



# 2018 Annual Groundwater Monitoring and Corrective Action Report

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

Prepared for:

**Luminant Generation Company LLC**

Submitted by:

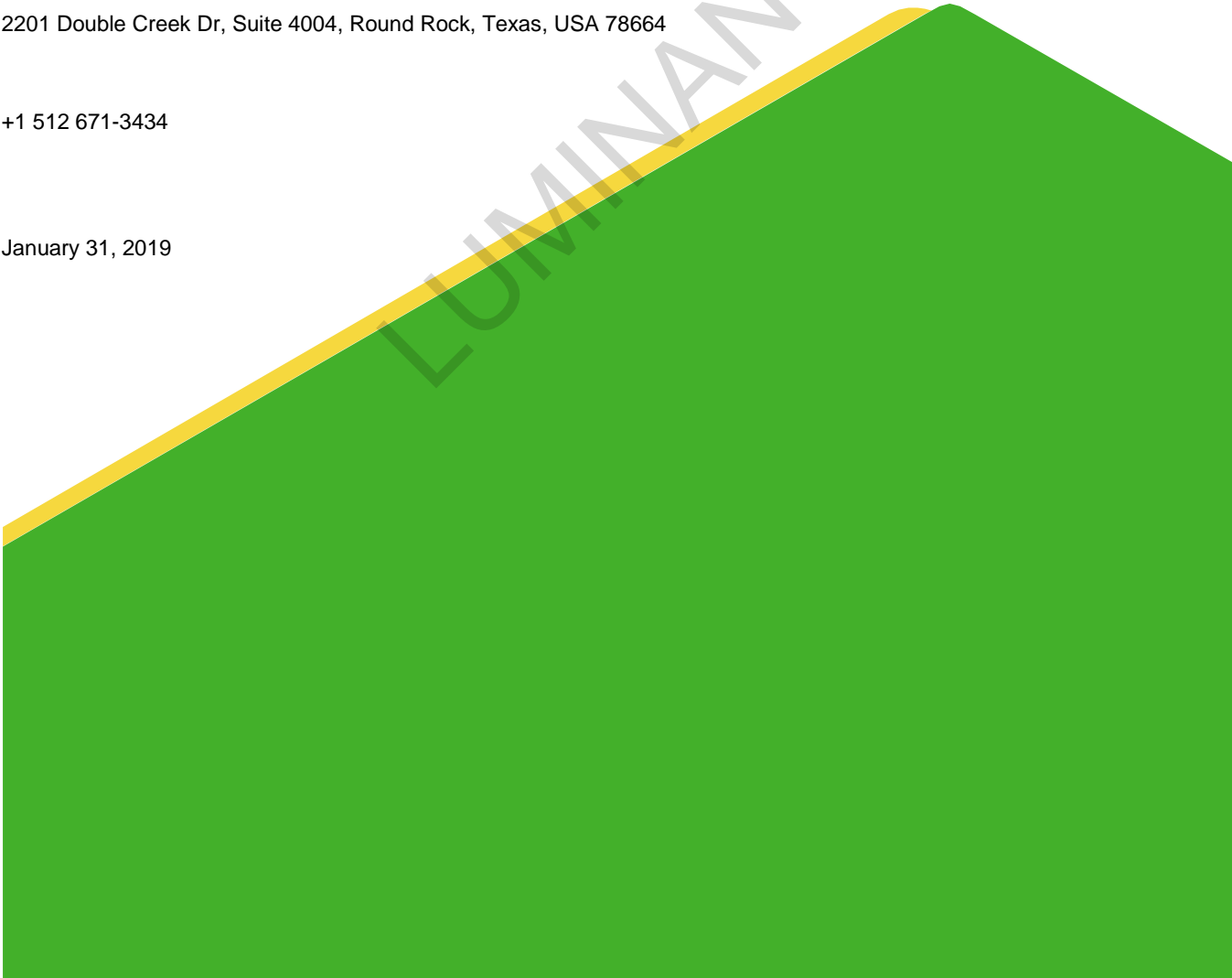
**Golder Associates Inc.**

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

+1 512 671-3434

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## **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 Ash Disposal Area II 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 Ash Disposal Area II 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
09/28/2017	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 Ash Disposal Area II 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 semi-annual sampling event, as required by 40 CFR § 257.95(d)(1). The following table provides a summary of the 2018 Assessment Monitoring Program:

**Assessment Monitoring Program Summary**

Sampling Dates	Parameters	SSIs/SSLs
06/07/2018	Appendix III	Not Applicable
	Appendix IV	
09/11-12/2018	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 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. 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.

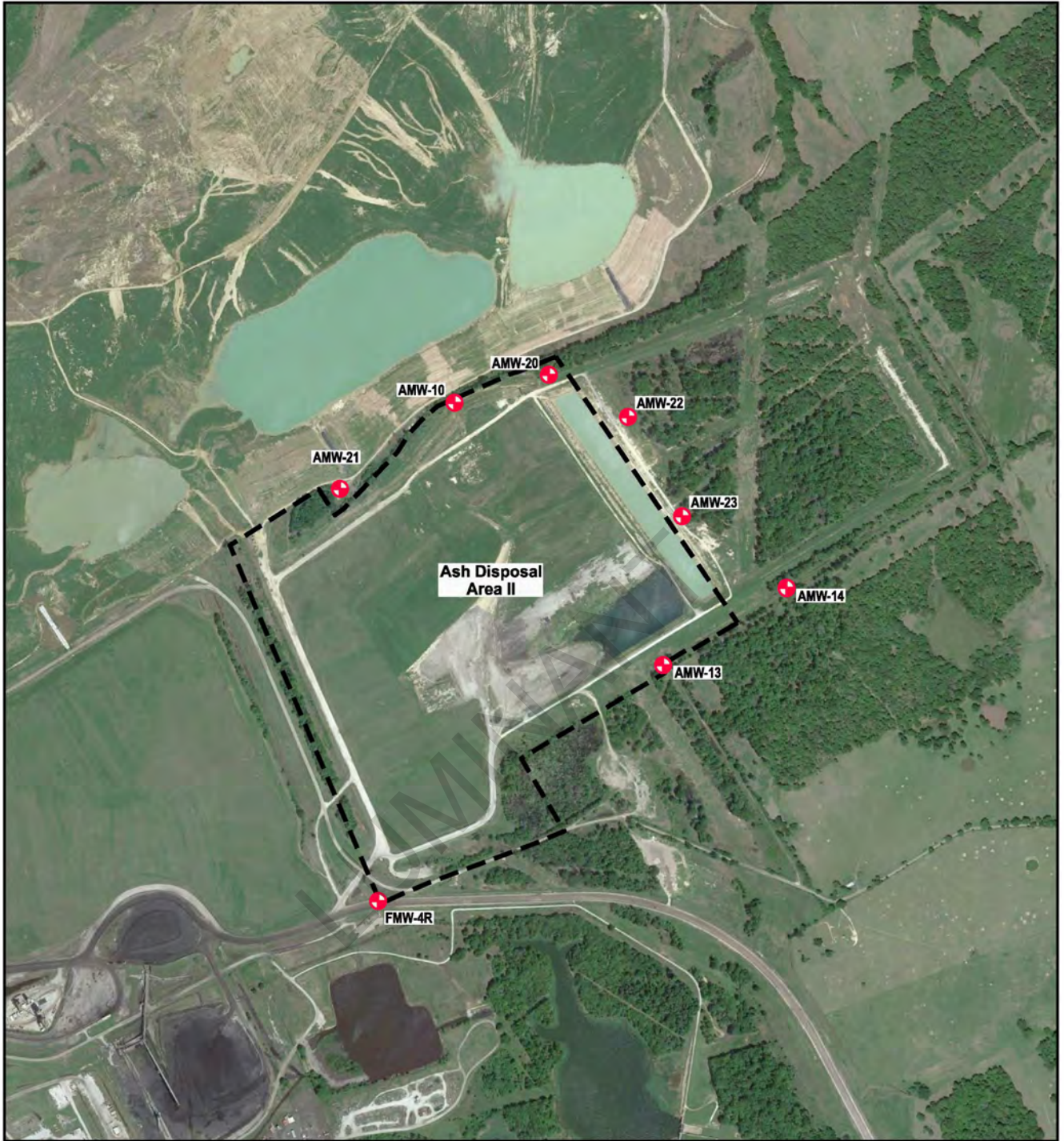
## 6.0 REFERENCES

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

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**FIGURES**

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**EXPLANATION**

 CCR Monitoring Well



Scale in Feet



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

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

Figure 1

**ASH DISPOSAL AREA II  
DETAILED SITE PLAN**

PROJECT: 5164A

BY: AJD

REVISIONS

DATE: SEPT., 2017

CHECKED: PJB

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**TABLES**

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**Table 1**  
**Statistical Background Values**  
**BBSES Ash Disposal Area II**

<b>Parameter</b>	<b>Statistical Background Value</b>
Boron (mg/L)	6.49
Calcium (mg/L)	69.2
Chloride (mg/L)	490
Fluoride (mg/L)	0.4
field pH (s.u.)	6.22
	7.31
Sulfate (mg/L)	365
Total Dissolved Solids (mg/L)	1,070

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**Table 2**  
**Groundwater Protection Standards**  
**BSES Ash Disposal Area II**

<b>Parameter</b>	<b>Groundwater Protection Standard</b>
Antimony (mg/L)	0.006
Arsenic (mg/L)	0.01
Barium (mg/L)	2
Beryllium (mg/L)	0.004
Cadmium (mg/L)	0.005
Chromium (mg/L)	0.1
Cobalt (mg/L)	0.006
Fluoride (mg/L)	4
Lead (mg/L)	0.015
Lithium (mg/L)	0.04
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)	5.06

**Table 3**  
**Appendix III Analytical Results**  
**BSES Ash Disposal Area II**

Sample Location	Date Sampled	B	Ca	Cl	Fl	field pH	SO <sub>4</sub>	TDS
<b>Downgradient Wells</b>								
AMW-10	09/28/17	0.0509	59.7	226	<0.100	6.75	11.7	470
	06/07/18	0.0388	107	558	0.256 J	6.77	20.8	1,030
	09/12/18	0.2730	421	1660	<0.100	5.97	8.45	2,610
AMW-13	09/28/17	0.102	45.3	162	<0.100	6.72	134	561
	06/07/18	0.0298 J	45.5	170	<0.100	6.90	111	548
	09/12/18	0.0428	41.4	173	<0.100	5.80	131	522
AMW-14	09/28/17	0.0504	260	911	<0.100	6.84	32.7	1,750
	06/07/18	0.0600	198	775	<0.100	6.65	41.2	1,510
	09/12/18	0.0338	267	1140	0.463	5.60	42.2	1,870
AMW-20	09/28/17	0.0477	71.2	274	<0.100	6.87	14.2	560
	06/07/18	0.0415	61.6	251	<0.100	6.87	14.0	538
	09/12/18	0.1480	57.9	261	<0.100	5.83	13.8	525
AMW-21	09/28/17	0.063	128	591	<0.100	6.68	17.5	1,100
	06/07/18	0.0416	113	522	0.243 J	6.86	21.6	1,010
	09/12/18	0.1680	99.5	561	0.226 J	5.78	22.7	1,020
AMW-22	09/28/17	0.0455	104	353	<0.100	6.82	21.7	707
	06/07/18	0.0342	103	354	0.161 J	6.64	22.6	707
	09/12/18	0.0412	91.3	349	<0.100	5.93	25.5	674
AMW-23	09/28/17	2.42	163	461	<0.100	6.78	90.5	995
	06/07/18	2.12	150	328	0.171 J	6.82	194	1,030
	09/12/18	2.26	147	336	0.175 J	6.26	266	975
<b>Upgradient Wells</b>								
FMW-4R	09/28/17	2.98	57.4	100	<0.100	6.85	153	517
	06/07/18	2.45	58.8	108	0.120 J	6.84	170	550
	09/11/18	2.6	47.9	132	<0.100	5.81	282	687

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 Results**  
**BSES Ash Disposal Area II**

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
<b>Downgradient Wells</b>																		
AMW-10	06/07/18	<0.0008	<0.002	0.901	<0.0003	0.000339 J	<0.002	0.00874	0.256 J	<0.0003	0.0179	<0.00008	<0.002	0.130	<0.0005	2.18	<1.030	3.21
	09/12/18	NA	<0.002	2.510	NA	0.00172	0.0129	0.00778	<0.100	<0.0003	0.0381	NA	NA	0.00687	NA	4.38	3.71	8.09
AMW-13	06/07/18	<0.0008	<0.002	0.0539	<0.0003	<0.0003	0.00496 J	<0.003	<0.100	<0.0003	0.0124	<0.00008	<0.002	<0.002	<0.0005	<0.300	<0.806	<1.106
	09/12/18	NA	<0.002	0.0413	NA	<0.0003	<0.002	<0.003	<0.100	<0.0003	0.0117	NA	NA	<0.002	NA	<0.317	<0.492	<0.809
AMW-14	06/07/18	<0.0008	0.00623	0.210	<0.0003	0.000402	0.00921	0.00453 J	<0.100	0.00101	0.0470	<0.00008	<0.002	<0.002	<0.0005	0.810	2.05	2.86
	09/12/18	NA	<0.002	0.242	NA	0.000311 J	0.00273 J	<0.003	0.463	<0.0003	0.0405	NA	NA	0.00509	NA	0.744	2.62	3.36
AMW-20	06/07/18	<0.0008	<0.002	0.315	<0.0003	<0.0003	0.00278 J	<0.003	<0.100	<0.0003	0.0190	<0.00008	<0.002	0.00221 J	<0.0005	0.741	2.37	3.11
	09/12/18	NA	<0.002	0.356	NA	<0.0003	<0.00200	<0.003	<0.100	<0.0003	0.0182	NA	NA	0.00224 J	NA	0.63	<0.528	1.16
AMW-21	06/07/18	<0.0008	<0.002	0.944	<0.0003	0.000333 J	<0.002	0.00869	0.243 J	<0.0003	0.0180	<0.00008	<0.002	0.129	<0.0005	1.77	1.27	3.04
	09/12/18	NA	<0.002	0.908	NA	0.000328 J	<0.002	0.00825	0.226 J	<0.0003	0.0179	NA	NA	0.146	NA	2.09	1.84	3.93
AMW-22	06/07/18	<0.0008	<0.002	0.211	<0.0003	<0.0003	<0.002	<0.003	0.161 J	<0.0003	0.0148	<0.00008	<0.002	0.00425 J	<0.0005	0.297	0.555	0.852
	09/12/18	NA	<0.002	0.212	NA	<0.0003	<0.002	0.00338 J	<0.100	<0.0003	0.0150	NA	NA	0.00583	NA	0.703	0.975	1.678
AMW-23	06/07/18	<0.0008	<0.002	0.109	<0.0003	<0.0003	<0.002	0.0163	0.171 J	<0.0003	0.0113	<0.00008	<0.002	0.0244	<0.0005	0.693	<0.5750	1.268
	09/12/18	NA	<0.002	0.101	NA	<0.0003	<0.002	0.0216	0.175 J	<0.0003	0.0119	NA	NA	0.0437	NA	0.324	1.67	1.994
<b>Upgradient Wells</b>																		
FMW-4R	06/07/18	<0.0008	<0.002	0.0316	<0.0003	<0.0003	0.00305 J	<0.003	0.120 J	<0.0003	<0.005	<0.00008	<0.002	<0.0020	<0.0005	0.182	<0.9460	1.128
	09/11/18	NA	<0.002	0.0254	NA	<0.0003	0.00237 J	<0.003	<0.100	<0.0003	<0.005	NA	NA	<0.002	NA	<0.405	<0.5190	<0.924

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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