2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT BOTTOM ASH POND CROSS GENERATING STATION

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1.   Annual Groundwater Monitoring Report Summary

The South Carolina Public Service Authority (Santee Cooper) has prepared this 2020 Annual Groundwater Monitoring Corrective Action Report for Bottom Ash Pond at the Cross Generating Station (CGS). This 2020 Annual Report was prepared to comply with the United States Environmental Protection Agency Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals (CCR) from Electric Utilities, 40 Code of Federal Regulations (CFR) Part 257, Subpart D dated April 17, 2015 (CCR Rule), specifically subsection § 257.90(e)(1) through (6).

In accordance with § 257.90(e)(6), an overview of the current status of groundwater monitoring and corrective action programs for the CCR unit is provided below:

At the start of the current annual reporting period (January 1, 2020), the Bottom Ash Pond continued to operate under an assessment monitoring program in accordance with § 257.95, which was initiated on July 16, 2018. Statistically significant levels (SSLs) of beryllium in monitoring wells CAP-5 and CAP-9; cobalt in monitoring wells CAP-1, CAP-3, CAP-5, CAP-7, and CAP-9; lithium in monitoring wells CAP-1 and CAP-9; and radium 226/228 in monitoring well CAP-5 were identified during the February 2020 sampling event. Following the June 2020 semiannual sampling event, SSLs above the groundwater protection standard (GWPS) for beryllium in monitoring wells CAP-1, CAP-5, and CAP-9; cobalt in monitoring wells CAP-1, CAP-3, CAP-5, CAP-7, and CAP-9; and lithium in monitoring wells CAP-1 and CAP-9 were identified. The radium SSL identified during the February 2020 sampling event was not detected above the GWPS in the June 2020 sampling event.

An assessment of corrective measures was initiated on April 15, 2019 for this unit due to the presence of Appendix IV SSLs. The assessment of corrective measures report was completed on September 11, 2019 for this unit. A public meeting was held on December 3, 2019 to discuss six remedial alternatives per § 257.96(e). An addendum to the assessment corrective measures report was completed on September 30, 2020 to address radium which became an additional SSL in 2020. A remedy has been selected pursuant to § 257.97 and the remedy selection report was completed on September 30, 2020 for this unit. Remedial activities were initiated in 2020 for this unit and are ongoing. At the end of the current annual reporting period (December 31, 2020), the Bottom Ash Pond had transitioned into corrective action.

To report on the activities conducted during the prior calendar year and document progress complying with the CCR Rule, the specific requirements listed in § 257.90(e)(1) through (5) are provided in the next section in bold/italic type followed by a short narrative stating how that specific requirement was met.

2.   40 CFR § 257.90 Applicability

2.1   40 CFR § 257.90(a)
All CCR landfills, CCR surface impoundments, and lateral expansions of CCR units are subject to the groundwater monitoring and corrective action requirements under § 257.90 through § 257.98.

The Bottom Ash Pond at CGS is subject to the groundwater monitoring and corrective action requirements set forth by the Environmental Protection Agency (EPA) in the Code of Federal Regulations

Title 40 (40 CFR) § 257.90 through § 257.98. This document satisfies the requirement under § 257.90(e) which requires the CCR Unit Owner/Operator to prepare an Annual Report.

2.2   40 CFR § 257.90(e) - SUMMARY

Annual groundwater monitoring and corrective action report. For existing CCR landfills and existing CCR surface impoundments, no later than January 31, 2018, and annually thereafter, the owner or operator must prepare an annual groundwater monitoring and corrective action report. [...] For the preceding calendar year, the annual report must document the status of the groundwater monitoring and corrective action program for the CCR unit, summarize key actions completed, describe any problems encountered, discuss actions to resolve the problems, and project key activities for the upcoming year. For purposes of this section, the owner or operator has prepared the annual report when the report is placed in the facility's operating record as required by § 257.105(h)(1).

This Annual Report documents the activities completed in 2020 for the Bottom Ash Pond at CGS as required by the Groundwater Monitoring and Corrective Action regulations. Groundwater sampling and analysis was conducted per the requirements of § 257.93, and the status of the groundwater monitoring program, set forth in § 257.95, is provided in this report.

2.2.1   Status of the Groundwater Monitoring and Corrective Action Program

Statistically significant increases (SSI) of Appendix III constituents were identified downgradient of the Bottom Ash Pond, and the notification was provided on January 15, 2018. An alternate source demonstration (ASD) was conducted by Haley & Aldrich, Inc, and a report was provided to Santee Cooper in April 2018. The review by Haley & Aldrich did not identify contributing sources that could serve as an ASD for the SSI's observed in the CCR well network for the CGS Bottom Ash Pond. As a result, an Assessment Monitoring program was initiated as required by § 257.94(e)(2).

SSLs of beryllium in monitoring wells CAP-5 and CAP-9; cobalt in monitoring wells CAP-1, CAP-3, CAP-5, CAP-7, and CAP-9; lithium in monitoring wells CAP-1 and CAP-9; and radium 226/228 in monitoring well CAP-5 were identified during the February 2020 sampling event. During the June 2020 semiannual sampling event, SSLs above the GWPS for beryllium in monitoring wells CAP-1, CAP-5, and CAP-9; cobalt in monitoring wells CAP-1, CAP-3, CAP-5, CAP-7, and CAP-9; and lithium in monitoring wells CAP-1 and CAP-9 were identified. The radium SSL identified in February 2020 was not detected above GWPS in the June 2020 semiannual sampling event.

An addendum to the assessment corrective measures report was completed on September 30, 2020 to address radium which became an additional SSL in 2020. The CMA Addendum Report concluded that the previously evaluated alternatives presented at the public hearing in December 2019 were also applicable to address radium in groundwater.

In accordance with § 257.97(a), a semi-annual progress report was posted to the publicly available website in March 2020 detailing a summary of actions completed to date in selecting and designing the remedy as well as planned activities. The remedy selection report was finalized on September 30, 2020 and posted to the publicly available website. The selected remedial alternative is closure by removal (CBR) with beneficial use plus monitored natural attenuation (MNA).

This remedy eliminates the source through removal thereby meeting the source control requirement stated in the CCR Rule. Over time, removing the source material will allow the concentrations of these constituents in downgradient groundwater to attenuate. Through the on-going beneficial use of reclaimed ponded bottom ash and gypsum, the amount of material that will need to be removed from the Pond has been greatly reduced already and serves as an interim and ongoing remedial measure. This beneficial use program's success makes the option of CBR viable. Since the Class 3 Landfill is an operating non-commercial landfill at CGS, on-site and off-site disposal options were considered for non-marketable CCR material from the pond. The other component of the selected remedy will be to address the presence of beryllium, cobalt, lithium, and possibly radium-226/228 in the groundwater above the GWPSs. Groundwater is being addressed through MNA, which is a viable remedial technology recognized by state and federal regulators that is applicable to inorganic compounds in groundwater. MNA is intended to reduce concentrations of beryllium, cobalt, lithium, and radium-226/228 in groundwater at the Bottom Ash Pond boundary, thereby attaining the groundwater protection standard.

The development of the corrective action groundwater monitoring program for MNA was completed by reevaluating the current groundwater sampling plan. This evaluation concluded that the assessment monitoring protocol currently being implemented was sufficient to meet the needs of the corrective action groundwater monitoring program.

2.2.2   Key Actions Completed

The following key actions were completed in 2020:

- Prepared 2019 Annual Report including:
  - The Annual Report was placed in the facility's operating record pursuant to § 257.105(h)(1);

  - Pursuant to § 257.106(h)(1), the notification was sent to the relevant State Director within 30 days of the Annual Report being placed in the facility's operating record [§ 257.106(d)];

  - Pursuant to § 257.107(h)(1), the Annual Report was posted to the CCR Website within 30 days of the Annual Report being placed in the facility's operating record [§ 257.107(d)];
- Collected and analyzed two rounds of groundwater monitoring (February and June) (Table 1) in accordance with § 257.95(b) and § 257.95(d)(1) and recorded the concentrations in the facility's operating record as required by § 257.95(d)(1); and
- Completed statistical evaluation to determine statistically significant exceedance of GWPS for Appendix IV in accordance with § 257.93(h)(2) (Appendix A);
- Posted an addendum to the notice of exceedance to the public website that identified radium as an additional SSL § 257.95(g)
- Installed additional groundwater monitoring well CCMAP-3 by a South Carolina Certified Well Driller in 2020, as part of the Corrective Measures Assessment and Nature and Extent investigation to address the new SSL identified for radium § 257.95(g)(1)(i).
- Initiated closure of the Bottom Ash Pond on August 31, 2020 and posted the notification to the public website § 257.102(g)
- Prepared and completed an addendum to the CMA Report to evaluate radium in the context of the six remedial alternatives § 257.96

- A semi-annual progress report was posted to the publicly available website in March detailing a summary of actions completed to date in selecting and designing the remedy as well as planned activities § 257.97(a)
- Selected the remedy and prepared the Remedy Selection Report including schedules for implementing and completing remedial activities § 257.97(a)
- Initiated Groundwater Remedial Activities within 90 days of selecting the remedy which included a reevaluation of the current groundwater monitoring plan § 257.98(a)
- Developed the Corrective Action Groundwater Monitoring Program (MNA Sampling Protocol) § 257.98 (a)(1) which is consistent with the Assessment Monitoring Program § 257.95

2.2.3   Problems Encountered

Problems, such as damaged wells, issues with sample collection, lack of sampling, or problems with analytical testing were not encountered at the Bottom Ash Pond in 2020.

2.2.4   Actions to Resolve Problems

Actions to resolve problems were not required.

2.2.5   Project Key Activities for Upcoming Year

Key activities to be completed in 2021 include the following:

- Conduct semi-annual groundwater monitoring § 257.95(d)(1)
- Field implementation of the selected remedy
- Install additional groundwater monitoring well to supplement the nature and extent evaluation for radium in accordance with § 257.95(g)(1)
- Prepare the 2021 annual report; place it in the record as required by § 257.105(h)(1), notify the state [§ 257.106(d)]; and post to website [§ 257.107(d)].

2.3   40 CFR § 257.90(e) - INFORMATION
At a minimum, the annual groundwater monitoring and corrective action report must contain the following information, to the extent available:

2.3.1   40 CFR § 257.90(e)(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;

As required by § 257.90(e)(1), a map showing the locations of the CCR unit and associated upgradient and downgradient monitoring wells for the Bottom Ash Pond is presented as Figure 1. In addition, this information is presented in the CCR Groundwater Monitoring Plan, which was placed in the facility's operating record by October 17, 2017 as required by § 257.105(h)(1).

2.3.2   40 CFR § 257.90(e)(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;

Groundwater monitoring well CCMAP-3 was installed by a South Carolina Certified Well Driller in 2020, as part of the Corrective Measures Assessment and Nature and Extent. It was installed downgradient of CAP-8 and CAP-9, outside the Bottom Ash Pond, and was relied upon to evaluate the vertical extent of impacts at the Ash Pond. Additional monitoring wells previously installed as part of the SCDHEC groundwater monitoring program were also used to further evaluate the nature and extent of contamination.

2.3.3   40 CFR § 257.90(e)(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;

In accordance with § 257.95(b) and § 257.95(d)(1), at least two independent samples from each background and downgradient monitoring well were collected and analyzed in 2020. A summary table including the sample names, dates of sample collection, reason for sample collection, and monitoring data obtained for the groundwater monitoring program for the Bottom Ash Pond is presented in Table 1 of this report. In addition, as required by § 257.95(d)(3), Table 1 includes the groundwater protection standards established under § 257.95(d)(2).

2.3.4   40 CFR § 257.90(e)(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

As required by § 257.93(h) a statistical analysis of the Appendix III constituents was completed on January 15, 2018. Baseline analytical data collected from background monitoring wells CBW-1 and PM-1 were combined to develop Upper Tolerance Limits (UTLs). The UTLs for each Appendix III constituent were compared to the analytical results for the downgradient monitoring wells CAP-1, CAP-3, CAP-5, CAP-7, and CAP-9. Constituents with analytical results exceeding the UTLs were identified as SSIs over background for the respective Appendix III constituent. An evaluation of alternate sources was initiated and completed on April 13, 2018 as provided in § 257.94(e)(2). A source causing the SSI over background levels other than the CCR unit was not identified at that time and an Assessment Monitoring program was initiated on July 16, 2018.

As required by § 257.93(h)(2), the statistical evaluation of the detected Appendix IV constituents identified SSLs of Appendix IV constituents above GWPS. Therefore, per §257.95(g)(3), an assessment of corrective measures and nature and extent evaluation was initiated on April 15, 2019, to evaluate the horizontal and vertical nature and extent of the SSLs downgradient of the Bottom Ash Pond. The Corrective Measures Assessment (CMA) report, considering the presence and distribution of beryllium, cobalt, and lithium in the uppermost aquifer, the configuration of the Cross Bottom Ash Pond, operational history, hydrogeologic setting, and the results of the evaluation of the nature and extent available at the time of the CMA, was created.

The sample concentrations from the downgradient wells for each of the detected Appendix IV constituents from the monitoring events of 2020 were compared to their respective background UTLs and GWPS (Appendix A). A sample concentration greater than the GWPS was considered to represent

an SSL. Based on previous compliance sampling events and statistical evaluations, interwell comparisons were utilized for all downgradient wells and constituents. Based on the statistical evaluation of the 2020 groundwater sampling events, SSLs above GWPS were identified at the Ash Pond (beryllium, cobalt, and lithium), consistent with previous results as presented at the 2019 Public Meeting. During the February 2020 sampling event radium was detected above the GWPS in CAP-5, however, radium was not detected above GWPS in the June 2020 sampling event for this well. Radium will continue to be evaluated during subsequent semiannual sampling events.

The development of the corrective action groundwater monitoring program for MNA was completed by reevaluating the current groundwater sampling plan. This evaluation concluded that the assessment monitoring protocol currently being implemented was sufficient to meet the needs of the corrective action groundwater monitoring program.

2.3.5   40 CFR § 257.90(e)(5)
Other information required to be included in the annual report as specified in § 257.90 through § 257.98.

Other information including development of groundwater protection standards, recording groundwater monitoring results in the operating record, an evaluation of alternate sources, and the remedy selection process is discussed in preceding sections.

TABLES

TABLE 1 - Summary of Analytical Results
Cross Generating Station Bottom Ash Pond Assessment Monitoring

Well ID	Purpose	Date of Sample Event	Laboratory Sample ID Number	Boron	Calcium	Chloride	Fluoride	Fluoride	Sulfate	Total Dissolved Solids	pH	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Fluoride	Lead	Lithium	Mercury	Molybdenum	Radium 226	Radium 228	Radium 226/Radium 228 Combined Calculation	Selenium	Thallium	Depth to Groundwater	Groundwater Elevation	pH	Specific Conductivity	Temperature	Oxidation Reduction Potential	Turbidity	Dissolved Oxygen
			Unit	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	mg/L	ug/L	ug/L	ug/L	ug/L	pCi/L	pCi/L	pCi/L	ug/L	ug/L	Feet (btoc)	Feet (msl)	SU	uS	C	mv	NTU	ppm
			Method	EPA 6020B	EPA 6020B	EPA 300.0	EPA 300.0	SM 4500 FC	EPA 300.0	SM 2540C	—	EPA 6020B	EPA 6020B	EPA 6020B	EPA 6020B	EPA 6020B	EPA 6020B	EPA 6020B	EPA 300.0	SM 4500 FC	EPA 6020B	EPA 6010D	EPA 7470	EPA 6010D	EPA 903.1 Mod	EPA 904.0	EPA 903.1 Mod	EPA 6020B	EPA 6020B	—	—	—	SM2580	—	—	—	—
			GWPS/US EPA MCL/RSL	—	—	—	4	4	—	—	—	6	10	2000	4	5	100	6	4	4	15	40	2	100	—	—	5	50	2	—	—	—	—	—	—	—
Site Background Wells																																					
PM-1	Background	2/24/2020	AE66534	<15	11	12.7		<0.10	8.36	120	4.92	<5.0	<5.0	72.5	<0.50	<0.50	<5.0	1		<0.10	<1.0	<10	<0.20	<10	0.532	0.00527	0.538	<10.0	<1.0	6.86	76.38	4.92	154	16.77	57	0.1	0.92
PM-1	Background	6/22/2020	AE75385	49	13.5	12.67	<0.10		8.32	112.5	5.12	<5.0	<5.0	76.6	<0.50	<0.50	<5.0	1	<0.10		<1.0	<5	<0.20	<10	0.547	0.938	1.38	<10.0	<1.0	7	76.24	5.12	157	24.65	78	9.1	0.71
PM-1	total samples			2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
CBW-1	Background	2/24/2020	AE66522	17	28.2	3.25		0.19	79.8	107.5	4.09	<5.0	<5.0	41.3	<0.50	<0.50	<5.0	0.82		0.19	2.7	<10	<0.20	<10	0.727	1.33	2.06	<10.0	<1.0	7.94	77.86	4.09	231	17.01	249	0	0.9
CBW-1	Background	6/22/2020	AE75384	18	28.4	3.44	0.2		79.9	147.5	4.48	<5.0	<5.0	43.3	<0.50	<0.50	<5.0	0.8	0.2		2.6	<5	<0.20	<10	0.493	0.647	1.14	<10.0	<1.0	8.19	77.61	4.48	218	25.75	324	0	0.74
CBW-1	total samples			2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Bottom Ash Pond Wells																																					
CAP-1	Assessment	2/26/2020	AE66507		203	119		0.82	437	1032	5.75	<5.0	<5.0	50.4	3.2	<0.50	<5.00	12.1		0.82	1.4	57	<0.20	<10	1.03	0.984	2.01	<10.0	<1.0	4.66	78.04	5.75	1210	17.54	5	20.2	0.8
CAP-1	Assessment	6/25/2020	AE75356	500	354	257	1.39		758	1760	5.58		<5.0	35.9	5.6	<0.50	<5.0	22.3	1.39		1.3	100	<0.20		1.02	1.14	2.16			6.33	76.37	5.58	2110	23.61	4	14.6	0.67
CAP-1	total samples			1	2	2	1	1	2	2	2	1	2	2	2	2	2	2	1	1	2	2	2	1	2	2	2	1	1	2	2	2	2	2	2	2	2
CAP-3	Assessment	2/27/2020	AE66509		675	664		<0.10	938	3332	6.26	<5.0	<5.0	83.9	<0.50	<0.50	<5.00	30		<0.10	<1.0	12	<0.20	<10	0.423	-0.128	0.423	<10.0	<1.0	13.94	77.55	6.26	4120	16.59	39	0	0.93
CAP-3	Assessment	6/30/2020	AE75358	7900	623	601	<0.10		834	2964	6.2		<5.0	68.7	<0.50	<0.50	<5.0	29.2	<0.10		<1.0	12	<0.20		0.535	1.31	1.85			14.18	77.31	6.2	3470	28.63	53	0	0.63
CAP-3	total samples			1	2	2	1	1	2	2	2	1	2	2	2	2	2	2	1	1	2	2	2	1	2	2	2	1	1	2	2	2	2	2	2	2	2
CAP-5	Assessment	2/27/2020	AE66511		145	610	0.52	<2.0	1180		3.75	<5.0	<5.0	1560	4.3	<0.50	<5.00	14.2		0.52	5.1	12	<0.20	<10	7.04	12	19	<10.0	<1.0	14.12	77.66	3.75	2120	17.87	301	0	0.87
CAP-5	Assessment	6/30/2020	AE75360	250	153	652	0.3			1392	3.89		<5.0	1500	4.6	<0.50	<5.0	14.6	0.3		6.3	14	<0.20		7.27	12.4	19.7			14.71	77.07	3.89	1960	27.27	262	0	0.57
CAP-5	CMA/NE	7/29/2020	AE79093								4.12														6.18	9.61	15.8			17.51	74.27	4.12	1960	25.83	179	5.1	0.57
CAP-5	total samples			1	2	2	1	1	1	2	3	1	2	2	2	2	2	2	1	1	2	2	2	1	3	3	3	1	1	3	3	3	3	3	3	3	3
CAP-7	Assessment	2/27/2020	AE66513		1020	1980		<0.10	3680	6105	5.35	<5.0	<5.0	37.8	<0.50	<0.50	<5.00	9.2		<0.10	<1.0	<10	0.24	<10	0.678	1.2	1.88	<10.0	<1.0	13.91	77.73	5.35	8140	17.62	51	4.3	0.86
CAP-7	Assessment	6/30/2020	AE75362	28000	981	2040	<0.10		1680	6236	5.38		<5.0	40.5	<0.50	<0.50	<5.0	9.9	<0.10		<1.0	<10	0.24		0.92	0.671	1.59			14.48	77.16	5.38	8360	23.9	72	3.2	0.83
CAP-7	total samples			1	2	2	1	1	2	2	2	1	2	2	2	2	2	2	1	1	2	2	2	1	2	2	2	1	1	2	2	2	2	2	2	2	2
CAP-9	Assessment	3/2/2020	AE66515		488	1070	3.23		571	3154	3.42	<0.50	7.8	39.8	14.9	<0.50	<5.0	38.4	3.23		12.8	64	0.33	<10	0.609	2.65	3.26	<10.0	<1.0	14.14	77.45	3.42	4280	19.23	303	0	0.92
CAP-9	Duplicate	3/2/2020	AE66516		475	1050	3.52		538	2982		<0.50	7.5	46.2	14.8	<0.50	<5.0	37.6	3.52		13.1	64	0.34	<10	0.497	2.61	3.11	<10.0	<1.0								
CAP-9	Assessment	6/29/2020	AE75364	7000	534	1070	2.09		556	3634	4		7	50.3	14.9	<0.50	<5.0	38.4	2.09		11.6	65	0.3		0.96	3.23	4.19			14.22	77.37	4	4100	25.18	266	4	0.59
CAP-9	Duplicate	6/29/2020	AE75365	6900	517	1050	1.99		546	3446			7.2	58.3	14.6	<0.50	<5.0	38.5	1.99		11.8	65	0.27		1	1.25	2.25										
CAP-9	total samples			2	4	4	4		4	4	2	2	4	4	4	4	4	4	4		4	4	4	2	4	4	4	2	2	2	2	2	2	2	2	2	2
CCMAP-1	CMA/NE	3/3/2020	AE66532								7.01	<0.50						1.1				<10								17.81	76.21	7.01	342	17.81	-17	0.7	0.94
CCMAP-1	CMA/NE	7/1/2020	AE75373								7.19	<0.50						1.6				<10								5.14	75.07	7.19	366	28.17	-150	2	0.87
CCMAP-1	CMA/NE	7/29/2020	AE78634								7.1														0.622	0.403	1.03			7.73	72.48	7.1	348	24.98	-99	1.6	0.68
CCMAP-1	total samples			0	0	0	0	0	0	0	3	2	0	0	0	0	0	2	0	0	0	2	0	0	1	1	1	0	0	3	3	3	3	3	3	3	3
CCMAP-2	CMA/NE	3/3/2020	AE66533								4.98	<0.50						0.52				<10								5.77	75.47	4.98	53	18.78	199	2.9	1.39
CCMAP-2	CMA/NE	7/1/2020	AE75374								5.49	<0.50						0.81				<10								4.62	76.62	5.49	62	22.96	78	2.7	0.91
CCMAP-2	CMA/NE	7/29/2020	AE78635								6.99														0.491	0.143	0.634			7.97	73.27	5.99	67	24.7	33	0	0.63
CCMAP-2	total samples			0	0	0	0	0	0	0	3	2	0	0	0	0	0	2	0	0	0	2	0	0	1	1	1	0	0	3	3	3	3	3	3	3	3
CCMAP-3	CMA/NE	5/21/2020	AE78808								6.33	<0.50										17								7.23	74.68	6.33	5530	21.68	39	5.8	1
CCMAP-3	Duplicate	5/21/2020	AE78809									<0.50										16															
CCMAP-3	CMA/NE	7/1/2020	AE75375								6.52					<0.50						18								6.31	75.6	6.52	5740	24.11	-20	12.3	0.7
CCMAP-3	Duplicate	7/1/2020	AE75376													<0.50						19															
CCMAP-3	CMA/NE	7/29/2020	AE78636								6.56														1.17	0.801	1.97			8.13	73.78	6.56	5400	25.54	-38	0	0.57
CCMAP-3	total samples			0	0	0	0	0	0	0	3	2	0	0	0	4	0	0	0	0	0	4	0	0	1	1	1	0	0	3	3	3	3	3	3	3	3

All groundwater samples collected from the monitoring wells for Assessment Monitoring in 2020 for the constituents listed in Appendix III and Appendix IV of the EPA CCR Rule (40 CFR) were analyzed by South Carolina Certified laboratories: Santee Cooper Analytical Services (Certification # 08552), GEL Laboratories, LLC (Certification # 10120), Test America Laboratories Inc. Savannah (Certification # 98001), Test America Laboratories Inc. Pensacola (Certification #96026), Rogers & Callcot, Inc. (Certification # 23105001), and Pace Analytical Services LLC (Certification #99030).

FIGURES

LOCATION OF BOTTOM ASH POND
GROUNDWATER MONITORING WELLS
FOR CCR COMPLIANCE

FIGURE 1

SANTEE COOPER
CROSS GENERATING STATION
PINEVILLE, SOUTH CAROLINA

DECEMBER 2020

LEGEND

- BACKGROUND WELL
- ASH POND WELL
- NATURE & EXTENT WELL
- ----- CCR BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.

2. AERIAL IMAGERY SOURCE: ESRI

0   720   1,440
SCALE IN FEET

N

CLASS 2 LANDFILL

FUTURE AREA B-2

CAP-5

CAP-7

CAP-3

BOTTOM ASH POND

CCMAP-3

CAP-9

CAP-1

CBW-1

FORMER GYPSUM POND

PM-1

GIS FILE PATH: I:\97130\Groundwater\GIS Groundwater\mxd map files\CGS_CCR_WELL_LOCATIONS.mxd — USER: ALDECOTE — LAST SAVED: 12/14/2020 11:07:19 AM
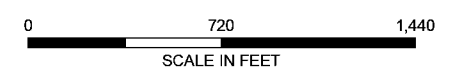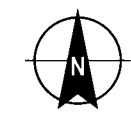
Appendix A – Statistical Analysis

TECHNICAL MEMORANDUM

July 20, 2020
File No. 132892-010

SUBJECT: 2020 Semi-annual Groundwater Assessment Monitoring Data
Statistical Evaluation
Cross Generating Station
Ash Pond

Pursuant to Title 40 Code of Federal Regulations (40 CFR) § 257.93 and 257.95 (Rule), this memorandum summarizes the statistical evaluation of the analytical results for the March 2020 semi-annual assessment monitoring groundwater sampling event for the Cross Generating Station (CGS) Ash Pond. The statistical evaluation discussed in this memorandum was conducted to determine if Appendix IV groundwater monitoring constituents have been detected in downgradient wells at concentrations that represent a statistically significant level (SSL) above background or upgradient wells consistent with the requirements in 40 CFR § 257.95.

Utilizing interwell statistical evaluations, data from the groundwater sampling event for the downgradient monitoring wells were compared to the Groundwater Protection Standard (GWPS) established from the background dataset for the upgradient monitoring wells (PM-1 and CBW-1). GWPS for each of the Appendix IV constituents have been set equal to the highest value of the maximum contaminant level (MCL), regional screening level (RSL), or background concentration. The results of the groundwater assessment monitoring statistical evaluation are discussed below and provided in Table I.

Statistical Evaluation of Appendix IV Constituents

The Rule provides four specific options for statistical evaluation of groundwater quality data collected at a coal combustion residual (CCR) unit (40 CFR §257.93(f) (1-4)). The statistical method used for these evaluations, tolerance limit (TL), was certified by Haley & Aldrich, Inc. on October 14, 2017. The TL method, determined applicable for this sampling event, was used to evaluate potential SSLs above GWPS. GWPS for each constituent listed in Appendix IV were computed as upper tolerance limits (UTL), and a minimum 95 percent confidence coefficient and 95 percent coverage. The most recent groundwater sampling result from each compliance well was compared to the corresponding GWPS UTL to determine if a SSL existed.

STATISTICAL EVALUATION

An interwell statistical evaluation was used to identify SSLs. An interwell evaluation compares the most recent values from downgradient compliance wells to a background dataset composed of upgradient

well data. Because the CCR unit has transitioned into assessment monitoring, no statistical evaluations were conducted on Appendix III (detection monitoring) semi-annual assessment monitoring data.

The parametric TL method was used to complete statistical evaluations of the referenced dataset. The TL procedure is one in which a concentration limit for each constituent is established from the distribution of the background data, with a minimum 95 percent confidence level. The upper endpoint of a tolerance interval is called the UTL. Depending on the data distribution, parametric or non-parametric TL procedures are used to evaluate groundwater monitoring data using this method. Parametric TLs utilize normally distributed data or data normalized via a transformation of the sample background data used to construct the limit. If the data are non-normal and a transformation is not indicated, non-parametric procedures (order statistics or bootstrap methods) are used to calculate the TL. If all the background data are non-detect, a maximum reporting limit may serve as an appropriate UTL.

These statistical evaluations were conducted using the background dataset for all detected Appendix IV constituents using parametric TL. If an Appendix IV constituent concentration from the March 2020 semi-annual sampling event was above the GWPS, the lower confidence limit (LCL) for the downgradient well constituent was used to evaluate if a SSL was present. The LCL is the lower end of the confidence interval range, which is an estimated concentration range intended to contain the true mean or median of the population from which the sample is drawn. The confidence interval range is designed to locate the true population mean or median with a high degree of statistical confidence, or conversely, with a low probability of error.

The UTLs were calculated from the background well dataset using Chemstat software after testing for outlier sample results that would warrant removal from the dataset based on likely error in sampling or measurement. Both visual and statistical outlier tests for the background data were performed using Chemstat and U.S. Environmental Protection Agency's ProUCL 5.1 software, and a visual inspection of the data was performed using box plots and distribution plots for the downgradient sample data. No sample data were identified as outliers that warranted removal from the dataset.

BACKGROUND DISTRIBUTIONS

The groundwater analytical results for each sampling event from the background sample location (PM-1 and CBW-1) were combined to calculate the UTL for each detected Appendix IV constituent. The variability and distribution of the pooled dataset was evaluated to determine the method for UTL calculation. Per the document *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, March 2009,* background concentrations were updated for the March 2020 semi-annual sampling event based on statistical evaluation of analytical results collected through March 2020.

RESULTS OF APPENDIX IV DOWNGRADIENT STATISTICAL COMPARISONS

The sample concentrations from the downgradient wells for each of the detected Appendix IV constituents from the March 2020 semi-annual assessment monitoring event were compared to their respective GWPS (Table I). A sample concentration greater than the GWPS is considered to represent a

HALEY
ALDRICH

SSL. Based on previous assessment monitoring sampling event and statistical evaluations, interwell comparisons were utilized for all downgradient wells and constituents. Based on this statistical evaluation SSLs above GWPS were identified at the Ash Pond for beryllium, cobalt, lithium and radium. While not previously identified at a statistically significant level, a SSL for radium was indicated by this evaluation. Radium has routinely been detected in groundwater downgradient of the Ash Pond and will continue to be evaluated in the semiannual sampling program.

Tables:
    Table I – Summary of Assessment Monitoring Statistical Evaluation – March 2020

TABLES

Cross Ash Pond

Summary of Assessment Monitoring Statistical Evaluation – March 2020

Prepared: July 20, 2020

																				Inter-well Analysis				
Location Id	Frequency of Detection	Percent Non-Detects	Range of Non-Detect	Mean	50th Percentile (Median)	95th Percentile	Maximum Detect	Variance	Standard Deviation	Coefficient of Variance	CCR MCL/RSL	Report Result Unit	Detection Exceedances (Y/N)	Number of Detection Exceedances	Number of Non-Detection Exceedances	Outlier Presence	Outlier Removed	Trend	Distribution Well*	February / March 2020 Concentrations	Detect?	Upper Tolerance Limit	GWPS (Higher of MCL/RSL or Upper Tolerance Limit)	SSL
							CCR Appendix-IV: Antimony, Total (mg/L)																	
CBW-1	0/12	100%	0.005-0.025	0.00667	0.005	0.014		0.00003333	0.005774	0.866	0.006	mg/L	N	0	1	NA	NA	NA	Non-parametric			0.0250	0.0250	
PM-1	0/12	100%	0.005-0.025	0.00667	0.005	0.014		0.00003333	0.005774	0.866	0.006	mg/L	N	0	1	NA	NA	NA						
CAP-1	0/11	100%	0.005-0.025	0.00682	0.005	0.015		0.00003636	0.00603	0.8844	0.006	mg/L	N	0	1	NA	NA	NA	NA	0.005	N			FALSE
CAP-3	0/11	100%	0.005-0.025	0.00682	0.005	0.015		0.00003636	0.00603	0.8844	0.006	mg/L	N	0	1	NA	NA	NA	NA	0.005	N			FALSE
CAP-5	0/11	100%	0.005-0.025	0.00682	0.005	0.015		0.00003636	0.00603	0.8844	0.006	mg/L	N	0	1	NA	NA	NA	NA	0.005	N			FALSE
CAP-7	0/11	100%	0.005-0.025	0.00682	0.005	0.015		0.00003636	0.00603	0.8844	0.006	mg/L	N	0	1	NA	NA	NA	NA	0.005	N			FALSE
CAP-9	0/11	100%	0.0005-0.025	0.00641	0.005	0.015		0.00003984	0.006312	0.9848	0.006	mg/L	N	0	1	NA	NA	NA	NA	0.0005	N			FALSE
							CCR Appendix-IV: Arsenic, Total (mg/L)																	
CBW-1	3/14	79%	0.005-0.005	0.00593	0.005	0.009955	0.016	0.000008602	0.002933	0.4943	0.01	mg/L	Y	1	0	Yes	No	Stable	Non-parametric			0.0160	0.0160	
PM-1	2/14	86%	0.005-0.005	0.00484	0.005	0.005	0.0042	1.932E-07	0.0004396	0.09091	0.01	mg/L	N	0	0	No	No	Stable						
CAP-1	0/14	100%	0.003-0.005	0.00471	0.005	0.005		5.275E-07	0.0007263	0.1541	0.01	mg/L	N	0	0	NA	NA	NA	NA	0.005	N			FALSE
CAP-3	0/14	100%	0.003-0.005	0.00471	0.005	0.005		5.275E-07	0.0007263	0.1541	0.01	mg/L	N	0	0	NA	NA	NA	NA	0.005	N			FALSE
CAP-5	0/14	100%	0.003-0.005	0.00471	0.005	0.005		5.275E-07	0.0007263	0.1541	0.01	mg/L	N	0	0	NA	NA	NA	NA	0.005	N			FALSE
CAP-7	6/14	57%	0.005-0.005	0.00535	0.005	0.00663	0.0073	4.814E-07	0.0006939	0.1297	0.01	mg/L	N	0	0	No	No	Stable	Non-parametric	0.005	N			FALSE
CAP-9	13/14	7%	0.005-0.005	0.00701	0.0068	0.009455	0.0103	0.000002259	0.001503	0.2145	0.01	mg/L	Y	1	0	No	No	Stable	Normal	0.0078	Y			FALSE
							CCR Appendix-IV: Barium, Total (mg/L)																	
CBW-1	14/14	0%	-	0.0441	0.0429	0.05209	0.061	0.00002784	0.005276	0.1197	2	mg/L	N	0	0	No	No	Stable	Normal			0.1030	2.0000	
PM-1	14/14	0%	-	0.0824	0.08025	0.101	0.103	0.00009314	0.009651	0.1171	2	mg/L	N	0	0	No	No	Stable						
CAP-1	14/14	0%	-	0.0468	0.0458	0.06432	0.069	0.0001137	0.01066	0.2276	2	mg/L	N	0	0	No	No	Stable	Normal	0.050	Y			FALSE
CAP-3	14/14	0%	-	0.0946	0.08155	0.1668	0.237	0.001962	0.0443	0.4684	2	mg/L	N	0	0	Yes	No	Stable	Non-parametric	0.084	Y			FALSE
CAP-5	14/14	0%	-	1.36	1.401	1.534	1.56	0.03903	0.1976	0.1455	2	mg/L	N	0	0	Yes	No	Stable	Non-parametric	1.560	Y			FALSE
CAP-7	14/14	0%	-	0.0316	0.03135	0.03683	0.0378	0.000007767	0.002787	0.08829	2	mg/L	N	0	0	No	No	Stable	Normal	0.038	Y			FALSE
CAP-9	14/14	0%	-	0.0588	0.06155	0.08135	0.095	0.000354	0.01882	0.3198	2	mg/L	N	0	0	No	No	Decreasing	Normal	0.040	Y			FALSE
							CCR Appendix-IV: Beryllium, Total (mg/L)																	
CBW-1	1/13	92%	0.0005-0.0005	0.00051	0.0005	0.000552	0.00063	1.3E-09	0.00003606	0.0707	0.004	mg/L	N	0	0	No	No	NA	Non-parametric			0.0006	0.0040	
PM-1	0/14	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.004	mg/L	N	0	0	No	No	NA						
CAP-1	13/14	0%	-	0.00527	0.0043	0.01044	0.0111	0.000008736	0.002956	0.5605	0.004	mg/L	Y	7	0	No	No	Stable	Normal	0.003	Y			FALSE
CAP-3	0/13	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.004	mg/L	N	0	0	No	No	NA	NA	0.001	N			FALSE
CAP-5	13/13	0%	-	0.00403	0.00415	0.00476	0.005	6.345E-07	0.0007965	0.1978	0.004	mg/L	Y	9	0	Yes	No	Stable	Normal	0.004	Y			TRUE
CAP-7	0/13	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.004	mg/L	N	0	0	No	No	NA	NA	0.001	N			FALSE
CAP-9	14/14	0%	-	0.0157	0.01585	0.01794	0.018	0.0000033	0.001817	0.1156	0.004	mg/L	Y	14	0	No	No	Stable	Normal	0.015	Y			TRUE
							CCR Appendix-IV: Cadmium, Total (mg/L)																	
CBW-1	0/13	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0	NA	NA	NA	NA			0.0005	0.0050	
PM-1	0/13	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0	NA	NA	NA						
CAP-1	0/13	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0	NA	NA	NA	NA	0.0005	N			FALSE
CAP-3	0/13	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0	NA	NA	NA	NA	0.0005	N			FALSE
CAP-5	0/13	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0	NA	NA	NA	NA	0.0005	N			FALSE
CAP-7	0/13	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0	NA	NA	NA	NA	0.0005	N			FALSE
CAP-9	0/13	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0	NA	NA	NA	NA	0.0005	N			FALSE
							CCR Appendix-IV: Chromium, Total (mg/L)																	
CBW-1	1/13	92%	0.005-0.005	0.00569	0.005	0.0086	0.014	0.000006231	0.002496	0.4385	0.1	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0140	0.1000	
PM-1	0/13	100%	0.005-0.005	0.005	0.005	0.005		1.807E-20	1.344E-10	2.688E-08	0.1	mg/L	N	0	0	NA	NA	NA						
CAP-1	0/13	100%	0.005-0.005	0.005	0.005	0.005		1.807E-20	1.344E-10	2.688E-08	0.1	mg/L	N	0	0	NA	NA	NA	NA	0.0050	N			FALSE
CAP-3	0/13	100%	0.005-0.005	0.005	0.005	0.005		1.807E-20	1.344E-10	2.688E-08	0.1	mg/L	N	0	0	NA	NA	NA	NA	0.0050	N			FALSE
CAP-5	1/13	92%	0.005-0.005	0.00655	0.005	0.01304	0.0251	0.00003108	0.005575	0.8516	0.1	mg/L	N	0	0	NA	NA	NA	Non-parametric	0.0050	N			FALSE
CAP-7	0/13	100%	0.005-0.005	0.005	0.005	0.005		1.807E-20	1.344E-10	2.688E-08	0.1	mg/L	N	0	0	NA	NA	NA	NA	0.0050	N			FALSE
CAP-9	0/13	100%	0.005-0.005	0.005	0.005	0.005		1.807E-20	1.344E-10	2.688E-08	0.1	mg/L	N	0	0	NA	NA	NA	NA	0.0050	N			FALSE
							CCR Appendix-IV: Cobalt, Total (mg/L)																	
CBW-1	14/14	0%	-	0.00115	0.001	0.002035	0.0034	4.446E-07	0.0006668	0.578	0.006	mg/L	N	0	0	Yes	No	Decreasing	Non-parametric			0.0034	0.0060	
PM-1	14/14	0%	-	0.000912	0.00092	0.001	0.001	4.342E-09	0.0000659	0.07229	0.006	mg/L	N	0	0	No	No	Stable						
CAP-1	13/13	0%	-	0.0156	0.0167	0.024	0.024	0.00003233	0.005686	0.3652	0.006	mg/L	Y	12	0	No	No	Stable	Normal	0.012	Y			TRUE
CAP-3	13/13	0%	-	0.0256	0.026	0.03	0.03	0.00001508	0.003883	0.1514	0.006	mg/L	Y	13	0	Yes	No	Stable	Non-parametric	0.030	Y			TRUE
CAP-5	13/13	0%	-	0.0123	0.0129	0.01472	0.0155	0.000004958	0.002227	0.1817	0.006	mg/L	Y	13	0	No	No	Stable	Normal	0.014	Y			TRUE
CAP-7	13/13	0%	-	0.0108	0.0107	0.01356	0.015	0.0000031	0.001761	0.1627	0.006	mg/L	Y	13	0	No	No	Stable	Normal	0.009	Y			TRUE
CAP-9	14/14	0%	-	0.0322	0.03235	0.03833	0.0384	0.0000337	0.005805	0.1801	0.006	mg/L	Y	14	0	No	No	Increasing	Normal	0.038	Y			TRUE
							CCR Appendix-IV: Fluoride (mg/L)																	
CBW-1	14/14	0%	-	0.233	0.225	0.2935	0.3	0.001668	0.04084	0.1754	4	mg/L	N	0	0	No	No	Decreasing	Non-parametric			0.3000	4.0000	
PM-1	0/14	100%	0.1-0.1	0.1	0.1	0.1		2.135E-18	1.461E-09	1.461E-08	4	mg/L	N	0	0	NA	NA	NA						
CAP-1	12/13	8%	0.1-0.1	0.825	0.69	1.832	1.97	0.3247	0.5698	0.6904	4	mg/L	N	0	0	No	No	Stable	Normal	0.820	Y			FALSE
CAP-3	5/13	62%	0.1-0.1	0.107	0.1	0.13	0.13	0.0001397	0.01182	0.1106	4	mg/L	N	0	0	No	No	Stable	Non-parametric	0.100	N			FALSE
CAP-5	13/13	0%	-	0.476	0.54	0.612	0.63	0.02346	0.1532	0.3217	4	mg/L	N	0	0	No	No	Stable	Normal	0.520	Y			FALSE
CAP-7	5/13	62%	0.1-0.1	0.115	0.1	0.154	0.16	0.0005269	0.02295	0.2003	4	mg/L	N	0	0	No	No	Stable	Non-parametric	0.100	N			FALSE
CAP-9	13/13	0%	-	2.43	2.21	4.112	4.4	1.192	1.092	0.4494	4	mg/L	Y	1	0	No	No	Stable	Normal	3.230	Y			FALSE

Cross Ash Pond

Summary of Assessment Monitoring Statistical Evaluation – March 2020

Prepared: July 20, 2020

CCR Appendix-IV: Lead, Total (mg/L)

Well	n/N	%	Range								Limit	Units												
CBW-1	14/14	0%	-	0.00362	0.0031	0.006287	0.011	0.000004634	0.002153	0.5953	0.015	mg/L	N	0	0	Yes	No	Stable	Non-parametric			0.0110	0.0150	
PM-1	0/14	100%	0.001-0.0025	0.00121	0.001	0.0025		2.967E-07	0.0005447	0.4486	0.015	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0110	0.0150	
CAP-1	2/12	83%	0.001-0.0025	0.00135	0.001	0.0025	0.0018	3.482E-07	0.0005901	0.4371	0.015	mg/L	N	0	0	NA	NA	NA	Non-parametric	0.001	Y			FALSE
CAP-3	0/12	100%	0.001-0.0025	0.00125	0.001	0.0025		3.409E-07	0.0005839	0.4671	0.015	mg/L	N	0	0	NA	NA	NA	NA	0.001	N			FALSE
CAP-5	11/12	8%	0.0025-0.0025	0.00542	0.00515	0.00745	0.008	0.000001976	0.001406	0.2592	0.015	mg/L	N	0	0	No	No	Stable	Normal	0.005	Y			FALSE
CAP-7	0/12	100%	0.001-0.01	0.002	0.001	0.005875		0.000006682	0.002585	1.292	0.015	mg/L	N	0	0	NA	NA	NA	NA	0.001	N			FALSE
CAP-9	12/12	0%	-	0.0104	0.0105	0.01406	0.0145	0.000008911	0.002985	0.286	0.015	mg/L	N	0	0	No	No	Stable	Normal	0.013	Y			FALSE

CCR Appendix-IV: Lithium, Total (mg/L)

Well	n/N	%	Range								Limit	Units												
CBW-1	0/14	100%	0.01-0.01	0.01	0.01	0.01		5.004E-20	2.237E-10	2.237E-08	0.04	mg/L	N	0	0	NA	NA	NA	NA			0.0100	0.0400	
PM-1	0/14	100%	0.01-0.01	0.01	0.01	0.01		5.004E-20	2.237E-10	2.237E-08	0.04	mg/L	N	0	0	NA	NA	NA	NA			0.0100	0.0400	
CAP-1	13/13	0%	-	0.0935	0.0994	0.124	0.13	0.0008277	0.02877	0.3078	0.04	mg/L	Y	12	0	No	No	Stable	Normal	0.057	Y			TRUE
CAP-3	9/13	31%	0.01-0.05	0.0139	0.011	0.0272	0.012	0.0001184	0.01088	0.7855	0.04	mg/L	N	0	1	Yes	No	Stable	Non-parametric	0.012	Y			FALSE
CAP-5	12/13	8%	0.01-0.01	0.0123	0.012	0.01428	0.0147	0.000001278	0.00113	0.09218	0.04	mg/L	N	0	0	No	No	Stable	Normal	0.012	Y			FALSE
CAP-7	0/13	100%	0.01-0.05	0.0131	0.01	0.026		0.0001231	0.01109	0.8484	0.04	mg/L	N	0	1	NA	NA	NA	NA	0.010	N			FALSE
CAP-9	14/14	0%	-	0.0616	0.0615	0.06752	0.0722	0.00001666	0.004082	0.06623	0.04	mg/L	Y	14	0	No	No	Stable	Normal	0.064	Y			TRUE

CCR Appendix-IV: Mercury, Total (mg/L)

Well	n/N	%	Range								Limit	Units												
CBW-1	0/14	100%	0.0002-0.001	0.000257	0.0002	0.00048		4.571E-08	0.0002138	0.8315	0.002	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0010	0.0020	
PM-1	0/14	100%	0.0002-0.001	0.000257	0.0002	0.00048		4.571E-08	0.0002138	0.8315	0.002	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0010	0.0020	
CAP-1	0/11	100%	0.0002-0.001	0.000273	0.0002	0.0006		5.818E-08	0.0002412	0.8844	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.0002	N			FALSE
CAP-3	0/12	100%	0.0002-0.001	0.000267	0.0002	0.00056		5.333E-08	0.0002309	0.866	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.0002	N			FALSE
CAP-5	0/12	100%	0.0002-0.001	0.000267	0.0002	0.00056		5.333E-08	0.0002309	0.866	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.0002	N			FALSE
CAP-7	1/12	92%	0.0002-0.001	0.00027	0.0002	0.000582	0.00024	5.298E-08	0.0002302	0.8525	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.0002	Y			FALSE
CAP-9	1/12	92%	0.0002-0.001	0.000278	0.0002	0.0006315	0.00033	5.317E-08	0.0002306	0.8309	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.0003	Y			FALSE

CCR Appendix-IV: Molybdenum, Total (mg/L)

Well	n/N	%	Range								Limit	Units												
CBW-1	0/12	100%	0.01-0.01	0.01	0.01	0.01		5.914E-20	2.432E-10	2.432E-08	0.1	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0100	0.1000	
PM-1	0/12	100%	0.01-0.01	0.01	0.01	0.01		5.914E-20	2.432E-10	2.432E-08	0.1	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0100	0.1000	
CAP-1	0/11	100%	0.01-0.01	0.01	0.01	0.01		4.337E-20	2.083E-10	2.083E-08	0.1	mg/L	N	0	0	NA	NA	NA	NA	0.010	N			FALSE
CAP-3	0/11	100%	0.01-0.01	0.01	0.01	0.01		4.337E-20	2.083E-10	2.083E-08	0.1	mg/L	N	0	0	NA	NA	NA	NA	0.010	N			FALSE
CAP-5	0/11	100%	0.01-0.01	0.01	0.01	0.01		4.337E-20	2.083E-10	2.083E-08	0.1	mg/L	N	0	0	NA	NA	NA	NA	0.010	N			FALSE
CAP-7	0/11	100%	0.01-0.05	0.0136	0.01	0.03		0.0001455	0.01206	0.8844	0.1	mg/L	N	0	0	NA	NA	NA	NA	0.010	N			FALSE
CAP-9	0/11	100%	0.01-0.04	0.0127	0.01	0.025		0.00008182	0.009045	0.7107	0.1	mg/L	N	0	0	NA	NA	NA	NA	0.010	N			FALSE

CCR Appendix-IV: Radium-226 & 228 (pCi/L)

Well	n/N	%	Range								Limit	Units												
CBW-1	6/13	54%	4-4	3.97	4	5.722	6.34	2.143	1.464	0.3688	5	pCi/L	Y	3	0	Yes	No	Stable	Non-parametric			16.3000	16.3000	
PM-1	7/13	46%	4-4	4.76	4	10.77	16.3	14.8	3.847	0.808	5	pCi/L	Y	2	0	Yes	No	Stable	Non-parametric			16.3000	16.3000	
CAP-1	4/12	67%	4-4	3.87	4	5.185	5.24	0.9288	0.9638	0.2488	5	pCi/L	Y	2	0	No	No	Stable	Non-parametric	2.010	Y			FALSE
CAP-3	5/12	58%	4-4	3.59	4	4.326	4.48	1.323	1.15	0.3201	5	pCi/L	N	0	0	Yes	No	Stable	Non-parametric	0.423	Y			FALSE
CAP-5	12/12	0%	-	16.4	17.81	19.4	19.66	12.75	3.57	0.2181	5	pCi/L	Y	12	0	No	No	Stable	Normal	19.000	Y			TRUE
CAP-7	8/12	33%	4-4	4.54	4.085	6.247	6.56	1.591	1.261	0.2776	5	pCi/L	Y	5	0	No	No	Stable	Normal	1.880	Y			FALSE
CAP-9	7/12	42%	4-4	4.25	4	6.359	7.31	2.032	1.425	0.3351	5	pCi/L	Y	2	0	Yes	No	Stable	Non-parametric	3.260	Y			FALSE

CCR Appendix-IV: Selenium, Total (mg/L)

Well	n/N	%	Range								Limit	Units												
CBW-1	0/14	100%	0.01-0.02	0.0114	0.01	0.02		0.00001319	0.003631	0.3177	0.05	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0200	0.0500	
PM-1	0/14	100%	0.01-0.02	0.0114	0.01	0.02		0.00001319	0.003631	0.3177	0.05	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0200	0.0500	
CAP-1	0/12	100%	0.01-0.02	0.0117	0.01	0.02		0.00001515	0.003892	0.3336	0.05	mg/L	N	0	0	NA	NA	NA	NA	0.010	N			FALSE
CAP-3	0/12	100%	0.01-0.02	0.0117	0.01	0.02		0.00001515	0.003892	0.3336	0.05	mg/L	N	0	0	NA	NA	NA	NA	0.010	N			FALSE
CAP-5	0/12	100%	0.01-0.02	0.0117	0.01	0.02		0.00001515	0.003892	0.3336	0.05	mg/L	N	0	0	NA	NA	NA	NA	0.010	N			FALSE
CAP-7	0/12	100%	0.01-0.02	0.0117	0.01	0.02		0.00001515	0.003892	0.3336	0.05	mg/L	N	0	0	NA	NA	NA	NA	0.010	N			FALSE
CAP-9	1/12	92%	0.01-0.02	0.0134	0.01	0.02495	0.031	0.00004554	0.006748	0.503	0.05	mg/L	N	0	0	NA	NA	NA	Non-parametric	0.010	N			FALSE

CCR Appendix-IV: Thallium, Total (mg/L)

Well	n/N	%	Range								Limit	Units												
CBW-1	0/12	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0010	0.0020	
PM-1	0/12	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0010	0.0020	
CAP-1	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.001	N			FALSE
CAP-3	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.001	N			FALSE
CAP-5	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.001	N			FALSE
CAP-7	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.001	N			FALSE
CAP-9	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.001	N			FALSE

TECHNICAL MEMORANDUM

October 23, 2020
File No. 132892-010

SUBJECT: 2020 Semi-annual Groundwater Assessment Monitoring Data
                      Statistical Evaluation
                      Cross Generating Station
                      Ash Pond

Pursuant to Title 40 Code of Federal Regulations (40 CFR) § 257.93 and 257.95 (Rule), this memorandum summarizes the statistical evaluation of the analytical results for the June 2020 semi-annual assessment monitoring groundwater sampling event for the Cross Generating Station (CGS) Ash Pond. The statistical evaluation discussed in this memorandum was conducted to determine if Appendix IV groundwater monitoring constituents have been detected in downgradient wells at concentrations that represent a statistically significant level (SSL) above background or upgradient wells consistent with the requirements in 40 CFR § 257.95.

Utilizing interwell statistical evaluations, data from the groundwater sampling event for the downgradient monitoring wells were compared to the Groundwater Protection Standard (GWPS) established from the background dataset for the upgradient monitoring wells (PM-1 and CBW-1). GWPS for each of the Appendix IV constituents have been set equal to the highest value of the maximum contaminant level (MCL), regional screening level (RSL), or background concentration. The results of the groundwater assessment monitoring statistical evaluation are discussed below and provided in Table I.

Statistical Evaluation of Appendix IV Constituents

The Rule provides four specific options for statistical evaluation of groundwater quality data collected at a coal combustion residual (CCR) unit (40 CFR §257.93(f) (1-4)). The statistical method used for these evaluations, tolerance limit (TL), was certified by Haley & Aldrich, Inc. on October 14, 2017. The TL method, determined applicable for this sampling event, was used to evaluate potential SSLs above GWPS. GWPS for each constituent listed in Appendix IV were computed as upper tolerance limits (UTL), and a minimum 95 percent confidence coefficient and 95 percent coverage. The most recent groundwater sampling result from each compliance well was compared to the corresponding GWPS UTL to determine if a SSL existed.

STATISTICAL EVALUATION

An interwell statistical evaluation was used to identify SSLs. An interwell evaluation compares the most recent values from downgradient compliance wells to a background dataset composed of upgradient

well data. Because the CCR unit has transitioned into assessment monitoring, no statistical evaluations were conducted on Appendix III (detection monitoring) semi-annual assessment monitoring data.

The parametric TL method was used to complete statistical evaluations of the referenced dataset. The TL procedure is one in which a concentration limit for each constituent is established from the distribution of the background data, with a minimum 95 percent confidence level. The upper endpoint of a tolerance interval is called the UTL. Depending on the data distribution, parametric or non-parametric TL procedures are used to evaluate groundwater monitoring data using this method. Parametric TLs utilize normally distributed data or data normalized via a transformation of the sample background data used to construct the limit. If the data are non-normal and a transformation is not indicated, non-parametric procedures (order statistics or bootstrap methods) are used to calculate the TL. If all the background data are non-detect, a maximum reporting limit may serve as an appropriate UTL.

These statistical evaluations were conducted using the background dataset for all detected Appendix IV constituents using parametric TL. If an Appendix IV constituent concentration from the June 2020 semi-annual sampling event was above the GWPS, the lower confidence limit (LCL) for the downgradient well constituent was used to evaluate if a SSL was present. The LCL is the lower end of the confidence interval range, which is an estimated concentration range intended to contain the true mean or median of the population from which the sample is drawn. The confidence interval range is designed to locate the true population mean or median with a high degree of statistical confidence, or conversely, with a low probability of error.

The UTLs were calculated from the background well dataset using Chemstat software after testing for outlier sample results that would warrant removal from the dataset based on likely error in sampling or measurement. Both visual and statistical outlier tests for the background data were performed using Chemstat and U.S. Environmental Protection Agency's ProUCL 5.1 software, and a visual inspection of the data was performed using box plots and distribution plots for the downgradient sample data. No sample data were identified as outliers that warranted removal from the dataset.

BACKGROUND DISTRIBUTIONS

The groundwater analytical results for each sampling event from the background sample location (PM-1 and CBW-1) were combined to calculate the UTL for each detected Appendix IV constituent. The variability and distribution of the pooled dataset was evaluated to determine the method for UTL calculation. Per the document *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, March 2009,* background concentrations were updated for the March 2020 semi-annual sampling event based on statistical evaluation of analytical results collected through March 2020.

RESULTS OF APPENDIX IV DOWNGRADIENT STATISTICAL COMPARISONS

The sample concentrations from the downgradient wells for each of the detected Appendix IV constituents from the June 2020 semi-annual assessment monitoring event were compared to their respective GWPS (Table I). A sample concentration greater than the GWPS is considered to represent a

SSL. Based on previous assessment monitoring sampling events and statistical evaluations, interwell comparisons were utilized for all downgradient wells and constituents. Consistent with previous results, the assessment of corrective measures, the preferred remedy presented to the public in December 2019, beryllium, cobalt and lithium continue to be the only Appendix IV constituents present in groundwater at SSLs above GWPS. During the February 2020 sampling event radium was detected above the GWPS however, radium was not detected above GWPS in the June 2020 sampling event. Radium will continue to be evaluated during subsequent semiannual sampling events.

Tables:
    Table I – Summary of Assessment Monitoring Statistical Evaluation – June 2020

HALEY
ALDRICH

TABLES

																	Inter-well Analysis						
Location Id	Frequency of Detection	Percent Non-Detects	Range of Non-Detect	Mean	50th Percentile (Median)	95th Percentile	Maximum Detect	Variance	Standard Deviation	Coefficient of Variance	CCR MCL/RSL	Report Result Unit	Detection Exceedances (Y/N)	Number of Detection Exceedances	Number of Non-Detection Exceedances	Outlier Presence	Outlier Removed	Trend	Distribution Well	June/July 2020 Concentrations	Detect?	Upper Tolerance Limit	SSI	GWPS (Higher of MCL/RSL or Upper Tolerance Limit)	SSL
CCR Appendix-IV: Antimony, Total (mg/L)																									
CBW-1	0/13	100%	0.005-0.025	0.00654	0.005	0.013		0.00003077	0.005547	0.8484	0.006	mg/L	N	0	1	NA	NA	NA	Non-parametric			0.0250		0.0250	
PM-1	0/13	100%	0.005-0.025	0.00654	0.005	0.013		0.00003077	0.005547	0.8484	0.006	mg/L	N	0	1	NA	NA	NA							
CAP-1	0/11	100%	0.005-0.025	0.00682	0.005	0.015		0.00003636	0.00603	0.8844	0.006	mg/L	N	0	1	NA	NA	NA	NA	0.005	N		N		FALSE
CAP-3	0/11	100%	0.005-0.025	0.00682	0.005	0.015		0.00003636	0.00603	0.8844	0.006	mg/L	N	0	1	NA	NA	NA	NA	0.005	N		N		FALSE
CAP-5	0/11	100%	0.005-0.025	0.00682	0.005	0.015		0.00003636	0.00603	0.8844	0.006	mg/L	N	0	1	NA	NA	NA	NA	0.005	N		N		FALSE
CAP-7	0/11	100%	0.005-0.025	0.00682	0.005	0.015		0.00003636	0.00603	0.8844	0.006	mg/L	N	0	1	NA	NA	NA	NA	0.005	N		N		FALSE
CAP-9	0/11	100%	0.0005-0.025	0.00641	0.005	0.015		0.00003984	0.006312	0.9848	0.006	mg/L	N	0	1	NA	NA	NA	NA	0.005	N		N		FALSE
CCR Appendix-IV: Arsenic, Total (mg/L)																									
CBW-1	3/15	80%	0.005-0.005	0.00587	0.005	0.00949	0.016	0.000008046	0.002836	0.4831	0.01	mg/L	Y	1	0	Yes	No	Stable	Non-parametric			0.0160		0.0160	
PM-1	2/15	87%	0.005-0.005	0.00485	0.005	0.005	0.0042	1.812E-07	0.0004257	0.08784	0.01	mg/L	N	0	0	No	No	Stable							
CAP-1	0/15	100%	0.003-0.005	0.00473	0.005	0.005		4.952E-07	0.0007037	0.1487	0.01	mg/L	N	0	0	NA	NA	NA	NA	0.005	N		N		FALSE
CAP-3	0/15	100%	0.003-0.005	0.00473	0.005	0.005		4.952E-07	0.0007037	0.1487	0.01	mg/L	N	0	0	NA	NA	NA	NA	0.005	N		N		FALSE
CAP-5	0/15	100%	0.003-0.005	0.00473	0.005	0.005		4.952E-07	0.0007037	0.1487	0.01	mg/L	N	0	0	NA	NA	NA	NA	0.005	N		N		FALSE
CAP-7	6/15	60%	0.005-0.005	0.00532	0.005	0.006579	0.0073	4.551E-07	0.0006746	0.1267	0.01	mg/L	N	0	0	No	No	Stable	Non-parametric	0.005	N		N		FALSE
CAP-9	14/15	7%	0.005-0.005	0.00701	0.0068	0.00939	0.0103	0.000002097	0.001448	0.2067	0.01	mg/L	Y	1	0	No	No	Stable	Normal	0.0070	Y				FALSE
CCR Appendix-IV: Barium, Total (mg/L)																									
CBW-1	15/15	0%	-	0.044	0.043	0.05141	0.061	0.00002589	0.005088	0.1155	2	mg/L	N	0	0	No	No	Stable	Non-parametric			0.1030		2.0000	
PM-1	15/15	0%	-	0.082	0.0802	0.1009	0.103	0.00008876	0.009421	0.1148	2	mg/L	N	0	0	No	No	Stable							
CAP-1	15/15	0%	-	0.0461	0.0442	0.06396	0.069	0.0001135	0.01066	0.2311	2	mg/L	N	0	0	No	No	Stable	Normal	0.036	Y		N		FALSE
CAP-3	15/15	0%	-	0.0928	0.081	0.1614	0.237	0.001866	0.0432	0.4654	2	mg/L	N	0	0	Yes	No	Stable	Non-parametric	0.069	Y		N		FALSE
CAP-5	15/15	0%	-	1.37	1.42	1.532	1.56	0.0376	0.1939	0.1418	2	mg/L	N	0	0	Yes	No	Stable	Non-parametric	1.500	Y		Y		FALSE
CAP-7	15/15	0%	-	0.0322	0.0315	0.03861	0.0405	0.00001254	0.003541	0.1101	2	mg/L	N	0	0	No	No	Stable	Normal	0.041	Y		N		FALSE
CAP-9	15/15	0%	-	0.0583	0.061	0.0803	0.095	0.0003336	0.01826	0.3135	2	mg/L	N	0	0	No	No	Decreasing	Normal	0.050	Y		N		FALSE
CCR Appendix-IV: Beryllium, Total (mg/L)																									
CBW-1	1/14	93%	0.0005-0.0005	0.000509	0.0005	0.0005455	0.00063	1.207E-09	0.00003474	0.06822	0.004	mg/L	N	0	0	No	No	NA	Non-parametric			0.0006		0.0040	
PM-1	0/15	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.004	mg/L	N	0	0	No	No	NA							
CAP-1	14/14	0%	-	0.0053	0.00495	0.01039	0.0111	0.000008072	0.002841	0.5364	0.004	mg/L	Y	8	0	No	No	Stable	Normal	0.006	Y		Y		TRUE
CAP-3	0/14	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.004	mg/L	N	0	0	No	No	NA	NA	0.001	N		N		FALSE
CAP-5	14/14	0%	-	0.00407	0.004175	0.00474	0.005	6.092E-07	0.0007805	0.1919	0.004	mg/L	Y	10	0	Yes	No	Stable	Normal	0.005	Y		Y		TRUE
CAP-7	0/14	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.004	mg/L	N	0	0	No	No	NA	NA	0.001	N		N		FALSE
CAP-9	15/15	0%	-	0.0157	0.0157	0.01793	0.018	0.00000311	0.001763	0.1126	0.004	mg/L	Y	15	0	No	No	Stable	Normal	0.015	Y		Y		TRUE
CCR Appendix-IV: Cadmium, Total (mg/L)																									
CBW-1	0/14	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0	NA	NA	NA	NA			0.0005		0.0050	
PM-1	0/14	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0	NA	NA	NA							
CAP-1	0/14	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0	NA	NA	NA	NA	0.0005	N		N		FALSE
CAP-3	0/14	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0	NA	NA	NA	NA	0.0005	N		N		FALSE
CAP-5	0/14	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0	NA	NA	NA	NA	0.0005	N		N		FALSE
CAP-7	0/14	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0	NA	NA	NA	NA	0.0005	N		N		FALSE
CAP-9	0/14	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0	NA	NA	NA	NA	0.0005	N		N		FALSE
CCR Appendix-IV: Chromium, Total (mg/L)																									
CBW-1	1/14	93%	0.005-0.005	0.00564	0.005	0.00815	0.014	0.000005786	0.002405	0.4263	0.1	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0140		0.1000	
PM-1	0/14	100%	0.005-0.005	0.005	0.005	0.005		1.251E-20	1.118E-10	2.237E-08	0.1	mg/L	N	0	0	NA	NA	NA							
CAP-1	0/14	100%	0.005-0.005	0.005	0.005	0.005		1.251E-20	1.118E-10	2.237E-08	0.1	mg/L	N	0	0	NA	NA	NA	NA	0.0050	N		N		FALSE
CAP-3	0/14	100%	0.005-0.005	0.005	0.005	0.005		1.251E-20	1.118E-10	2.237E-08	0.1	mg/L	N	0	0	NA	NA	NA	NA	0.0050	N		N		FALSE
CAP-5	1/14	93%	0.005-0.005	0.00644	0.005	0.01204	0.0251	0.00002886	0.005372	0.8347	0.1	mg/L	N	0	0	NA	NA	NA	Non-parametric	0.0050	N		N		FALSE
CAP-7	0/14	100%	0.005-0.005	0.005	0.005	0.005		1.251E-20	1.118E-10	2.237E-08	0.1	mg/L	N	0	0	NA	NA	NA	NA	0.0050	N		N		FALSE
CAP-9	0/14	100%	0.005-0.005	0.005	0.005	0.005		1.251E-20	1.118E-10	2.237E-08	0.1	mg/L	N	0	0	NA	NA	NA	NA	0.0050	N		N		FALSE
CCR Appendix-IV: Cobalt, Total (mg/L)																									
CBW-1	15/15	0%	-	0.00113	0.001	0.00193	0.0034	4.212E-07	0.000649	0.5743	0.006	mg/L	N	0	0	Yes	No	Decreasing	Non-parametric			0.0034		0.0060	
PM-1	15/15	0%	-	0.000917	0.00095	0.001	0.001	4.554E-09	0.00006749	0.07356	0.006	mg/L	N	0	0	No	No	Stable							
CAP-1	14/14	0%	-	0.016	0.01675	0.024	0.024	0.00003308	0.005751	0.3583	0.006	mg/L	Y	13	0	No	No	Stable	Normal	0.022	Y		Y		TRUE
CAP-3	14/14	0%	-	0.0258	0.02625	0.03	0.03	0.00001438	0.003793	0.1469	0.006	mg/L	Y	14	0	Yes	No	Stable	Non-parametric	0.028	Y		Y		TRUE
CAP-5	14/14	0%	-	0.0124	0.01295	0.01491	0.0155	0.00000497	0.002229	0.1795	0.006	mg/L	Y	14	0	No	No	Stable	Normal	0.015	Y		Y		TRUE
CAP-7	14/14	0%	-	0.0108	0.01045	0.01344	0.015	0.000002923	0.00171	0.1589	0.006	mg/L	Y	14	0	No	No	Stable	Normal	0.010	Y		Y		TRUE
CAP-9	15/15	0%	-	0.0326	0.0327	0.0384	0.0384	0.00003383	0.005816	0.1782	0.006	mg/L	Y	15	0	No	No	Increasing	Normal	0.038	Y		Y		TRUE
CCR Appendix-IV: Fluoride (mg/L)																									
CBW-1	15/15	0%	-	0.231	0.22	0.293	0.3	0.001621	0.04026	0.1745	4	mg/L	N	0	0	No	No	Decreasing	Non-parametric			0.3000		4.0000	
PM-1	0/15	100%	0.1-0.1	0.1	0.1	0.1		1.983E-18	1.408E-09	1.408E-08	4	mg/L	N	0	0	NA	NA	NA							
CAP-1	13/14	7%	0.1-0.1	0.866	0.74	1.821	1.97	0.3225	0.5679	0.656	4	mg/L	N	0	0	No	No	Stable	Normal	1.390	Y		Y		FALSE
CAP-3	5/14	64%	0.1-0.1	0.106	0.1	0.13	0.13	0.0001324	0.01151	0.1081	4	mg/L	N	0	0	No	No	Stable	Non-parametric	0.100	N		N		FALSE
CAP-5	14/14	0%	-	0.464	0.53	0.6105	0.63	0.02387	0.1545	0.3333	4	mg/L	N	0	0	No	No	Stable	Normal	0.300	Y		N		FALSE
CAP-7	5/14	64%	0.1-0.1	0.114	0.1	0.1535	0.16	0.0005016	0.0224	0.1972	4	mg/L	N	0	0	No	No	Stable	Non-parametric	0.100	N		N		FALSE
CAP-9	14/14	0%	-	2.41	2.185	4.088	4.4	1.109	1.053	0.4377	4	mg/L	Y	1	0	No	No	Stable	Normal	2.090	Y		Y		FALSE

CCR Appendix-IV: Lead, Total (mg/L)

Well	n	%ND	ND Range	C5	C6	C7	C8	C9	C10	C11	GWPS	Units	C14	C15	C16	C17	C18	C19	Test	C21	C22	C23	C24	C25	Result
CBW-1	15/15	0%	-	0.00355	0.0031	0.005925	0.011	0.000004372	0.002091	0.5892	0.015	mg/L	N	0	0	Yes	No	Stable	Non-parametric						
PM-1	0/15	100%	0.001-0.0025	0.0012	0.001	0.0025		2.786E-07	0.0005278	0.4398	0.015	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0110		0.0150	
CAP-1	3/13	77%	0.001-0.0025	0.00135	0.001	0.0025	0.0018	3.194E-07	0.0005651	0.4198	0.015	mg/L	N	0	0	NA	NA	NA	Non-parametric	0.001	Y		N		FALSE
CAP-3	0/13	100%	0.001-0.0025	0.00123	0.001	0.0025		3.173E-07	0.0005633	0.4577	0.015	mg/L	N	0	0	NA	NA	NA	NA	0.001	N		N		FALSE
CAP-5	12/13	8%	0.0025-0.0025	0.00549	0.0052	0.0074	0.008	0.000001871	0.001368	0.2491	0.015	mg/L	N	0	0	No	No	Stable	Normal	0.006	Y		N		FALSE
CAP-7	0/13	100%	0.001-0.01	0.00192	0.001	0.0055		0.000006202	0.00249	1.295	0.015	mg/L	N	0	0	NA	NA	NA	NA	0.001	N		N		FALSE
CAP-9	13/13	0%	-	0.0105	0.0106	0.01402	0.0145	0.000008272	0.002876	0.2733	0.015	mg/L	N	0	0	No	No	Stable	Normal	0.012	Y		Y		FALSE

CCR Appendix-IV: Lithium, Total (mg/L)

Well	n	%ND	ND Range	C5	C6	C7	C8	C9	C10	C11	GWPS	Units	C14	C15	C16	C17	C18	C19	Test	C21	C22	C23	C24	C25	Result
CBW-1	0/15	100%	0.005-0.01	0.00967	0.01	0.01		0.000001667	0.001291	0.1336	0.04	mg/L	N	0	0	NA	NA	NA	NA						
PM-1	0/15	100%	0.005-0.01	0.00967	0.01	0.01		0.000001667	0.001291	0.1336	0.04	mg/L	N	0	0	NA	NA	NA				0.0100		0.0400	
CAP-1	14/14	0%	-	0.0939	0.0997	0.1235	0.13	0.0007671	0.0277	0.2949	0.04	mg/L	Y	13	0	No	No	Stable	Normal	0.100	Y		Y		TRUE
CAP-3	10/14	29%	0.01-0.05	0.0137	0.011	0.0253	0.012	0.0001095	0.01047	0.7628	0.04	mg/L	N	0	1	Yes	No	Stable	Non-parametric	0.012	Y		Y		FALSE
CAP-5	13/14	7%	0.01-0.01	0.0124	0.012	0.01424	0.0147	0.000001395	0.001181	0.09537	0.04	mg/L	N	0	0	No	No	Stable	Normal	0.014	Y		Y		FALSE
CAP-7	0/14	100%	0.01-0.05	0.0129	0.01	0.024		0.0001143	0.01069	0.8315	0.04	mg/L	N	0	1	NA	NA	NA	NA	0.010	N		N		FALSE
CAP-9	15/15	0%	-	0.0619	0.062	0.06716	0.0722	0.00001623	0.004028	0.06513	0.04	mg/L	Y	15	0	No	No	Stable	Normal	0.065	Y		Y		TRUE

CCR Appendix-IV: Mercury, Total (mg/L)

Well	n	%ND	ND Range	C5	C6	C7	C8	C9	C10	C11	GWPS	Units	C14	C15	C16	C17	C18	C19	Test	C21	C22	C23	C24	C25	Result
CBW-1	0/15	100%	0.0002-0.001	0.000253	0.0002	0.00044		4.267E-08	0.0002066	0.8154	0.002	mg/L	N	0	0	NA	NA	NA	Non-parametric						
PM-1	0/15	100%	0.0002-0.001	0.000253	0.0002	0.00044		4.267E-08	0.0002066	0.8154	0.002	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0010		0.0020	
CAP-1	0/12	100%	0.0002-0.001	0.000267	0.0002	0.00056		5.333E-08	0.0002309	0.866	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.0002	N		N		FALSE
CAP-3	0/13	100%	0.0002-0.001	0.000262	0.0002	0.00052		4.923E-08	0.0002219	0.8484	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.0002	N		N		FALSE
CAP-5	0/13	100%	0.0002-0.001	0.000262	0.0002	0.00052		4.923E-08	0.0002219	0.8484	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.0002	N		N		FALSE
CAP-7	2/13	85%	0.0002-0.001	0.000268	0.0002	0.000544	0.00024	4.864E-08	0.0002205	0.8238	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.0002	Y		N		FALSE
CAP-9	2/13	85%	0.0002-0.001	0.000279	0.0002	0.000598	0.00033	4.877E-08	0.0002208	0.7909	0.002	mg/L	N	0	0	NA	NA	NA	NA	0.0003	Y		N		FALSE

CCR Appendix-IV: Molybdenum, Total (mg/L)

Well	n	%ND	ND Range	C5	C6	C7	C8	C9	C10	C11	GWPS	Units	C14	C15	C16	C17	C18	C19	Test	C21	C22	C23	C24	C25	Result
CBW-1	0/13	100%	0.01-0.01	0.01	0.01	0.01		7.228E-20	2.688E-10	2.688E-08	0.1	mg/L	N	0	0	NA	NA	NA	Non-parametric						
PM-1	0/13	100%	0.01-0.01	0.01	0.01	0.01		7.228E-20	2.688E-10	2.688E-08	0.1	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0100		0.1000	
CAP-1	0/11	100%	0.01-0.01	0.01	0.01	0.01		4.337E-20	2.083E-10	2.083E-08	0.1	mg/L	N	0	0	NA	NA	NA	NA	NS			N		FALSE
CAP-3	0/11	100%	0.01-0.01	0.01	0.01	0.01		4.337E-20	2.083E-10	2.083E-08	0.1	mg/L	N	0	0	NA	NA	NA	NA	NS			N		FALSE
CAP-5	0/11	100%	0.01-0.01	0.01	0.01	0.01		4.337E-20	2.083E-10	2.083E-08	0.1	mg/L	N	0	0	NA	NA	NA	NA	NS			N		FALSE
CAP-7	0/11	100%	0.01-0.05	0.0136	0.01	0.03		0.0001455	0.01206	0.8844	0.1	mg/L	N	0	0	NA	NA	NA	NA	NS			N		FALSE
CAP-9	0/11	100%	0.01-0.04	0.0127	0.01	0.025		0.00008182	0.009045	0.7107	0.1	mg/L	N	0	0	NA	NA	NA	NA	NS			N		FALSE

CCR Appendix-IV: Radium-226 & 228 (pCi/L)

Well	n	%ND	ND Range	C5	C6	C7	C8	C9	C10	C11	GWPS	Units	C14	C15	C16	C17	C18	C19	Test	C21	C22	C23	C24	C25	Result
CBW-1	7/14	50%	4-4	3.77	4	5.67	6.34	2.549	1.597	0.4239	5	pCi/L	Y	3	0	Yes	No	Stable	Non-parametric						
PM-1	8/14	43%	4-4	4.52	4	10.31	16.3	14.48	3.805	0.8418	5	pCi/L	Y	2	0	Yes	No	Stable	Non-parametric			16.3000		16.3000	
CAP-1	5/13	62%	4-4	3.74	4	5.18	5.24	1.077	1.038	0.2774	5	pCi/L	Y	2	0	No	No	Stable	Non-parametric	2.160	Y		N		FALSE
CAP-3	6/13	54%	4-4	3.46	4	4.312	4.48	1.446	1.203	0.3477	5	pCi/L	Y	0	0	Yes	No	Stable	Non-parametric	1.850	Y		N		FALSE
CAP-5	14/14	0%	-	16.6	17.81	19.67	19.7	11.62	3.409	0.2058	5	pCi/L	Y	14	0	No	No	Stable	Normal	15.800	Y		N		FALSE
CAP-7	9/13	31%	4-4	4.32	4	6.218	6.56	2.129	1.459	0.3381	5	pCi/L	Y	5	0	No	No	Stable	Normal	1.590	Y		N		FALSE
CAP-9	8/13	38%	4-4	4.25	4	6.272	7.31	1.863	1.365	0.3213	5	pCi/L	Y	2	0	Yes	No	Stable	Non-parametric	4.190	Y		N		FALSE

CCR Appendix-IV: Selenium, Total (mg/L)

Well	n	%ND	ND Range	C5	C6	C7	C8	C9	C10	C11	GWPS	Units	C14	C15	C16	C17	C18	C19	Test	C21	C22	C23	C24	C25	Result
CBW-1	0/15	100%	0.01-0.02	0.0113	0.01	0.02		0.00001238	0.003519	0.3105	0.05	mg/L	N	0	0	NA	NA	NA	Non-parametric						
PM-1	0/15	100%	0.01-0.02	0.0113	0.01	0.02		0.00001238	0.003519	0.3105	0.05	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0200		0.0500	
CAP-1	0/12	100%	0.01-0.02	0.0117	0.01	0.02		0.00001515	0.003892	0.3336	0.05	mg/L	N	0	0	NA	NA	NA	NA	NS			N		FALSE
CAP-3	0/12	100%	0.01-0.02	0.0117	0.01	0.02		0.00001515	0.003892	0.3336	0.05	mg/L	N	0	0	NA	NA	NA	NA	NS			N		FALSE
CAP-5	0/12	100%	0.01-0.02	0.0117	0.01	0.02		0.00001515	0.003892	0.3336	0.05	mg/L	N	0	0	NA	NA	NA	NA	NS			N		FALSE
CAP-7	0/12	100%	0.01-0.02	0.0117	0.01	0.02		0.00001515	0.003892	0.3336	0.05	mg/L	N	0	0	NA	NA	NA	NA	NS			N		FALSE
CAP-9	1/12	92%	0.01-0.02	0.0134	0.01	0.02495	0.031	0.00004554	0.006748	0.503	0.05	mg/L	N	0	0	NA	NA	NA	Non-parametric	NS			N		FALSE

CCR Appendix-IV: Thallium, Total (mg/L)

Well	n	%ND	ND Range	C5	C6	C7	C8	C9	C10	C11	GWPS	Units	C14	C15	C16	C17	C18	C19	Test	C21	C22	C23	C24	C25	Result
CBW-1	0/13	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	NA	NA	NA	Non-parametric						
PM-1	0/13	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	NA	NA	NA	Non-parametric			0.0010		0.0020	
CAP-1	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	NA	NA	NA	NA	NS			N		FALSE
CAP-3	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	NA	NA	NA	NA	NS			N		FALSE
CAP-5	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	NA	NA	NA	NA	NS			N		FALSE
CAP-7	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	NA	NA	NA	NA	NS			N		FALSE
CAP-9	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	NA	NA	NA	NA	NS			N		FALSE

Notes: NS = Not Sampled