



2018 Annual Groundwater Monitoring and Corrective Action Report

Big Brown Steam Electric Station Bottom Ash Ponds - Freestone County, Texas

Prepared for:

Luminant Generation Company LLC

Submitted by:

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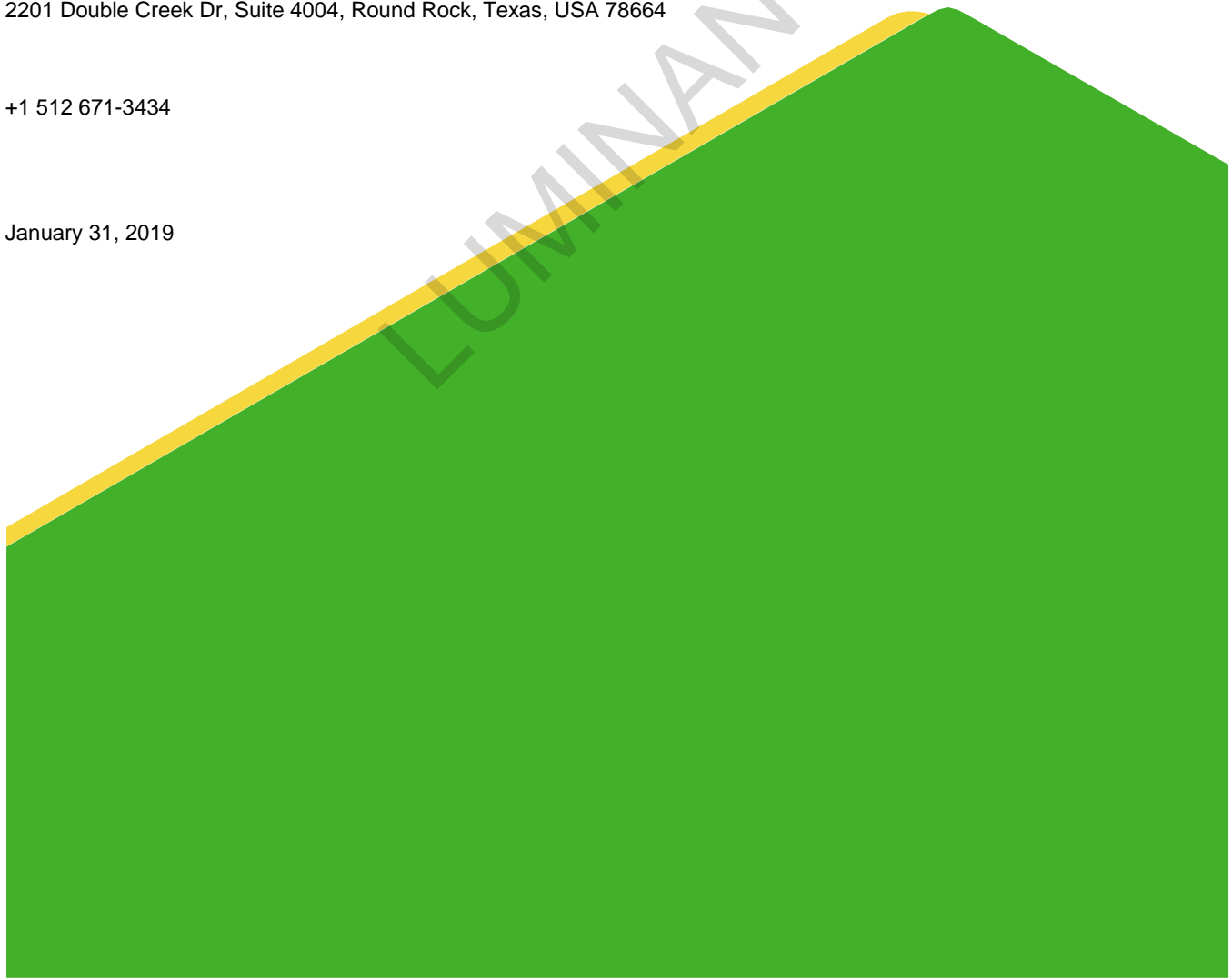


TABLE OF CONTENTS

LIST OF FIGURES II

LIST OF TABLES..... II

ACRONYMS AND ABBREVIATIONS III

1.0 INTRODUCTION..... 1

2.0 MONITORING AND CORRECTIVE ACTION PROGRAM STATUS 2

3.0 KEY ACTIONS COMPLETED IN 2018..... 4

4.0 PROBLEMS ENCOUNTERED AND ACTIONS TO RESOLVE THE PROBLEMS..... 5

5.0 KEY ACTIVITIES PLANNED FOR 2019 6

6.0 REFERENCES..... 7

LIST OF FIGURES

Figure 1 Bottom Ash Ponds Detailed Site Plan

LIST OF TABLES

Table 1 Statistical Background Values

Table 2 Groundwater Protection Standards

Table 3 Appendix III Analytical Results

Table 4 Appendix IV Analytical Results

ACRONYMS AND ABBREVIATIONS

BBSES	Big Brown Steam Electric Station
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 Bottom Ash Ponds at the Big Brown Steam Electric Station (BBSES) in Freestone 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 Bottom Ash Pond 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
09/27/2017	Appendix III	Yes	July 16, 2018

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

Assessment Monitoring groundwater samples were collected from the CCR groundwater monitoring network in 2018, as required by the CCR Rule. Golder collected the initial Assessment Monitoring Program groundwater samples in June 2018. All CCR groundwater monitoring wells were sampled for Appendix III and Appendix IV constituents at that time. A second Assessment Monitoring Program sampling event was conducted in September 2018. During the second Assessment Monitoring Program sampling event, all CCR wells were sampled for all Appendix III parameters and for Appendix IV parameters that were detected during the first sampling event, as required by 40 CFR § 257.95(d)(1). In accordance with procedures described in the Statistical Analysis Plan, one verification re-sample (for cobalt in well BAP-61) was collected in November 2018 to verify the September 2018 sample result. The following table provides a summary of the 2018 Assessment Monitoring Program:

Assessment Monitoring Program Summary

Sampling Dates	Parameters	SSIs/SSLs
06/06/2018	Appendix III	Not Applicable
	Appendix IV	
09/11/2018 11/06/2018 (re-sample)	Appendix III	To Be Determined
	Appendix IV	

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. The analytical data from the 2018 Assessment Monitoring sampling events were evaluated using procedures described in the updated Statistical Analysis Plan to identify SSIs of Appendix III parameters over background concentrations and statistically significant levels (SSLs) of Appendix IV parameters over GWPSs. Since the Assessment 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.

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3.0 KEY ACTIONS COMPLETED IN 2018

Assessment Monitoring Program groundwater monitoring events were completed in June and September 2018. One groundwater re-sample was also collected in November 2018 to verify results of the September 2018 sampling event. Statistical background values were established for Appendix III parameters and are summarized in Table 1. GWPSs were established for Appendix IV parameters and are summarized in Table 2. Analytical results for the groundwater samples collected in 2018 are summarized in Table 3 (Appendix III parameters) and Table 4 (Appendix IV parameters). A map showing the CCR units and all upgradient and downgradient monitoring wells for the CCR units 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 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 an SSL has occurred.
- If an SSL is identified, notification will be prepared as required under 40 CFR § 257.95(g) and will be 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 2019 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 in 2019 will be met, including associated recordkeeping/notifications required by 40 CFR §§ 257.105 through 257.108.

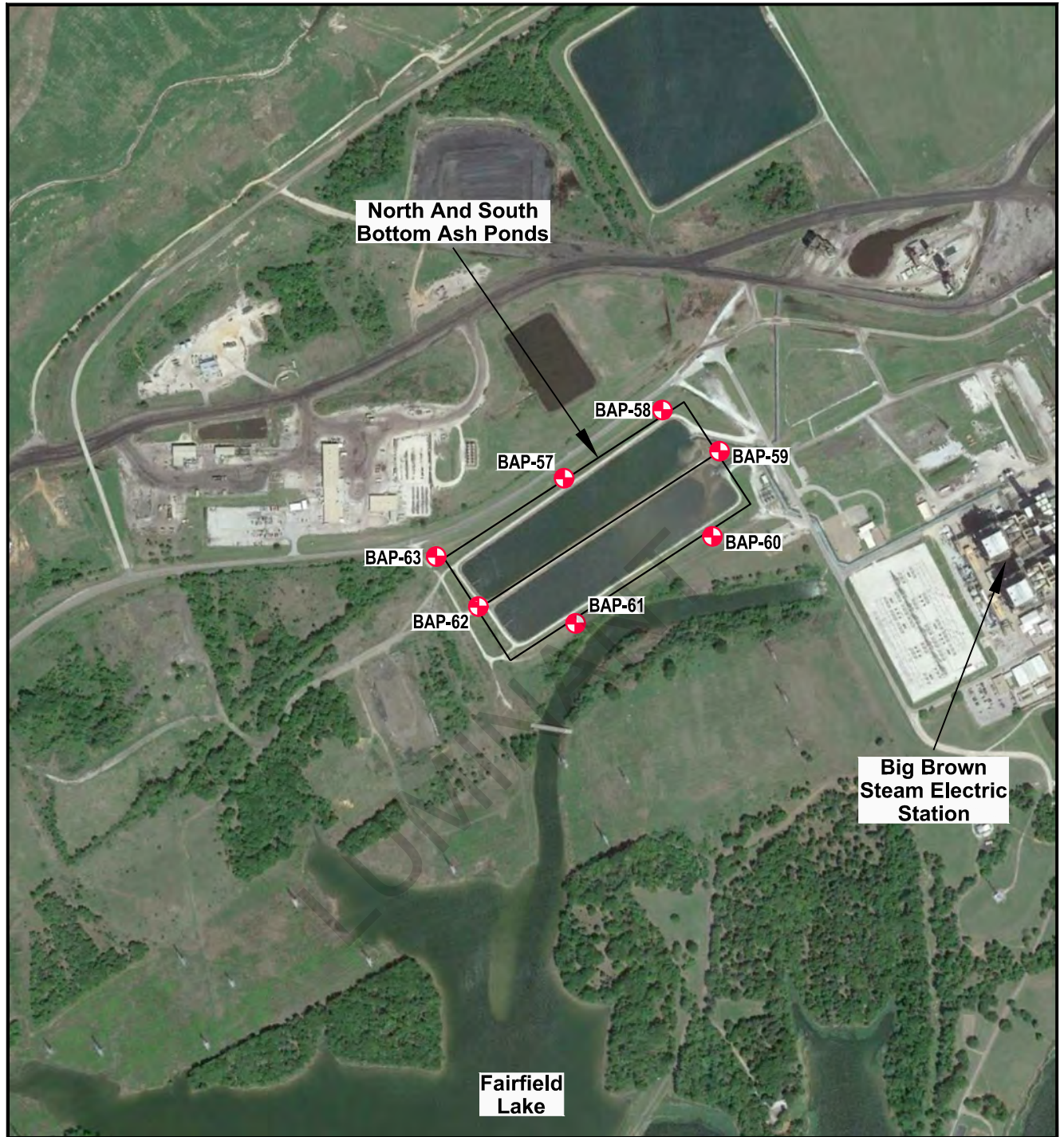
6.0 REFERENCES

Pastor, Behling & Wheeler, LLC (PBW), 2017. Coal Combustion Residual Rule Statistical Analysis Plan, Big Brown Steam Electric Station, Bottom Ash Ponds, Freestone County, Texas.

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FIGURES

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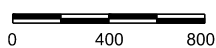


EXPLANATION

 CCR Monitoring Well Location



Scale in Feet



SOURCE:
Imagery from Google Earth dated 3/30/2017.

BIG BROWN STEAM ELECTRIC STATION
FAIRFIELD, TEXAS

Figure 1

**BOTTOM ASH PONDS
DETAILED SITE PLAN**

PROJECT: 5164A	BY: AJD	REVISIONS
DATE: SEPT. 2017	CHECKED: PJB	

TABLES

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Table 1
Statistical Background Values
BBSES Bottom Ash Ponds

Parameter	Statistical Background Value
Boron (mg/L)	0.584
Calcium (mg/L)	80.6
Chloride (mg/L)	83.2
Fluoride (mg/L)	0.446
field pH (s.u.)	5.98 7.98
Sulfate (mg/L)	268
Total Dissolved Solids (mg/L)	1,070

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Table 2
Groundwater Protection Standards
BBSSES Bottom Ash Ponds

Parameter	Groundwater Protection Standard
Antimony (mg/L)	0.006
Arsenic (mg/L)	0.0167
Barium (mg/L)	2
Beryllium (mg/L)	0.004
Cadmium (mg/L)	0.005
Chromium (mg/L)	0.1
Cobalt (mg/L)	0.00688
Fluoride (mg/L)	4
Lead (mg/L)	0.015
Lithium (mg/L)	0.276
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)	5

Table 3
Appendix III Analytical Results
BBSSES Bottom Ash Ponds

Sample Location	Date Sampled	B	Ca	Cl	Fl	field pH	SO ₄	TDS
Upgradient Wells								
BAP-57	09/27/17	0.376	16.1	85.4	<0.100	6.68	55.8	352
	06/06/18	0.313	35.3	59.5	0.122 J	6.73	50.3	372
	09/11/18	0.295	11.4	54.7	<0.100	6.22	49.2	293
Downgradient Wells								
BAP-58	09/27/17	1.06	18.4	35.1	<0.100	6.90	70.4	328
	06/06/18	1.22	17.5	36.8	0.114 J	6.57	67.4	308
	09/11/18	1.16	15.9	39.8	<0.100	6.14	75.9	327
BAP-59	09/27/17	2.85	26.4	55.4	0.205 J	6.69	157	500
	06/06/18	3.25	38.4	68.1	0.387 J	6.78	187	551
	09/11/18	3.20	51.9	98.7	0.309 J	6.59	211	644
BAP-60	09/27/17	0.531	12.9	13.5	0.197 J	6.72	91.3	328
	06/06/18	0.589	13.1	14.3	0.199 J	6.52	84.9	336
	09/11/18	0.487	14.6	16.7	0.169 J	6.13	96.2	383
BAP-61	09/27/17	1.22	91.5	214	<0.100	6.65	116	688
	06/06/18	1.36	89.8	208	0.174 J	6.73	113	667
	09/11/18	1.70	76.2	213	<0.100	6.93	131	657
BAP-62	09/27/17	0.820	63.6	20.4	0.163 J	6.86	109	363
	06/06/18	1.200	107	61.3	0.278 J	6.77	236	642
	09/11/18	3.610	108	76.6	0.469	6.76	265	758
BAP-63	09/27/17	1.91	150	55.1	0.260 J	6.82	132	591
	06/06/18	0.891	140	17.9	0.277 J	6.83	73.9	576
	09/11/18	1.65	124	25.9	0.163 J	6.77	105	626

Notes:

1. All concentrations in mg/L except pH, which is in standard units.
2. J - concentration is below sample quantitation limit; result is an estimate.

Table 4
Appendix IV Analytical Summary
BBSES Botm Ash Ponds

Sample Location	Date Sampled	Sb	As	Ba	Be	Cd	Cr	Co	Fl	Pb	Li	Hg	Mo	Se	Th	Ra 226	Ra 228	Ra 226/228 Combined
Upgradient Wells																		
BAP-57	06/06/18	<0.0008	<0.002	0.189	<0.0003	<0.0003	<0.002	<0.003	0.122 J	<0.0003	0.0429	<0.00008	0.00234 J	<0.002	<0.0005	0.437	<0.539	0.976
	09/11/18	NA	<0.002	0.118	NA	NA	NA	<0.003	<0.100	NA	0.0121	NA	<0.002	<0.002	NA	<0.411	<0.483	<0.894
Downgradient Wells																		
BAP-58	06/06/18	<0.0008	<0.002	0.0449	<0.0003	<0.0003	<0.002	<0.003	0.114 J	<0.0003	0.00878 J	<0.00008	<0.002	<0.002	<0.0005	<0.249	<0.460	<0.709
	09/11/18	NA	<0.002	0.0454	NA	NA	NA	<0.003	<0.100	NA	0.00910 J	NA	<0.002	<0.002	NA	<0.236	<0.577	<0.813
BAP-59	06/06/18	<0.0008	<0.002	0.0587	<0.0003	<0.0003	<0.002	<0.003	0.387 J	<0.0003	0.0139	<0.00008	0.00358 J	0.00904	<0.0005	<0.269	<0.576	<0.845
	09/11/18	NA	<0.002	0.0758	NA	NA	NA	<0.003	0.309 J	NA	0.0115	NA	0.00275 J	0.00771	NA	<0.266	<0.497	<0.763
BAP-60	06/06/18	<0.0008	<0.002	0.0542	<0.0003	<0.0003	<0.002	<0.003	0.199 J	<0.0003	0.00811 J	<0.00008	<0.002	<0.002	<0.0005	<0.216	4.53	4.746
	09/11/18	NA	<0.002	0.0688	NA	NA	NA	<0.003	0.169 J	NA	0.00875 J	NA	<0.002	0.00369	NA	<0.345	<0.65	<0.995
BAP-61	06/06/18	<0.0008	<0.002	0.0943	<0.0003	<0.0003	<0.002	0.00398 J	0.174 J	<0.0003	0.00621 J	<0.00008	<0.002	<0.002	<0.0005	0.342	<0.562	0.904
	09/11/18	NA	<0.002	0.0789	NA	NA	NA	0.013	<0.100	NA	0.00674 J	NA	<0.002	<0.002	NA	0.437	<0.848	1.285
	11/06/18	NA	NA	NA	NA	NA	NA	0.00608	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BAP-62	06/06/18	<0.0008	<0.002	0.0891	<0.0003	<0.0003	<0.002	<0.003	0.278 J	<0.0003	0.0363	<0.00008	<0.002	0.0172	<0.0005	0.333	<0.668	1.001
	09/11/18	NA	<0.002	0.0456	NA	NA	NA	0.0046 J	0.469	NA	0.0507	NA	0.0067	0.0696	NA	<0.311	<0.666	<0.977
BAP-63	06/06/18	<0.0008	0.00201 J	0.159	<0.0003	<0.0003	<0.002	<0.003	0.277 J	<0.0003	<0.005	<0.00008	0.0165	<0.002	<0.0005	0.266	1.62	1.886
	09/11/18	NA	<0.002	0.148	NA	NA	NA	<0.003	0.163 J	NA	<0.005	NA	0.0127	0.0042 J	NA	<0.329	0.972	1.301

Notes:

1. All concentrations in mg/L except Ra 226, Ra 228, and Ra 226/228 Combined, which are in pCi/L.
2. J - concentration is below sample quantitation limit; result is an estimate.
3. Non-detect Ra isotope results were assigned a value equal to the minimum detectable concentration.
4. NA - Not analyzed.

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