2019 Annual Groundwater Monitoring and Corrective Action Report

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

Prepared for:

Luminant Generation Company LLC

Submitted by:

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January 31, 2020

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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
MLSES	Martin Lake Steam Electric Station
NA	Not Applicable
SSI	Statistically Significant Increase
SSL	Statistically Significant Levels
USEPA	United States Environmental Protection Agency

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 A1 Area Landfill at the Martin Lake Steam Electric Station (MLSES) in Panola County, 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

Golder collected the initial Detection Monitoring Program groundwater samples from the A1 Area Landfill CCR monitoring well network in September 2017. The evaluation of those 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
September 25-26, 2017	Appendix III	Yes	July 16, 2018

Alternate source evaluations were inconclusive for one or more of the SSIs. Consequently, an Assessment Monitoring Program was initiated and established for the A1 Area Landfill CCR units in July 2018 in accordance with 40 CFR § 257.94(e)(2).

Assessment Monitoring groundwater samples were collected from the CCR groundwater monitoring network in 2018 and 2019, as required by the CCR Rule. Golder collected the initial Assessment Monitoring Program groundwater samples in June 2018. Subsequent Assessment Monitoring Program sampling events have been conducted on a semi-annual basis, as required by the CCR Rule. All CCR groundwater monitoring wells were sampled for Appendix III and Appendix IV constituents during the first semi-annual sampling events of each year. During the second semi-annual sampling events, the CCR wells were sampled for all Appendix III parameters and for the Appendix IV parameters that were detected during the first semi-annual sampling events in accordance with 40 CFR § 257.95(d)(1).

The statistical background values and Groundwater Protection Standards (GWPSs) are summarized in Tables 1 and 2, respectively. Appendix III and Appendix IV analytical data are summarized in Tables 3 and 4, respectively. Using the Appendix IV data collected during the assessment period through September 2018, SSLs above GWPSs were identified for arsenic, barium, cobalt, and lithium. Notification of these SSLs was placed in the operating record on February 6, 2019 and was subsequently placed on the public website in accordance with 40 CFR § 257.107(d). An Assessment of Corrective Measures (ACM) was initiated on April 8, 2019 pursuant to §257.95(g). A justification letter for a 60-day extension due to site-specific circumstances that delayed work on the ACM was certified on July 3, 2019 in accordance with 40 CFR §257.96(a). A copy of the extension justification letter is provided in Attachment 1. The ACM was completed in September 2019 (Golder 2019) for the parameters detected at SSLs above GWPSs, pursuant to 40 CFR § 257.96.

Additional semi-annual Assessment Monitoring events were conducted in June 2019 and September 2019. Statistical analysis of the 2019 data was performed in accordance with the Statistical Analysis Plan for CCR Groundwater Monitoring (PBW 2017) and the USEPA Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities-Unified Guidance (USEPA 2009). The statistical analysis included an evaluation of confidence intervals for each of the Appendix IV parameter data sets to evaluate whether constituent concentrations were present at concentrations above GWPSs. Cobalt was the only Appendix IV parameter identified at a SSL above the GWPS during the 2019 Assessment Monitoring period. Notification of the cobalt SSL based on the Appendix IV data collected through June 2019 was placed in the operating record on October 7, 2019 and was subsequently placed on the public website in accordance with 40 CFR § 257.107(d). Notification of the cobalt SSL based on Appendix IV data collected through September 2019 is due in the operating record in February 2020.

The Assessment Monitoring Program sampling dates and parameters are summarized in the following table:

Assessment Monitoring Program Summary

Sampling Dates	Analytical Data Receipt Date	Parameters Collected	SSL(s)	SSL(s) Determination Date	Corrective Measures Assessment Initiated
June 11-12, 2018	July 21, 2018	Appendix III Appendix IV	NA	NA	NA
September 13-14, 2018	October 12, 2018	Appendix III Appendix IV[1]	As, Ba, Co, Li	January 7, 2019	April 8, 2019
May 15, 2019	June 18, 2019	Appendix III Appendix IV	Co	September 5, 2019	NA
September 4 and 9, 2019	October 14, 2019	Appendix III Appendix IV[1]	Co	January 8, 2020	NA

Notes:

NA: Not Applicable

1. Groundwater sample analysis was limited to Appendix IV parameters detected in previous events in accordance with 40 CFR § 257.95(d)(1).

3.0 KEY ACTIONS COMPLETED IN 2019

Assessment Monitoring Program groundwater monitoring events were completed in June and September 2019. The number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and the analytical results for the groundwater samples are summarized in Table 3 (Appendix III parameters) and Table 4 (Appendix IV parameters). A map showing the CCR units and monitoring wells is provided as Figure 1.

As noted in Section 2.0, an ACM for the Appendix IV parameters identified at SSLs above GWPSs in 2018 (arsenic, barium, cobalt, and lithium) was completed in September 2019. Five new nature and extent monitoring wells (BMW-29, BMW-30, BMW-31, BMW-32, and BMW-33) were completed at the Site in May 2019 as part of the ACM evaluation. Two existing non-CCR wells (BMW-25 and AI-2-OB) were also used as nature and extent wells during the ACM evaluation. The location of the nature and extent wells are shown on Figure 1.

A public meeting was held on November 13, 2019 at the Henderson Chamber of Commerce to discuss the results of the of the ACM in accordance with 40 C.F.R. § 257.96(e).

4.0 PROBLEMS ENCOUNTERED AND ACTIONS TO RESOLVE THE PROBLEMS

No problems were encountered with the CCR groundwater monitoring program in 2019.

5.0 KEY ACTIVITIES PLANNED FOR 2020

The following key activities are planned for 2020:

- Continue the Assessment Monitoring Program in accordance with 40 CFR § 257.95.

- Complete statistical evaluation of Appendix IV analytical data from the downgradient wells and compare results to GWPSs to determine whether SSLs have occurred.

- If an SSL is identified, notification will be prepared as required under 40 CFR § 257.95(g), will placed in the operating record per 40 CFR § 257.105(h)(8), and will be subsequently placed on the public website per 40 CFR § 257.107(d). Potential alternate sources (i.e., a source other than the CCR unit caused the SSL or that the SSL 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 SSL, a written demonstration will be completed within 90 days of SSL detection and included in the Annual Groundwater Monitoring and Corrective Action Report.

- If an alternate source is not identified to be the cause of the SSL, the applicable requirements of 40 CFR §§ 257.94 through 257.98 (e.g., assessment of corrective measures) as may apply will be met, including associated recordkeeping/notifications required by 40 CFR §§ 257.105 through 257.108.

- The remedy for parameters detected at SSLs above GWPSs will be selected from the potential corrective measure alternatives proposed in the ACM (Golder 2019). The remedy will be selected in accordance with 40 CFR §257.97 as soon as feasible after the public meeting required under 40 CFR §257.96(e).

6.0 REFERENCES

Golder, 2019. CCR Assessment of Corrective Measures, Martin Lake Steam Electric Station – A1 Area Landfill, Panola County, Texas. September.

Pastor, Behling & Wheeler, LLC (PBW), 2017. Coal Combustion Residual Rule Statistical Analysis Plan, Martin Lake Steam Electric Station, A1 Area Landfill, Rusk County, Texas.

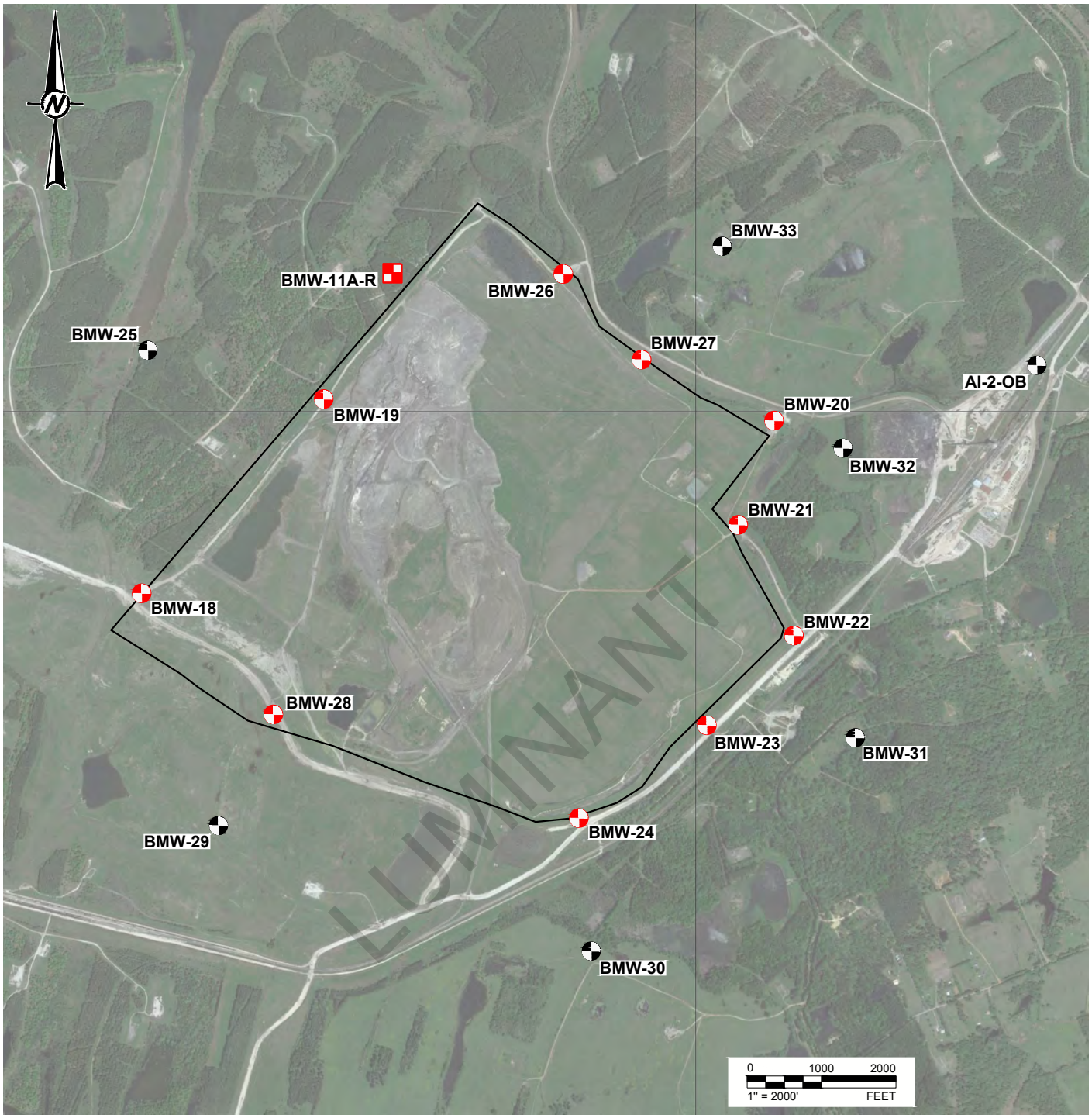
USEPA, 2009. Unified Guidance Document: Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, EPA 530-R-09-007, March 2009.

Signature Page

Golder Associates Inc.

Pat Behling
Principal Engineer

FIGURES



LEGEND

- DOWNGRADIENT CCR MONITORING WELL
- UPGRADIENT CCR MONITORING WELL
- NATURE AND EXTENT MONITORING WELL

REFERENCE(S)

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

CLIENT
LUMINANT

PROJECT
MARTIN LAKE STEAM ELECTRIC STATION
TATUM, TEXAS

TITLE
DETAILED SITE PLAN - A1 AREA LANDFILL

CONSULTANT
GOLDER

YYYY-MM-DD	2020-01-17
DESIGNED	AJD
PREPARED	AJD
REVIEWED	WFV
APPROVED	WFV

PROJECT NO.	REV.	FIGURE
19122262	0	1

TABLES

Table 1
Statistical Background Values
MLSES A1 Area Landfill

Parameter	Statistical Background Value
Boron (mg/L)	0.546
Calcium (mg/L)	276
Chloride (mg/L)	35.5
Fluoride (mg/L)	0.4
field pH (s.u.)	5.81 7.58
Sulfate (mg/L)	1,100
Total Dissolved Solids (mg/L)	2,850

Table 2
Groundwater Protection Standards
MLSES A1 Area Landfill

Parameter	Groundwater Protection Standard
Antimony (mg/L)	0.006
Arsenic (mg/L)	0.0164
Barium (mg/L)	2
Beryllium (mg/L)	0.004
Cadmium (mg/L)	0.005
Chromium (mg/L)	0.1
Cobalt (mg/L)	0.0124
Fluoride (mg/L)	4
Lead (mg/L)	0.015
Lithium (mg/L)	0.103
Mercury (mg/L)	0.002
Molybdenum (mg/L)	0.1
Selenium (mg/L)	0.05
Thallium (mg/L)	0.002
Radium 226+228 (pCi/L)	10.7

TABLE 3
APPENDIX III ANALYTICAL DATA
MLSES A1 AREA LANDFILL

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								
BMW-11-AR	10/29/15	0.332	91.5	11.3	<0.100	6.97	243	923
	12/30/15	0.285	92.3	2.39	0.26 J	6.87	114	642
	02/25/16	0.44	136	18.8	0.123 J	6.52	382	1,450
	04/07/16	0.391	151	17.5	<0.100	6.34	334	1,290
	06/09/16	0.417	182	19.8	<0.100	6.63	603	1,700
	08/11/16	0.389	170	20.8	<0.100	6.68	682	1,790
	10/26/16	0.316	99.7	15.8	<0.100	6.85	495	1,590
	12/14/16	0.409	201	19.8	<0.100	6.65	665	1,970
	09/25/17	0.448	199	15.2	<0.100	6.97	561	1,620
	06/12/18	0.634	173	8.37	0.323 J	6.82	320	1,080
	09/14/18	0.455	175	19.7	0.353 J	5.86	538	1,720
	05/15/19	0.374	138	6.11	0.198 J	6.84	324	970
	09/04/19	0.368	149	6.41	0.170 J	6.82	356	1,090
Downgradient Wells								
BMW-18	10/30/15	0.41	7.2	26.6	0.148 J	6.65	97	768
	12/30/15	0.322	346	7.14	0.101 J	6.77	1,570	2,470
	02/26/16	0.406	9.49	17.1	0.164 J	6.91	90	508
	04/07/16	0.423	7.08	16.3	0.117 J	6.52	87	489
	06/09/16	0.429	7.32	18.7	0.128 J	6.64	101	498
	08/11/16	0.415	7.02	18.5	<0.100	6.81	100	493
	10/26/16	0.45	6.55	18.1	0.158 J	6.67	94.3	534
	12/14/16	0.411	9.26	17.6	0.134 J	6.77	94.1	493
	9/25/17	0.437	6.49	16.9	0.128 J	6.87	87.2	476
	6/12/18	0.636	14.4	18.2	0.176 J	6.82	87.2	464
	9/14/18	0.423	6.06	18.6	0.201 J	5.7	81.3	476
	5/15/19	0.443	7.91	20	0.229 J	6.65	89.9	473
	9/4/19	0.435	7.72	19.2	0.203 J	6.51	91.8	478
BMW-19	10/29/18	0.385	417	16.2	<0.100	6.77	2,070	4,060
	12/30/15	0.4	441	11.4	0.127 J	6.49	2,100	3,260
	02/25/16	0.458	504	8.4	<0.100	6.14	2,330	2,960
	04/07/16	0.424	480	8.46	<0.100	6.71	2,270	3,740
	06/09/16	0.444	489	8.04	<0.100	6.32	2,390	4,180
	08/11/16	0.419	458	8.26	<0.100	6.95	2,370	3,780
	10/26/16	0.417	443	8.26	<0.100	6.97	2,210	4,410
	12/14/16	0.427	481	7.2	<0.100	6.75	2220	3,660
	09/25/17	0.481	496	6.11	<0.100	6.95	2,360	3,670
	06/12/18	0.667	539	6.08	<0.100	6.92	2,080	3,660
	09/13/18	0.460	514	6.86	0.404	6.26	2,330	4,010
	05/15/19	0.474	388	4.66	0.189 J	6.88	1,760	3,090
	09/04/19	0.430	434	5.93	<0.1	6.74	2,010	3,320
BMW-20	10/23/15	0.139 J	71.2	64.8	<0.100	6.28	223	804
	12/30/15	0.144	96	36.4	0.12 J	6.32	443	987
	02/25/16	0.202	157	30.7	<0.100	5.7	131	888
	04/07/16	0.0787	80	30	<0.100	6.22	219	600
	06/09/16	0.129	128	37.5	<0.100	6.24	557	1,220
	08/11/16	0.106	107	39.4	<0.100	6.86	602	1,310
	10/26/16	0.113	93.5	48.2	<0.100	6.93	801	1,610
	12/13/16	0.0687	62.8	42.8	<0.100	6.64	335	757
	09/26/17	0.0973	116	33.5	<0.100	6.73	472	986
	06/11/18	0.0912	149	35.9	0.144 J	6.67	654	1,160
	09/13/18	0.0773	91.1	48.8	<0.100	5.26	831	1,360
	05/15/19	0.979	146	426	<0.418	6.71	474	2,030
	09/04/19	0.101	136	50.7	<0.100	6.74	1160	1,830

TABLE 3
APPENDIX III ANALYTICAL DATA
MLSES A1 AREA LANDFILL

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)
BMW-21	10/23/15	0.973	157	496	<0.100	7.28	484	2,510
	12/30/15	0.951	142	365	0.126 J	7.08	444	2,020
	02/25/16	1.01	148	393	<0.100	6.64	462	1,990
	04/07/16	0.99	158	373	<0.100	7.02	454	2,190
	06/09/16	1.17	155	415	<0.100	7.09	477	2,230
	08/11/16	1.04	143	425	<0.100	6.66	484	1,860
	10/26/16	1.14	145	399	<0.100	6.85	434	2,170
	12/13/16	0.993	149	426	<0.100	6.93	483	2,170
	09/26/17	1.02	138	364	<0.100	6.76	417	1,850
	06/11/18	1.01	168	402	0.233 J	6.75	457	1,990
	09/13/18	0.987	151	418	0.136 J	6.64	474	2,100
	05/15/19	0.994	147	428	0.366 J	6.92	474	1,980
	09/04/19	0.0409	152	426	<0.1	6.73	477	2,090
BMW-22	10/23/15	2.76	209	377	<0.100	6.86	927	2,720
	12/30/15	2.54	150	215	0.186 J	6.92	670	1,870
	02/25/16	3.18	209	295	<0.100	6.27	949	2,430
	04/07/16	3.34	202	256	<0.100	6.84	839	2,230
	06/08/16	3.53	193	279	<0.100	6.84	890	2,340
	08/11/16	3.18	198	311	<0.100	6.25	946	2,520
	10/26/16	3.38	183	241	<0.100	6.89	803	2,600
	12/13/16	3.45	191	281	<0.100	6.73	896	2,370
	09/26/17	3.53	209	270	<0.100	6.82	860	2,250
	06/11/18	3.49	219	280	0.312 J	6.85	883	2,180
	09/13/18	3.28	188	296	0.205 J	6.34	919	2,310
	05/15/19	3.39	198	311	0.351 J	6.68	967	2,260
	09/09/19	3.65	208	307	<0.100	6.58	960	2,420
BMW-23	10/23/15	1.19	102	287	<0.100	6.84	577	1,980
	12/30/15	1.25	95.2	214	0.122 J	6.76	529	1,500
	02/25/16	1.31	97.7	225	<0.100	6.16	527	1,520
	04/07/16	1.22	95.1	221	<0.100	6.63	503	1,510
	06/08/16	1.31	102	254	<0.100	6.71	558	1,720
	08/11/16	1.28	90.4	242	<0.100	6.15	539	1,430
	10/26/16	1.22	86.8	219	<0.100	6.85	467	1,700
	12/13/16	1.25	91.8	237	<0.100	6.63	510	1,870
	09/26/17	1.46	99.6	223	<0.100	6.65	482	1,550
	06/12/18	1.49	104	236	0.204 J	6.72	490	1,530
	09/13/18	1.34	91.7	236	0.190 J	6.25	482	1,560
	05/15/19	1.31	89.9	240	<0.100	6.84	613	1,640
	09/09/19	1.47	98.9	257	<0.100	6.65	503	1,680
BMW-24	10/23/15	0.144 J	61.6	633	0.247 J	7.14	45	1,510
	12/30/15	0.347	58.8	404	0.391 J	7.07	125	1,210
	02/25/16	0.431	61.6	332	0.236 J	5.8	184	1,210
	04/07/16	0.532	63.4	224	0.109 J	7.07	240	1,100
	06/08/16	0.612	60.1	201	0.147 J	7.06	259	984
	08/11/16	0.248	58.5	481	0.225 J	5.84	97.8	1,150
	10/26/16	0.225	59.2	518	0.305 J	6.78	34.2	1,490
	12/13/16	0.225	62.5	518	0.3 J	6.78	33	1,480
	09/26/17	0.656	66.8	229	<0.100	6.82	242	940
	06/11/18	0.469	70.6	336	0.466	6.76	117	970
	09/13/18	0.197	59.5	488	0.769	6.45	40	1,090
	05/15/19	0.601	57.9	169	0.219 J	6.78	280	881
	09/09/19	0.247	56.4	501	0.534 J	6.65	16.4	985

TABLE 3
APPENDIX III ANALYTICAL DATA
MLSES A1 AREA LANDFILL

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)
BMW-26	9/13/16	0.457	234	97.8	<0.100	6.51	671	2,120
	10/26/16	0.127	44.3	16.2	<0.100	6.87	140	414
	12/14/16	0.251	130	152	0.344 J	6.96	1210	2,050
	01/23/17	0.478	224	126	<0.100	6.33	669	1,950
	02/23/17	0.0683	52	23.9	0.106 J	6.22	20.4	209
	03/24/17	0.44	215	112	<0.100	6.68	610	1,690
	04/24/17	0.495	218	111	<0.100	6.37	576	2,210
	05/25/17	0.613	178	115	<0.100	6.82	613	2,110
	06/29/17	0.507	233	111	<0.100	--[3]	604	1700
	09/25/17	0.514	71	112	<0.100	6.95	606	1,510
	06/12/18	0.726	96.5	120	<0.100	6.61	633	1,550
	09/13/18	0.474	230	125	<0.100	5.32	671	2,020
	05/15/19	0.449	200	135	<0.100	6.9	706	1,930
	09/04/19	0.473	262	140	<0.100	6.78	753	2,170
BMW-27	9/13/16	0.486	160	133	0.668	5.87	1,150	2,750
	10/26/16	0.548	196	102	<0.100	6.73	700	2,020
	12/14/16	0.529	211	101	<0.100	6.9	674	1,810
	01/23/17	0.393	152	143	0.573	5.62	1,280	2,260
	02/23/17	0.0832	52.4	24	0.252 J	6.4	20.6	239
	03/24/17	0.304	120	132	0.738	6.35	1,190	2,100
	04/24/17	0.34	132	130	0.663	6.22	1,150	2,290
	05/25/17	0.331	122	124	1.61	6.67	1,150	2,320
	06/29/17	0.39	144	129	0.717	--[3]	1,180	2,080
	09/25/17	0.336	128	126	0.254 J	6.89	1,160	2,110
	06/12/18	0.478	96.1	98.4	<0.100	6.87	522	1,420
	09/13/18	0.398	143	132	0.750	5.6	1,230	2,380
	05/15/19	0.46	190	129	<0.100	6.72	674	1,840
	09/04/19	0.463	257	141	<0.100	6.95	755	2,130
BMW-28	12/14/16	1.22	234	111	<0.100	6.87	1280	2,360
	01/23/17	1.18	221	122	0.104 J	6.85	1,370	2,810
	02/23/17	0.0776	53.3	24	0.11 J	6.43	20.3	203
	03/24/17	1.14	242	121	<0.100	6.36	1,350	2,580
	04/24/17	1.16	266	121	0.19 J	6.57	1,330	2,980
	05/25/17	1.23	255	130	<0.100	6.70	1,410	3,180
	06/29/17	1.21	269	130	0.137 J	6.98	1,450	2,950
	08/01/17	1.17	260	132	<0.100	--[3]	1,460	2,780
	09/25/17	1.35 J	262	130	<0.100	6.85	1,430	3,060
	06/12/18	1.41	262	139	0.529	6.92	1,470	3,100
	09/13/18	1.35	243	143	0.445	5.71	1,420	3,180
	05/15/19	1.01	249	133	0.496	6.77	1,820	3,610
	09/04/19	1.22	277	137	<0.1	6.77	1,720	3,470

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.
3. --[3]: pH meter malfunctioned in field.

TABLE 4
APPENDIX IV ANALYTICAL RESULTS
MLSES A1 AREA LANDFILL

Sample Location	Date Sampled	Sb (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Fl (mg/L)	Pb (mg/L)	Li (mg/L)	Hg (mg/L)	Mo (mg/L)	Se (mg/L)	Tl (mg/L)	Ra 226 (pCi/L)	Ra 228 (pCi/L)	Ra 226/228 Comb.^ (pCi/L)
Upgradient Wells																		
BMW-11-AR	10/29/15	<0.0008	0.0116	0.0659	<0.0003	<0.0003	<0.002	0.0124	<0.1	0.000391 J	0.0594	<0.00008	0.00496 J	<0.002	<0.0005	1.60	4.75	6.35
	12/30/15	<0.0008	0.00362 J	0.0433	<0.0003	<0.0003	<0.002	<0.003	0.26 J	0.000362 J	0.0589	<0.00008	0.00384 J	<0.002	<0.0005	1.66	3.19	4.85
	02/25/16	<0.0008	0.00608	0.0724	<0.0003	<0.0003	<0.002	0.00486 J	0.123 J	<0.0003	0.0276	<0.00008	0.00597	<0.002	<0.0005	2.43	3.80	6.23
	04/07/16	<0.0008	0.00614	0.0929	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0195	<0.00008	0.00444 J	<0.002	<0.0005	0.885	1.48	2.37
	06/09/16	<0.0008	0.00532	0.0891	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0187	<0.00008	0.00355 J	<0.002	<0.0005	0.47	<0.674	1.14
	08/11/16	<0.0008	0.00271 J	0.0772	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0147	<0.00008	0.00346 J	<0.002	<0.0005	0.810	2.42	3.23
	10/26/16	<0.0008	<0.002	0.0429	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0508	<0.00008	0.00363 J	<0.002	<0.0005	0.631	0.922	1.55
	12/14/16	<0.0008	0.0061	0.074	<0.0003	<0.0003	<0.002	<0.003	<0.1	0.00347	0.0139	<0.00008	0.00303 J	<0.002	<0.0005	<0.821	<1.73	<2.551
	06/12/18	<0.0008	0.00444 J	0.0692	<0.0003	<0.0003	0.00295 J	<0.003	0.323 J	0.0017	0.0686	<0.00008	0.00340 J	<0.002	<0.0005	0.996	1.7	2.696
	09/14/18	--	0.0056	0.0735	--	--	<0.002	<0.003	0.353 J	0.00147	0.0196	--	0.00299 J	--	--	1.52	1.11	2.63
	05/15/19	<0.0008	0.00208 J	0.0399	<0.0003	<0.0003	<0.002	<0.003	0.198 J	<0.0003	0.0404	<0.00008	<0.002	<0.002	<0.0005	0.83	4.89	5.72
	09/04/19	--	<0.2	0.0393	--	--	--	<0.003	0.170 J	--	0.0411	--	<0.002	--	--	0.382	0.317	0.699
Downgradient Wells																		
BMW-18	10/30/15	<0.0008	<0.002	0.0401	<0.0003	<0.0003	0.00944	<0.003	0.148 J	<0.0003	0.14	<0.00008	<0.002	<0.002	<0.0005	0.526	<1.51	2.04
	12/30/15	<0.0008	<0.002	0.0168	<0.0003	<0.0003	<0.002	0.0129	0.101 J	<0.0003	0.0415	<0.00008	<0.002	<0.002	<0.0005	<0.405	<2.04	<2.445
	02/26/16	<0.0008	<0.002	0.0446	<0.0003	<0.0003	0.00214 J	<0.003	0.164 J	<0.0003	0.0156	<0.00008	<0.002	<0.002	<0.0005	<0.406	<1.9	<2.306
	04/07/16	<0.0008	<0.002	0.0306	<0.0003	<0.0003	<0.002	<0.003	0.117 J	<0.0003	0.0171	<0.00008	<0.002	<0.002	<0.0005	<0.109	<1.00	<1.109
	06/09/16	<0.0008	<0.002	0.0283	<0.0003	<0.0003	<0.002	<0.003	0.128 J	<0.0003	0.0152	<0.00008	<0.002	<0.002	<0.0005	<0.143	0.857	1.00
	08/11/16	<0.0008	<0.002	0.0291	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0147	<0.00008	<0.002	<0.002	<0.0005	<0.22	<1.07	<1.29
	10/26/16	<0.0008	<0.002	0.029	<0.0003	<0.0003	<0.002	<0.003	0.158 J	<0.0003	0.0156	<0.00008	<0.002	<0.002	<0.0005	<0.132	<0.534	<0.666
	12/14/16	<0.0008	<0.002	0.0384	<0.0003	<0.0003	<0.002	<0.003	0.134 J	<0.0003	0.0158	<0.00008	<0.002	<0.002	<0.0005	0.140	<1.99	2.13
	06/12/18	<0.0008	<0.002	0.0412	<0.0003	<0.0003	<0.002	<0.003	0.176 J	0.0013	0.0185	<0.00008	<0.002	<0.002	<0.0005	0.232	0.706	0.938
	09/14/18	--	<0.002	0.0277	--	--	<0.002	<0.003	0.201 J	<0.0003	0.0165	--	<0.002	--	--	<0.509	<0.589	<1.098
	05/15/19	<0.0008	<0.002	0.0362	<0.0003	<0.0003	<0.002	<0.003	0.229 J	<0.0003	0.016	<0.00008	<0.002	<0.002	<0.0005	<0.264	3.95	4.214
	9/4/2019	--	<0.002	0.0337	--	--	--	<0.003	0.203 J	--	0.0128	--	<0.002	--	--	0.304	1.48	1.79
BMW-19	10/29/18	<0.0008	<0.002	0.0231	<0.0003	<0.0003	<0.002	0.0161	<0.1	<0.0003	0.0545	<0.00008	<0.002	<0.002	<0.0005	0.395	<1.56	1.96
	12/30/15	<0.0008	<0.002	0.0222	<0.0003	<0.0003	<0.002	0.0166	0.127 J	<0.0003	0.0506	<0.00008	<0.002	<0.002	<0.0005	0.598	<2.89	3.49
	02/25/16	<0.0008	0.00235 J	0.0169	<0.0003	<0.0003	<0.002	0.0149	<0.1	<0.0003	0.0711	<0.00008	<0.002	<0.002	<0.0005	0.571	1.94	2.51
	04/07/16	<0.0008	<0.002	0.0178	<0.0003	<0.0003	<0.002	0.0137	<0.1	<0.0003	0.0591	<0.00008	<0.002	<0.002	<0.0005	<0.185	<0.715	<0.9
	06/09/16	<0.0008	<0.002	0.0158	<0.0003	<0.0003	<0.002	0.0141	<0.1	<0.0003	0.0644	<0.00008	<0.002	<0.002	<0.0005	<0.142	1.98	2.12
	08/11/16	<0.0008	0.00711	0.0158	<0.0003	<0.0003	<0.002	0.0128	<0.1	<0.0003	0.0568	<0.00008	<0.002	<0.002	<0.0005	0.927	<0.812	1.74
	10/26/16	<0.0008	<0.002	0.0144	<0.0003	<0.0003	<0.002	0.0104	<0.1	<0.0003	0.0495	<0.00008	<0.002	<0.002	<0.0005	<0.152	<0.48	<0.632
	12/14/16	<0.0008	0.00369 J	0.0171	<0.0003	<0.0003	<0.002	0.0125	<0.1	<0.0003	0.0584	<0.00008	<0.002	<0.002	<0.0005	0.309	0.827	1.14
	06/12/18	<0.0008	0.0428	0.0243	<0.0003	<0.0003	0.00267	0.0115	<0.100	0.00183	0.0734	<0.00008	<0.002	<0.002	<0.0005	<0.395	1.17	1.565
	09/13/18	--	0.00491 J	0.0132	--	--	<0.002	0.0125	0.404 J	<0.0003	0.0845	--	<0.002	--	--	<0.376	1.46	1.836
	05/15/19	<0.0008	<0.002	0.0104	<0.0003	<0.0003	<0.002	<0.003	0.189 J	<0.0003	0.0647	<0.00008	<0.002	<0.002	<0.0005	0.487	4.66	5.147
	09/04/19	--	<0.002	0.0117	--	--	--	<0.003	<0.1	--	0.0694	--	<0.002	--	--	-0.00769	0.563	0.563
BMW-20	10/23/15	<0.0008	0.00236 J	0.0778	<0.0003	<0.0003	<0.002	0.0256	<0.1	0.000501 J	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.463	<1.89	2.35
	12/30/15	<0.0008	0.00344 J	0.0777	<0.0003	<0.0003	<0.002	0.051	0.12 J	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.816	<2.41	3.23
	02/25/16	<0.0008	0.00474 J	0.0989	<0.0003	<0.0003	<0.002	0.022	<0.1	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	<0.61	2.85	3.46
	04/07/16	<0.0008	0.00411 J	0.0912	<0.0003	<0.0003	<0.002	0.0276	<0.1	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.221	<1.08	1.30
	06/09/16	<0.0008	0.0103	0.0776	<0.0003	<0.0003	<0.002	0.054	<0.1	0.000696 J	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.51	<0.716	1.23
	08/11/16	<0.0008	<0.002	0.0637	<0.0003	<0.0003	<0.002	0.0513	<0.1	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.322	1.40	1.72
	10/26/16	<0.0008	0.00444 J	0.0421	<0.0003	<0.0003	<0.002	0.0786	<0.1	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.347	0.848	1.20
	12/13/16	<0.0008	0.00483 J	0.0377	<0.0003	<0.0003	<0.002	0.0451	<0.1	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.246	1.15	1.40
	06/11/18	<0.0008	0.00473 J	0.0515	<0.0003	<0.0003	<0.002	0.0681	0.144 J	0.000476	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.74	0.865	1.605
	09/13/18	--	0.00473 J	0.0258	--	--	<0.002	0.0645	<0.100	0.000368 J	<0.005	--	<0.002	--	--	0.519	0.711	1.23
	05/15/19	<0.0008	0.00541	0.0412	<0.0003	<0.0003	<0.002	0.003	0.418	<0.0003	0.0615	<0.00008	<0.002	<0.002	<0.0005	1.18	0.657	1.837
	09/04/19	--	0.00768	0.0261	--	--	--	0.108	<0.1	--	<0.005	--	<0.002	--	--	0.0996	1.62	1.72

TABLE 4
APPENDIX IV ANALYTICAL RESULTS
MLSES A1 AREA LANDFILL

Sample Location	Date Sampled	Sb (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Fl (mg/L)	Pb (mg/L)	Li (mg/L)	Hg (mg/L)	Mo (mg/L)	Se (mg/L)	Tl (mg/L)	Ra 226 (pCi/L)	Ra 228 (pCi/L)	Ra 226/228 Comb.^ (pCi/L)
BMW-21	10/23/15	<0.0008	0.00324 J	0.0703	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0623	<0.00008	<0.002	<0.002	<0.0005	<0.436	<0.948	<1.384
	12/30/15	<0.0008	0.00247 J	0.0478	<0.0003	<0.0003	<0.002	<0.003	0.126 J	<0.0003	0.0602	<0.00008	<0.002	<0.002	<0.0005	0.584	<2.00	2.58
	02/25/16	<0.0008	0.00327 J	0.0471	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0602	<0.00008	<0.002	<0.002	<0.0005	0.735	2.13	2.87
	04/07/16	<0.0008	0.00337 J	0.0472	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0653	<0.00008	<0.002	<0.002	<0.0005	0.470	<2.78	3.25
	06/09/16	<0.0008	0.0034 J	0.0457	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0675	<0.00008	<0.002	<0.002	<0.0005	0.32	<0.917	1.24
	08/11/16	<0.0008	0.00373 J	0.0445	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0527	<0.00008	<0.002	<0.002	<0.0005	0.655	<0.728	1.38
	10/26/16	<0.0008	0.0037 J	0.0443	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0611	<0.00008	<0.002	<0.002	<0.0005	0.383	1.61	1.99
	12/13/16	<0.0008	0.00217 J	0.0438	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0631	<0.00008	<0.002	<0.002	<0.0005	0.213	1.00	1.21
	06/11/18	<0.0008	0.00373 J	0.0438	<0.0003	<0.0003	<0.002	<0.003	0.233 J	<0.0003	0.07	<0.00008	<0.002	<0.002	<0.0005	<0.239	<0.939	<1.178
	09/13/18	--	0.00353 J	0.0412	--	--	<0.002	<0.003	0.136 J	<0.0003	0.0646	--	<0.002	--	--	0.562	1.49	2.052
	05/15/19	<0.0008	0.00399 J	0.0412	<0.0003	<0.0003	<0.002	<0.003	0.366 J	<0.0003	0.0613	<0.00008	<0.002	<0.002	<0.0005	<0.322	1.07	1.392
	9/4/2019	--	0.00378	0.0409	--	--	--	<0.003	<0.1	--	0.0683	--	<0.002	--	--	0.506	1.51	2.06
BMW-22	10/23/15	<0.0008	<0.002	0.106	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0675	<0.00008	<0.002	<0.002	<0.0005	1.59	2.11	3.70
	12/30/15	<0.0008	<0.002	0.084	<0.0003	<0.0003	<0.002	<0.003	0.186 J	<0.0003	0.0594	<0.00008	<0.002	<0.002	<0.0005	0.973	<1.55	2.52
	02/25/16	<0.0008	<0.002	0.0761	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0801	<0.00008	<0.002	<0.002	<0.0005	0.594	<1.93	2.52
	04/07/16	<0.0008	<0.002	0.072	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0773	<0.00008	<0.002	<0.002	<0.0005	0.480	1.46	1.94
	06/08/16	<0.0008	0.00206 J	0.0667	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0847	<0.00008	<0.002	<0.002	<0.0005	0.888	1.88	2.77
	08/11/16	<0.0008	<0.002	0.0679	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0675	<0.00008	<0.002	<0.002	<0.0005	0.607	1.93	2.54
	10/26/16	<0.0008	0.00216 J	0.0645	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0753	<0.00008	<0.002	<0.002	<0.0005	0.633	1.02	1.65
	12/13/16	<0.0008	0.00232 J	0.0655	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0689	<0.00008	<0.002	<0.002	<0.0005	<0.209	1.05	1.26
	06/11/18	<0.0008	<0.002	0.0638	<0.0003	<0.0003	<0.002	<0.003	0.312 J	<0.0003	0.089	<0.00008	<0.002	<0.002	<0.0005	0.522	<1.020	1.54
	09/13/18	--	<0.002	0.063	--	--	<0.002	<0.003	0.205 J	<0.0003	0.0882	--	<0.002	--	--	1.29	2.89	4.18
	05/15/19	<0.0008	<0.002	0.0618	<0.0003	<0.0003	<0.002	<0.003	0.351 J	<0.0003	0.0779	<0.00008	<0.002	<0.002	<0.0005	3.36	1.64	5.00
	09/09/19	--	<0.002	0.0599	--	--	--	<0.003	<0.100	--	0.0829	--	<0.002	--	--	0.954	1.85	2.81
BMW-23	10/23/15	<0.0008	<0.002	0.0519	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0802	<0.00008	<0.002	<0.002	<0.0005	1.19	<1.91	3.10
	12/30/15	<0.0008	<0.002	0.0462	<0.0003	<0.0003	<0.002	<0.003	0.122 J	<0.0003	0.0897	<0.00008	<0.002	<0.002	<0.0005	0.711	<2.62	3.33
	02/25/16	<0.0008	<0.002	0.0488	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0959	<0.00008	<0.002	<0.002	<0.0005	0.604	<1.78	2.38
	04/07/16	<0.0008	<0.002	0.0472	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.095	<0.00008	<0.002	<0.002	<0.0005	0.723	1.98	2.70
	06/08/16	<0.0008	<0.002	0.0497	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.103	<0.00008	<0.002	<0.002	<0.0005	0.654	1.29	1.94
	08/11/16	<0.0008	<0.002	0.0458	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.077	<0.00008	<0.002	<0.002	<0.0005	0.936	1.94	2.88
	10/26/16	<0.0008	<0.002	0.0437	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0856	<0.00008	<0.002	<0.002	<0.0005	0.472	1.76	2.23
	12/13/16	<0.0008	<0.002	0.0407	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0817	<0.00008	<0.002	<0.002	<0.0005	<0.225	0.704	0.93
	06/11/18	<0.0008	<0.002	0.0381	<0.0003	<0.0003	<0.002	<0.003	0.204 J	<0.0003	0.106	<0.00008	<0.002	<0.002	<0.0005	0.442	1.79	2.23
	09/13/18	--	<0.002	0.0414	--	--	<0.002	<0.003	0.190 J	<0.0003	0.0915	--	<0.002	--	--	0.774	1.23	2.00
	05/15/19	<0.0008	0.0024	0.0381	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0951	<0.00008	<0.002	<0.002	<0.0005	2.54	1	3.54
	09/09/19	--	<0.002	0.0382	--	--	--	<0.003	<0.100	--	0.0896	--	<0.002	--	--	0.583	2.4	2.98
BMW-24	10/23/15	<0.0008	0.00494 J	1.87	<0.0003	<0.0003	<0.002	0.00802	0.247 J	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	1.83	3.32	5.15
	12/30/15	<0.0008	0.00579	0.801	<0.0003	<0.0003	<0.002	0.0146	0.391 J	<0.0003	0.0161	<0.00008	<0.002	<0.002	<0.0005	0.485	<1.66	2.15
	02/25/16	<0.0008	0.00442 J	0.645	<0.0003	<0.0003	<0.002	0.0137	0.236 J	<0.0003	0.0267	<0.00008	<0.002	<0.002	<0.0005	1.20	<1.93	3.13
	04/07/16	<0.0008	0.00376 J	0.202	<0.0003	<0.0003	<0.002	0.0238	0.109 J	<0.0003	0.0415	<0.00008	<0.002	<0.002	<0.0005	<0.349	<1.58	<1.929
	06/08/16	<0.0008	0.00481 J	0.181	<0.0003	<0.0003	<0.002	0.0227	0.147 J	<0.0003	0.0475	<0.00008	<0.002	<0.002	<0.0005	0.360	1.26	1.62
	08/11/16	<0.0008	0.00414 J	1.26	<0.0003	<0.0003	<0.002	0.00707	0.225 J	<0.0003	0.00938 J	<0.00008	<0.002	<0.002	<0.0005	0.564	<0.942	1.51
	10/26/16	<0.0008	0.00364 J	1.88	<0.0003	<0.0003	<0.002	<0.003	0.305 J	<0.0003	0.00767 J	<0.00008	<0.002	<0.002	<0.0005	1.37	1.31	2.68
	12/13/16	<0.0008	0.00498 J	1.96	<0.0003	<0.0003	<0.002	0.00326 J	0.3 J	<0.0003	0.00914 J	<0.00008	<0.002	<0.002	<0.0005	0.270	1.16	1.43
	06/11/18	<0.0008	0.00266 J	0.487	<0.0003	<0.0003	<0.002	0.00633	0.466	<0.0003	0.0198	<0.00008	<0.002	<0.002	<0.0005	0.668	0.975	1.643
	09/13/18	--	<0.002	2.19	--	--	<0.002	0.00304 J	0.769	<0.0003	0.00764 J	--	<0.002	--	--	1.82	1.45	3.27
	05/15/19	<0.0008	0.00272 J	0.221	<0.0003	<0.0003	<0.002	0.000643	0.219 J	<0.0003	0.0512	<0.00008	<0.002	<0.002	<0.0005	1.45	<1.21	2.66
	09/09/19	--	<0.002	1.48	--	--	--	<0.003	0.534	--	0.00826 J	--	<0.002	--	--	0.584	1.41	2

TABLE 4
APPENDIX IV ANALYTICAL RESULTS
MLSES A1 AREA LANDFILL

Sample Location	Date Sampled	Sb (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Fl (mg/L)	Pb (mg/L)	Li (mg/L)	Hg (mg/L)	Mo (mg/L)	Se (mg/L)	Tl (mg/L)	Ra 226 (pCi/L)	Ra 228 (pCi/L)	Ra 226/228 Comb.^ (pCi/L)
BMW-26	9/13/16	<0.0008	0.017	0.0425	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0944	<0.00008	0.00215 J	<0.002	<0.0005	0.154	<1.02	1.17
	10/26/16	<0.0008	0.00318 J	0.0731	<0.0003	<0.0003	<0.002	0.00402 J	<0.1	<0.0003	<0.005	<0.00008	<0.002	<0.002	<0.0005	0.175	<0.695	0.87
	12/14/16	<0.0008	<0.002	0.0424	<0.0003	0.00082 J	<0.002	0.236	0.344 J	<0.0003	0.0527	<0.00008	<0.002	<0.002	<0.0005	0.177	<1.29	1.47
	01/23/17	<0.0008	0.0325	0.0446	<0.0003	<0.0003	<0.002	<0.003	<0.1	0.000594 J	0.0977	<0.00008	0.0035 J	<0.002	<0.0005	0.351	0.936	1.29
	02/23/17	<0.0008	<0.002	0.0705	<0.0003	<0.0003	<0.002	<0.003	0.106 J	0.000726 J	0.0052 J	<0.00008	<0.002	<0.002	<0.0005	0.306	0.951	1.26
	03/24/17	<0.0008	0.0107	0.0371	<0.0003	<0.0003	<0.002	<0.003	<0.1	0.000742 J	0.0964	<0.00008	0.00461 J	<0.002	<0.0005	0.335	<0.627	0.96
	04/24/17	<0.0008	0.00732	0.0322	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.099	<0.00008	0.00303 J	<0.002	<0.0005	<0.363	1.60	1.96
	05/25/17	<0.0008	0.00347 J	0.0243	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0951	<0.0008	0.00302 J	<0.002	<0.0005	<0.477	0.818	1.30
	06/29/17	<0.0008	0.0328	0.0352	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0985	<0.0008	0.00257 J	<0.002	<0.0005	0.198	0.677	0.88
	06/12/18	<0.0008	0.00316 J	0.0222	<0.0003	<0.0003	0.00231 J	<0.003	<0.100	0.00152	0.111	<0.00008	0.0029 J	<0.002	<0.0005	<0.251	<0.508	<0.759
	09/13/18	--	0.0165	0.0360	--	--	<0.002	<0.003	<0.100	<0.0003	0.11	--	<0.002	--	--	<0.426	0.826	1.252
	05/15/19	<0.0008	<0.002	0.0253	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.101	<0.00008	0.00218 J	<0.002	<0.0005	0.457	<1.13	1.587
	9/4/2019	--	0.00725	0.0317	--	--	--	<0.003	<0.1	--	0.109	--	<0.002	--	--	0.126	1.53	1.66
BMW-27	9/13/16	<0.0008	0.00536	0.0434	<0.0003	0.00062 J	<0.002	0.15	0.668	0.000432 J	0.0541	<0.00008	<0.002	<0.002	<0.0005	0.308	<1.14	1.45
	10/26/16	<0.0008	0.00625	0.0339	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0933	<0.00008	<0.002	<0.002	<0.0005	0.156	1.94	2.10
	12/14/16	<0.0008	0.0051	0.0342	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.0932	<0.00008	<0.002	<0.002	<0.0005	<0.12	<1.05	<1.17
	01/23/17	<0.0008	0.00845	0.0333	<0.0003	0.00071 J	0.00278 J	0.195	0.573	0.000323 J	0.0484	<0.00008	<0.002	<0.002	<0.0005	0.369	0.934	1.30
	02/23/17	<0.0008	<0.002	0.0704	<0.0003	<0.0003	<0.002	<0.003	0.252 J	0.000736 J	<0.005	<0.00008	<0.002	<0.002	<0.0005	<0.209	0.660	0.87
	03/24/17	<0.0008	0.00319 J	0.0296	<0.0003	0.00078 J	<0.002	0.222	0.738	<0.0003	0.0474	<0.00008	<0.002	<0.002	<0.0005	0.414	<0.725	1.14
	04/24/17	<0.0008	<0.002	0.0269	<0.0003	0.00066 J	<0.002	0.21	0.663	<0.0003	0.0497	<0.00008	<0.002	<0.002	<0.0005	<0.452	1.53	1.98
	05/25/17	<0.0008	<0.002	0.0266	<0.0003	0.000521 J	<0.002	0.2	1.61	0.000439 J	0.0471	<0.00008	<0.002	<0.002	<0.0005	<0.443	1.38	1.82
	06/29/17	<0.0008	0.00593	0.0307	<0.0003	0.00851 J	0.00266 J	0.255	0.717	<0.0003	0.048	<0.0008	<0.002	<0.002	<0.0005	0.303	0.628	0.93
	06/12/18	<0.0008	0.00223 J	0.0182	<0.0003	<0.0003	<0.002	<0.003	<0.100	0.00097 J	0.0721	<0.00008	<0.002	<0.002	<0.0005	0.305	<0.5860	0.891
	09/13/18	--	0.00467 J	0.0250	--	--	0.002 J	0.190	0.750	<0.0003	0.0531	--	<0.002	--	--	0.691	1.04	1.731
	05/15/19	<0.0008	<0.002	0.0238	<0.0003	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0943	<0.00008	<0.002	<0.002	<0.0005	<0.195	0.962	1.157
	9/4/2019	--	0.00759	0.32	--	--	--	<0.003	<0.1	--	0.107	--	<0.002	--	--	0.0726	1.68	1.75
BMW-28	12/14/16	0.0012 J	<0.002	0.0509	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.11	<0.00008	0.0103	0.0045 J	<0.0005	<0.566	<2.22	2.79
	01/23/17	0.001 J	<0.002	0.0518	<0.0003	<0.0003	<0.002	<0.003	0.104 J	<0.0003	0.116	<0.00008	0.00881	<0.002	<0.0005	0.626	1.12	1.75
	02/23/17	<0.0008	<0.002	0.0734	<0.0003	<0.0003	<0.002	<0.003	0.11 J	0.000965 J	0.00514 J	<0.00008	<0.002	<0.002	<0.0005	0.168	0.835	1.00
	03/24/17	0.0012 J	<0.002	0.046	<0.0003	<0.0003	<0.002	<0.003	<0.1	<0.0003	0.1	<0.00008	0.00773	0.0021 J	<0.0005	1.04	1.17	2.21
	04/24/17	0.0011 J	<0.002	0.047	<0.0003	<0.0003	<0.002	<0.003	0.19 J	<0.0003	0.109	<0.00008	0.00766	<0.002	<0.0005	0.356	1.880	2.24
	05/25/17	0.00119 J	<0.002	0.0468	<0.0003	<0.0003	<0.002	<0.003	<0.1	0.000427 J	0.102	<0.00008	0.00764	<0.002	<0.0005	<0.739	1.170	1.91
	06/29/17	<0.0008	0.00253 J	0.0549	<0.0003	<0.0003	<0.002	0.0084	0.137 J	<0.0003	0.104	<0.00008	0.00754	<0.002	<0.0005	0.489	2.310	2.80
	08/01/17	<0.0008	0.0057	0.0524	<0.0003	<0.0003	<0.002	0.0115	<0.1	<0.0003	0.114	<0.00008	0.00707	<0.002	<0.0005	0.536	2.43	2.97
	06/12/18	<0.0008	<0.002	0.0505	<0.0003	<0.0003	<0.002	<0.003	0.529	0.00122	0.116	<0.00008	0.00764	<0.002	<0.0005	0.197	1.12	1.32
	09/14/18	--	<0.002	0.0419	--	--	<0.002	<0.003	0.445	<0.0003	0.114	--	0.00782	--	--	0.35	1.15	1.50
	05/15/19	<0.0008	<0.002	0.0285	<0.0003	<0.0003	<0.002	<0.003	0.496	<0.0003	0.119	<0.00008	0.0124	<0.002	<0.0005	0.289	0.924	1.21
	9/4/2019	--	<0.002	0.027	--	--	--	<0.003	<0.1	--	0.131	--	0.00961	--	--	0.0173	3.2	3.21

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

ATTACHMENT 1

JUSTIFICATION FOR EXTENSION TO COMPLETE ASSESSMENT OF CORRECTIVE MEASURES

July 3, 2019 Project No. 19122434

Kim Mireles
Sr. Director, Environmental Services
Luminant
200 West John Carpenter Freeway
Irving, TX 75039

RE: JUSTIFICATION FOR EXTENSION TO COMPLETE ASSESSMENT OF CORRECTIVE MEASURES UNDER 40 C.F.R. § 257.96
A1 AREA LANDFILL – MARTIN LAKE STEAM ELECTRIC STATION
PANOLA COUNTY, TEXAS

Dear Ms. Mireles,

Golder Associates, Inc. (Golder) is providing Luminant with this letter certifying that, based on our knowledge of the status of the groundwater monitoring and assessment of corrective measure activities at the A1 Area Landfill coal combustion residual (CCR) unit at the Martin Lake Electric Station, a 60-day extension to complete the assessment of corrective measures is justified and valid.

Golder understands the assessment of corrective measures was initiated on April 8, 2019, following identification of a groundwater protection standard exceedance under 40 C.F.R. § 257.95. Activities for the assessment of corrective measures are ongoing, and due to Site-specific circumstances, the assessment of corrective measures cannot be completed within 90-days. Accordingly, 60 additional days are warranted based on the following site-specific circumstances:

- Abnormally wet weather has limited the access for heavy drilling equipment. The site has received approximately 25 inches of rainfall during the second quarter of 2019, which is >12 inches above average for the same period historically;
- A 29-day delay in mobilization to perform required fieldwork due to limited driller availability; and
- An extended laboratory analytical schedule due to monitored natural attenuation parameter analyses (e.g., standard extraction procedure (SEP) analyses) taking 28 days or more to complete.

As used herein, the word “certification” or “certifying” shall mean an expression of the Engineer’s professional opinion to the best of his or her information, knowledge, and belief, and does not constitute a warranty or guarantee by the Engineer.

Golder Associates Inc.
2201 Double Creek Dr, Suite 4004, Round Rock, Texas, USA 78664 T: +1 512 671-3434 F: +1 512 671-3446

PROFESSIONAL CERTIFICATION

I hereby certify that a 60-day extension to the 90-day completion timeframe for the assessment of corrective measures is justified and valid pursuant to 40 CFR § 257.96(a).

Patrick J. Behling, P.E.

Principal Engineer

GOLDER ASSOCIATES INC.

GOLDER

golder.com