL 1

Sample Location	Date Sampled	B (mg/L)	Ca (mg/L)	Cl (mg/L)	Fl (mg/L)	pH (s.u.)	SO ₄ (mg/L)	TDS (mg/L)	
MW-08	11/04/15	0.0631	120	599	0.17 J	6.81	138	2,070	
	12/18/15	0.0604	70.4	488	0.158 J	6.78	49.8	1,140	
	02/09/16	0.0695	140	612	0.175 J	6.42	170	1,530	
	04/15/16	0.0726	133	566	<0.1	6.61	139	1,680	
	06/16/16	0.0677	76.6	520	<0.1	6.76	83.6	1,090	
MW-08R	8/2016	Destroyed							
	12/22/16	0.0702	32.4	166	0.355 J	6.93	39.7	617	
	03/21/17	0.0662	117	563	0.2 J	5.83	98.3	1,220	
	04/20/17	0.0696	115	560	0.149 J	5.91	94.9	1,190	
	10/02/17	0.061	13.1	14.4	<0.100	6.63	28.7	243	
	06/05/18	0.082	18.9	53.9	0.138 J	6.37	9.66	302	
	09/07/18	0.0921	106	504	0.242 J	5.84	96.9	1,550	
	11/06/18	--	15.7	19	--	--	--	268	
	05/17/19	0.102	16.7	69.8	0.269 J	6.54	12.4	326	
	08/20/19	0.096	24.9	48	0.501	6.84	30.7	255	
	MW-09	11/03/15	0.0722	36.4	155	0.149 J	6.45	74.9	583
		12/18/15	0.077	40.3	157	0.266 J	6.48	83.1	528
02/09/16		0.072	38.4	158	0.152 J	6.16	80	445	
04/15/16		0.0734	42.2	151	<0.1	6.41	80.9	568	
06/15/16		0.0778	43.1	174	<0.1	6.52	98.7	574	
08/25/16		0.0829	45.6	195	<0.1	6.76	116	715	
10/04/16		0.0803	47.8	179	0.256 J	6.64	108	648	
12/22/16		0.0776	42.6	290	0.159 J	6.87	116	791	
10/02/17		0.106	58.2	140	<0.100	6.76	95.3	433	
06/04/18		0.091	21.7	6.48	0.162 J	6.28	6.08	135	
09/06/18		0.0999	49.8	186	0.134 J	5.61	104	704	
11/06/18		--	--	--	--	--	58.6	--	
05/17/19		0.12	17.2	366	0.541	6.72	53.2	935	
08/20/19		0.117	26	61.2	0.359 J	6.96	22.3	331	

Notes:

1. Abbreviations: mg/L - milligrams per liter; TDS - total dissolved solids; s.u. - standard units.
2. J - concentration is below method quantitation limit; result is an estimate.

ATTACHMENT 1
ALTERNATE SOURCE DEMONSTRATION REPORT

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ALTERNATE SOURCE DEMONSTRATION SUMMARY
OAK GROVE STEAM ELECTRIC STATION – ASH LANDFILL 1

Introduction

This Alternative Source Demonstration Summary was prepared to document that a source other than the Ash Landfill 1 (the Site) caused the statistically significant increases (SSIs) over background levels observed during the 2018 Detection Monitoring Program sampling events as required by 40 CFR 257.94(e)(2). A detailed Site plan of the Coal Combustion Residual (CCR) groundwater monitoring network is shown on Figure 1. The Detection Monitoring Program groundwater data are summarized in Table 1.

Ash Landfill 1 Groundwater Monitoring System

The CCR groundwater monitoring well system at the Ash Landfill 1 consists of six monitoring wells (MW-02, MW-05, MW-07, MW-08R, MW-09, and AL-10) that are each screened in the uppermost aquifer at the Site. The uppermost aquifer at the Site occurs under unconfined conditions within the shallow sand units at the Site (PBW, 2017a). Groundwater elevations have consistently been highest west of the Ash Landfill 1 and lowest east of the Ash Landfill 1 during the background and detection monitoring period, with a groundwater flow direction from west to east. Based on the observed groundwater potentiometric surface at the Site, the location of each CCR monitoring well relative to the Ash Landfill 1 is as follows:

Upgradient/Background Wells	Downgradient Wells
MW-02 AL-10	MW-05 MW-07 MW-08R MW-09

2018 Semi-Annual Detection Monitoring Results and Discussion

Detection Monitoring Program groundwater samples were collected on a semi-annual basis from the Site CCR monitoring well network in 2018 in accordance with 40 CFR 257.94. Golder collected the initial 2018 Detection Monitoring Program groundwater samples in June 2018 and the second semi-annual Detection Monitoring Program groundwater samples in September 2018. In accordance with procedures described in the Statistical Analysis Plan (PBW, 2017b), several verification re-samples were collected in November 2018 to verify the September 2018 sample results. Based on the semi-annual and re-sample results, SSIs were identified for boron in upgradient well MW-02 and downgradient well MW-07 during the second semi-annual and November 2018 re-sampling events. Additional potential SSIs were identified for other Appendix III constituents (calcium, chloride, sulfate, and TDS) during the second 2018 semi-annual sampling event; however, all verification sample results for these constituents were below prediction limits; therefore, in accordance with procedures outlined in the Statistical Analysis Plan, SSIs were not indicated for constituents other than boron.

The boron concentrations in upgradient well MW-02 and downgradient well MW-07 during the second semi-annual and re-sample events were very similar (approximately 0.15 mg/L in both wells). Since SSIs over background were observed in the upgradient/background well, MW-02, and the concentrations observed in that well were similar to those observed in downgradient well MW-07, the SSIs observed during the second semi-annual and resampling events are attributed to natural variation in groundwater quality related to heterogeneity of the uppermost aquifer at the Site rather than a release from the Ash Landfill 1.

Conclusion

SSIs were identified for boron during the 2018 Detection Monitoring Program sampling events at the Ash Landfill 1. All observed SSIs are attributed to natural variation in groundwater quality due to the heterogeneity of the groundwater system and are not considered evidence of a release from the CCR unit. In accordance with Section 257.94(e)(2), Luminant should continue the Detection Monitoring Program. Initiation of an Assessment Monitoring Program is not required at this time.

References

Pastor, Behling & Wheeler, LLC (PBW), 2017a. Coal Combustion Residual Rule, Groundwater Monitoring System Certification, Oak Grove Steam Electric Station, Ash Landfill 1, Robertson County, Texas. October 16, 2017.

Pastor, Behling & Wheeler, LLC (PBW), 2017b. Coal Combustion Residual Rule, Statistical Analysis Plan, Ash Landfill 1, Robertson County, Texas. October 11, 2017.

PROFESSIONAL CERTIFICATION

This document and all attachments were prepared by Golder Associates Inc. 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.



A handwritten signature in black ink that reads "Patrick J. Behling". The signature is written over a horizontal line.

Patrick J. Behling, P.E.

Principal Engineer

GOLDER ASSOCIATES INC.

Table 1
CCR Groundwater Detection Monitoring Data Summary
Ash Landfill I
Oak Grove Steam Electric Station

Sample Location	Date Sampled	B	Ca	Cl	Fl	field pH	SO ₄	TDS
Prediction Limit		0.124	74.9	353	0.4	6.31 7.09	97.4	948
Upgradient Wells								
AL-10	10/02/17	0.0973	27	50.6	0.120 J	6.85	12.2	398
	06/04/18	0.0875	21.9	62.1	0.183 J	6.67	11.6	362
	09/06/18	0.113	21.9	56.7	0.260 J	6.66	11.8	371
MW-02	10/02/17	0.0567	22.2	42.4	<0.100	6.68	9.67	310
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	06/05/18	0.0739	16.8	60	0.391 J	6.43	12.1	253
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	06/05/18	0.105	17.5	15.7	0.169 J	5.98	61.1	316
	09/07/18	0.151	19.7	21.5	0.250 J	6.18	80.3	357
	11/06/18	0.154	--	--	--	--	--	--
MW-08R	10/02/17	0.061	13.1	14.4	<0.100	6.63	28.7	243
	06/05/18	0.082	18.9	53.9	0.138 J	6.37	9.66	302
	09/07/18	0.0921	106	504	0.242 J	5.84	96.9	1,550
	11/06/18	--	15.7	19	--	--	--	268
MW-09	10/02/17	0.106	58.2	140	<0.100	6.76	95.3	433
	06/04/18	0.091	21.7	6.48	0.162 J	6.28	6.08	135
	09/06/18	0.0999	49.8	186	0.134 J	5.61	104	704
	--	--	--	--	--	--	58.6	--

Notes:

1. All concentrations in mg/L. pH in standard units.
2. J - concentration is below sample quantitation limit; result is an estimate.
3. Highlighted sample results exceed the prediction limit.



LEGEND



CCR MONITORING WELL

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PROJECT
**OAK GROVE STEAM ELECTRIC STATION
ROBERTSON COUNTY, TEXAS**

TITLE
DETAILED SITE PLAN

CONSULTANT



YYYY-MM-DD 2019-01-29

DESIGNED AJD

PREPARED AJD

REVIEWED WFV

APPROVED PJB

REFERENCE(S)

BASE MAP TAKEN FROM GOOGLE EARTH, IMAGERY DATED 10/30/14.

PROJECT NO.
30405440-D

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FIGURE
1

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