2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT SLURRY POND 3 & 4 WINYAH GENERATING STATION

by Santee Cooper
Moncks Corner, South Carolina

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1. 40 CFR § 257.90 Applicability

1.1 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 § 257.99.

The Slurry Pond 3 & 4 at Winyah Generating Station (WGS) 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 § 257.99. This document satisfies the requirement under § 257.90(e) which requires the CCR Unit Owner/Operator to prepare an Annual Report per § 257.90(e).

1.2 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 new CCR landfills, new CCR surface impoundments, and all lateral expansions of CCR units, the owner or operator must prepare the initial annual groundwater monitoring and corrective action report no later than January 31 of the year following the calendar year a groundwater monitoring system has been established for such CCR unit as required by this subpart, and annually thereafter. 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 2019 for Slurry Pond 3 & 4 at WGS 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.

1.2.1 Status of the Groundwater Monitoring and Corrective Action Program

Statistically significant increases (SSI) of Appendix III constituents were identified downgradient of Slurry Pond 3 & 4, 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. Haley & Aldrich reviewed the field sampling and equipment calibration logs and the field indicator parameters and at that time, did not identify deviations or errors in sampling. They also conducted quality assurance/quality control reviews of the laboratory data and the statistical evaluation and did not identify any laboratory errors. 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 Slurry Pond 3 & 4. As a result, an Assessment Monitoring program was initiated as required by § 257.94(e)(2). The notification was placed in the facility's operating record as required by 257.106(h)(4).

As required by § 257.93(h)(2), the statistical evaluation of the Appendix IV constituents detected were determined to be statistically significant exceedance of groundwater protection standards, specifically arsenic and lithium. Therefore, an assessment of corrective measures and nature and extent was initiated per §257.95(g)(3). Due to inclement weather, limited accessibility of the testing area, and limited trained personnel, discussed in depth at 1.2.3, there was difficulty in scheduling the implementation of this assessment so utilized the 60-day extension allowed under § 257.95(a). This was an opportunity for an ASD to show something other than the Slurry Pond 3 & 4 caused the statistically significant level of the Appendix IV constituents, arsenic and lithium, as required by §257.95(g)(3)(ii). Haley & Aldrich presented technical data and analysis to document the naturally occurring conditions that exist within the uppermost shallow alluvial aquifer are responsible for the mobilization of the naturally occurring arsenic and lithium.

Arsenic was demonstrated to be naturally occurring and there were conditions of reductive dissolution of iron oxides and iron oxyhydroxides which subsequently led to the mobilization of naturally occurring arsenic in the groundwater. Two alternative sources of naturally occurring lithium were demonstrated to include desorption of lithium-bearing marine sediments in the vadose and saturated zones and dissolution of evaporates and brines derived from the evapo-concentration of naturally occurring lithium in saltwater. All of this is detailed in the ASD provided in Appendix B on this report.

Therefore, this CCR unit will remain in Assessment Monitoring.

1.2.2 Key Actions Completed

The following key actions were completed in 2019:

- Completed statistical evaluation to determined statistically significant exceedance of groundwater protection standards for Appendix IV constituents that were detected and initiated assessment of corrective measures for Slurry Pond 3 & 4 § 257.95(g)(3).
- Prepared 2018 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)];
- Placed a notification of initiation of assessment of corrective measures for Slurry Pond 3 & 4 in the operating record, as required by § 257.95(g)(5).
- Notification to the state and notice placed on public CCR website that assessment of corrective measures had been initiated, as required by § 257.106(h)(7)
- Scheduling challenges and difficulty due to scheduling appropriate certified well drillers, delays due to field accessibility, and unforeseen weather events, required utilization of the 60-day extension (Appendix A) for completion of the assessment of corrective measures per § 257.95(e)
- Initiated a characterization of the nature and extent of Appendix IV constituents identified at statistically significant levels above the GWPS in accordance with § 257.95(g)(1).

- Completed a successful ASD documenting how naturally occurring conditions that exist within the uppermost aquifer are responsible for the mobilization of naturally occurring arsenic and lithium per § 257.95(g)(3)(ii) (Appendix B).
- Provided notification of completion of assessment of corrective measures and nature and extent to state; and place completed assessment on website per § 257.106(h)(8) and 257.107(h)(8)
- 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 C);
- Held a public meeting December 10, 2019 to discuss the ASD § 257.96(e).

1.2.3 Problems Encountered

It was difficult to get qualified well drillers for the field work scheduled at the appropriate times because multiple utilities were implementing the CCR Rule concurrently, and there are a limited number of certified well drillers for South Carolina. There were also accessibility issues, as many parts of property boundaries and areas of investigation were heavily wooded with undergrowth which had to be cleared and surveyed. Lastly, unforeseen weather events prohibited field work during some phases. This led to the delays.

Delays and second mobilizations at another station held up both South Carolina Certified Drillers and geologist.

Detection monitoring analyte Boron was inadvertently not analyzed for WAP-18, 19 and 20.

1.2.4 Actions to Resolve Problems

Emergency procurement measures were implemented to secure and hire an additional drilling company. Consultants were used to provide geologists to oversee the field work at Winyah Generating Station.

Chains of custody, specific to each well have been compiled to ensure that all analytes are captured for each groundwater monitoring event.

1.2.5 Project Key Activities for Upcoming Year

Key activities to be completed in 2019 include the following:

- Respond to any comments or questions brought up at the Public Meeting
- Statistical analysis of Assessment Monitoring analytical data to determine if statistically significant levels (SSLs) of the detected Appendix IV constituents are present.
- Prepare the 2020 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)].
- Conduct semi-annual groundwater monitoring and subsequent statistical analysis as required by § 257.94 or § 257.95.

1.3 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:

1.3.1 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 Slurry Pond3 & 4 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 17 October 2017 as required by § 257.105(h)(2).

1.3.2 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 wells WAP-14A, WAP-14B, and WAP-14C were installed in 2019, as part of the Corrective Measures Assessment, Nature and Extent, and Alternate Source Demonstration activities. 2018. Both soil and groundwater samples were collected and analyzed which led to the successful ASD.

1.3.3 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), two independent samples from each background and downgradient monitoring well were collected and analyzed. 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 Slurry Pond 3 & 4 is presented in Table 1 of this report. In addition, and in accordance with § 257.95(d)(3), Table 1 includes the groundwater protection standards established under § 257.95(d)(2).

1.3.4 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 by January 15, 2018. Baseline analytical data collected from background monitoring wells WBW-1 and WAP-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 WAP-4, WAP-14, WAP-15, and WAP-16. Constituents with analytical results exceeding the UTLs were identified as SSIs over background for the respective Appendix III constituent. This statistical analysis determined that statistically significant increases of boron, calcium, chloride, fluoride, pH, sulfate and total dissolved solids were present downgradient of Slurry Pond 3 & 4. 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. The Assessment Monitoring program has been established to meet the requirements of 40 CFR § 257.95. As required by § 257.93(h)(2), the statistical evaluation of the Appendix IV constituents detected were determined to be statistically significant exceedance of groundwater protection standards, specifically arsenic and lithium. During extensive research and testing to conduct a nature and extent investigation, additional information showed another source than the Slurry Pond 3 & 4 caused the statistically significant level of the Appendix IV constituents, arsenic and lithium, and an ASD was successful, per §257.95(g)(3)(ii) (Appendix B). Based on the statistical evaluation for the 2019 data, there are no new SSLs or SSIs identified (Appendix C).

1.3.5 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, and an evaluation of alternate sources is discussed in preceding sections.

TABLES

TABLE 1 - Summary of Analytical Results
Winyah Generating Station Slurry Pond 3 & 4 Assessment Monitoring

Appendix III Constituents

Well ID	Purpose	Date of Sample Event		Boron	Calcium	Calcium	Chloride	Fluoride	Sulfate	Total Dissolved Solids	pH
			Unit	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU
			Method	EPA 6020B	EPA 6010D	EPA 6020B	EPA 300.0	EPA 300.0	EPA 300.0	SM 2540C	
			GWPS/US EPA MCL/RSL	---	---	---	---	4	---	---	---
Site Background Wells											
WAP-1	Background	1/23/2019				3.1	9.88	<0.10	17.3	56.25	4.63
WAP-1	Background	5/30/2019		54		1.9	5.08	<0.10	16	43.75	4.58
WAP-1	**total samples**			1	0	2	2	2	2	2	2
WBW-1	Background	1/23/2019						<0.10			4.4
WBW-1	Background	5/30/2019		85		<0.50	2.71	<0.10	5.64	21.25	4.02
WBW-1	**total samples**			1	0	1	1	2	1	1	2
Slurry Pond 3 & 4 Wells											
WAP-4	Assessment	1/22/2019				54.4	11.1	<0.10	13.6	243.8	6.44
WAP-4	Assessment	6/18/2019		170	52		9.53	<0.10	20.6	238.8	6.56
WAP-4	**total samples**			1	1	1	2	2	2	2	2
WAP-15		1/22/2019						<0.10			5.46
WAP-15		6/11/2019		4100	218		428	0.1	155	990	5.82
WAP-15	**total samples**			1	1	1	1	2	1	1	2
WAP-16	Assessment	1/22/2019				193		0.18			5.75
WAP-16	Assessment	6/19/2019					180	0.13	174	977.5	6.68
WAP-16	**total samples**			0	0	0	1	1	1	1	2
WAP-14	Assessment	1/22/2019						0.54			6.38
WAP-14	Duplicate	1/22/2019						0.56			
WAP-14	Assessment	6/18/2019		8200	940		1240	0.37	831	4588	7.3
WAP-14	Duplicate	6/18/2019		8700	980		1230	0.38	796	4760	
WAP-14	**total samples**			2	2	0	2	4	2	2	2
WAP-14A	CMA/NE	6/18/2019					1010	0.11	791	4076	6.87
WAP-14A	**total samples**			0	0	0	1	1	1	1	1
WAP-14B	CMA/NE	6/19/2019					792		698	3172	6.53
WAP-14B	**total samples**			0	0	0	1	0	1	1	1
WAP-14C	CMA/NE	6/18/2019					205	0.1	52.7	943.8	6.78
WAP-14C	**total samples**			0	0	0	1	1	1	1	1

Appendix IV Constituents

Well ID	Purpose	Date of Sample Event	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum
		Unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	ug/L	ug/L	ug/L	ug/L
		Method	EPA 6020B	EPA 6020B	EPA 6020B	EPA 6020B	EPA 6020B	EPA 6020B	EPA 6020B	EPA 300.0	EPA 6020B	EPA 6010D	EPA 7470	EPA 6010D
		GWPS/US EPA MCL/RSL	6	10	2000	4	5	100	6	4	15	40	2	100
Site Background Wells														
WAP-1	Background	1/23/2019	<5.0	<5.0	43.7	<0.50	<0.50	<5.0	<0.50	<0.10	<1.0	<10	<0.20	<10
WAP-1	Background	5/30/2019		<5.0	39.9		<0.50	<5.0	0.59	<0.10	<10.0	<10		
WAP-1	**total samples**		1	2	2	1	2	2	2	2	2	2	1	1
WBW-1	Background	1/23/2019	<5.0	<5.0	9.5	<0.50	<0.50	<5.0	<0.50	<0.10	<1.0	<10	<0.20	<10
WBW-1	Background	5/30/2019		<5.0	12.4		<0.50	<5.0	<0.50	<0.10	<10.0	<10		
WBW-1	**total samples**		1	2	2	1	2	2	2	2	2	2	1	1
Slurry Pond 3 & 4 Wells														
WAP-4	Assessment	1/22/2019	<5.0	<5.0	38.6	<0.50	<0.50	<5.0	<0.50	<0.10	<1.0	<10	<0.20	<10
WAP-4	Assessment	6/18/2019		<5	52		<2	<10		<0.10	<2	<10		
WAP-4	**total samples**		1	2	2	1	2	2	1	2	2	2	1	1
WAP-15		1/22/2019	<5.0	6	302	<0.50	<0.50	<5.0	<0.50	<0.10	<1.0	53	<0.20	<10
WAP-15		6/11/2019		<5	121				<10	0.1	<2	27		
WAP-15	**total samples**		1	2	2	1	1	1	2	2	2	2	1	1
WAP-16	Assessment	1/22/2019	<5.0	<5.0	92	<0.50	<0.50	<5.0	<0.50	0.18	1.2	<10	<0.20	<10
WAP-16	Assessment	6/19/2019		<5	62					0.13	<2	<10		
WAP-16	**total samples**		1	2	2	1	1	1	1	1	2	2	1	1
WAP-14	Assessment	1/22/2019	<5.0	16.5	48.8	<0.50	<0.50	<5.0	<0.50	0.54	<1.0	<10	<0.20	<10
WAP-14	Duplicate	1/22/2019	<5.0	15.1	50.9	<0.50	<0.50	<5.0	<0.50	0.56	<1.0	<10	<0.20	<10
WAP-14	Assessment	6/18/2019		23	51					0.37	<2	<10		
WAP-14	Duplicate	6/18/2019		23	49					0.38	<2	<10		
WAP-14	**total samples**		2	4	4	2	2	2	2	4	4	4	2	2
WAP-14A	CMA/NE	6/18/2019		<5						0.11		34		
WAP-14A	**total samples**		0	1	0	0	0	0	0	1	0	1	0	0
WAP-14B	CMA/NE	6/19/2019		<5								<10		
WAP-14B	**total samples**		0	1	0	0	0	0	0	1	0	1	0	0
WAP-14C	CMA/NE	6/18/2019		<5						0.1		<10		
WAP-14C	**total samples**		0	1	0	0	0	0	0	1	0	1	0	0

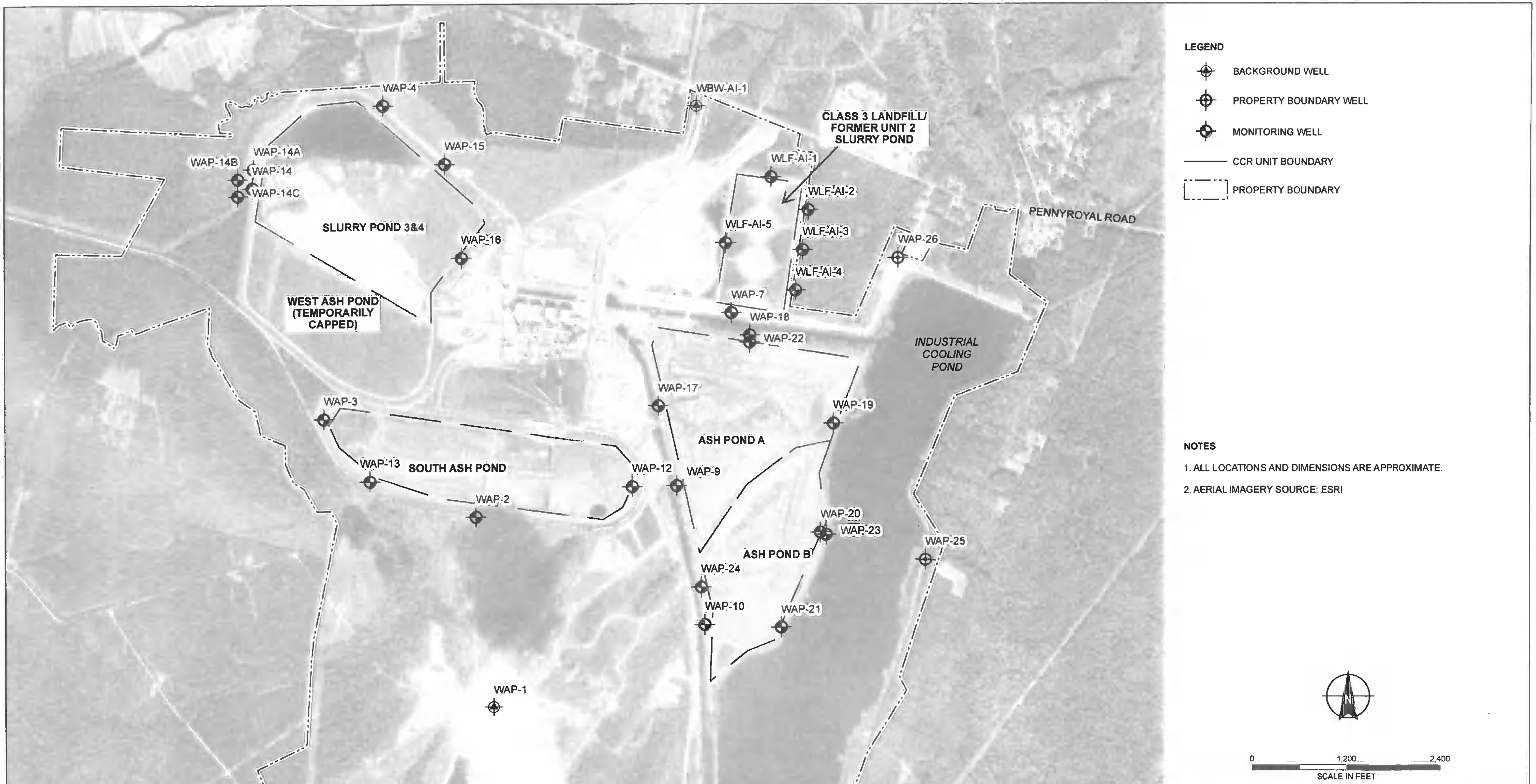
Appendix IV Constituents (continued) and Field Parameters

Well ID	Purpose	Date of Sample Event	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	pCi/L	pCi/L	ug/L	ug/L	ug/L	Feet (btoc)	Feet (msl)	SU	uS	C	mv	NTU	ppm
		Method	EPA 903.1 Mod	EPA 904.0	EPA 903.1 Mod	EPA 6020B	EPA 6020B						SM2580		
		GWPS/US EPA MCL/RSL	----	----	50	50	2	----	----	----	----	----	----	----	----
Site Background Wells															
WAP-1	Background	1/23/2019	<1.00	<3.00	1.67	<10.0	<1.0	6.86	22.58	4.63	95	19.25	80	0	0.91
WAP-1	Background	5/30/2019	0.742	<3.00	1.37	<10.0		6.76	22.68	4.58	73	28.25	164	0.4	0.78
WAP-1	**total samples**		2	2	2	2	1	2	2	2	2	2	2	2	2
WBW-1	Background	1/23/2019	<1.00	<3.00	1.43	<10.0	<1.0	5.65	26.32	4.4	40	17.48	78	0	1.16
WBW-1	Background	5/30/2019	<1.00	<3.00	0.564	<10.0		5.34	26.63	4.02	37	28.26	173	0	0.57
WBW-1	**total samples**		2	2	2	2	1	2	2	2	2	2	2	2	2
Slurry Pond 3 & 4 Wells															
WAP-4	Assessment	1/22/2019	2.17	<3.00	2.34	<10.0	<1.0	7.21	13.13	6.44	603	19.76	-7	0	0.86
WAP-4	Assessment	6/18/2019	1.31	<3.00	2.29	<5		7.02	13.32	6.56	379	20.39	7	25.9	0.46
WAP-4	**total samples**		2	2	2	2	1	2	2	2	2	2	2	2	2
WAP-15		1/22/2019	4.35	<3.00	6.58	<10.0	<1.0	6.98	13.43	5.46	5430	19.93	8	47.7	0.8
WAP-15		6/11/2019	1.09	<3.00	2.64			6.74	13.67	5.82	1850	25.03	53	104	0.33
WAP-15	**total samples**		2	2	2	1	1	2	2	2	2	2	2	2	2
WAP-16	Assessment	1/22/2019	1.19	<3.00	2.77	<10.0	<1.0	6.95	18.13	5.75	2320	20.09	-75	0	0.73
WAP-16	Assessment	6/19/2019	1.06	<3.00	1.37			6.91	18.17	6.68	1530	25.42	-121	0	0.33
WAP-16	**total samples**		2	2	2	1	1	2	2	2	2	2	2	2	2
WAP-14	Assessment	1/22/2019	1.38	<3.00	3.22	<10.0	<1.0	4.14	10.55	6.38	7450	18.49	-349	0	0.66
WAP-14	Duplicate	1/22/2019	2.31	<3.00	4.23	<10.0	<1.0								
WAP-14	Assessment	6/18/2019	<1.00	<3.00	2.17			4.65	10.04	7.3	5510	22.58	-401	0	0.66
WAP-14	Duplicate	6/18/2019	<1.00	<3.00	1.68										
WAP-14	**total samples**		4	4	4	2	2	2	2	2	2	2	2	2	2
WAP-14A	CMA/NE	6/18/2019						3.18	10.77	6.87	4540	21.84	-359	0	0.34
WAP-14A	**total samples**		0	0	0	0	0	2	2	2	2	2	2	2	2
WAP-14B	CMA/NE	6/19/2019						5.26	3.97	6.53	3770	19.33	-370	110	0.44
WAP-14B	**total samples**		0	0	0	0	0	2	2	2	2	2	2	2	2
WAP-14C	CMA/NE	6/18/2019						9.95	3.93	6.78	986	22.48	-154	0	0.3
WAP-14C	**total samples**		0	0	0	0	0	2	2	2	2	2	2	2	2

All groundwater samples collected from the monitoring wells for Assessment Monitoring in 2019 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).

(highlighted) Boron was inadvertently not analized for this sampling event.

FIGURES



SANTEE COOPER
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

LOCATION OF GROUNDWATER MONITORING WELLS FOR CCR COMPLIANCE - 2019

JANUARY 2020

FIGURE 1

Appendix A – Corrective Measures Assessment 60-Day Extension

SANTEE COOPER
WINYAH GENERATING STATION SLURRY POND 3&4
CERTIFICATION OF 60-DAY EXTENSION OF ASSESSMENT OF CORRECTIVE MEASURES

The South Carolina Public Service Authority (Santee Cooper) is implementing the April 17, 2015 U.S. EPA Federal Coal Combustion Residuals (CCR) Rule (40 CFR 257 and 261) for the Slurry Pond 3&4 at Winyah Generating Station, located near the city of Georgetown, South Carolina.

In accordance with 40 CFR 257.95 Santee Cooper initiated an Assessment of Corrective Measures (ACM) for the Slurry Pond 3&4. Statistical analysis indicated arsenic and lithium were present at statistically significant levels above the respective groundwater protection standards in one or more monitoring well downgradient of the Slurry Pond 3&4.

Pursuant to 40 CFR 257.96(a), Santee Cooper requires the deadline to complete the Assessment of Corrective Measures to be extended an additional 60 days, until September 11, 2019, due to site-specific conditions and circumstances.

The 60-day extension is required because activities are on-going to characterize the nature and extent of the arsenic, lithium, and relevant site conditions. Evaluation of the site is in progress in accordance with the CCR Rule. The collected data will be incorporated into the conceptual site model (CSM). A representative CSM is necessary for a complete evaluation of the corrective measures that have, and will be, undertaken to meet the requirements of 40 CFR 257.96(c). The need for the extension is also due to weather events impacting accessibility of the site, lack of availability of South Carolina certified well drillers, a lack of availability of the appropriate drilling equipment for heavily wooded remote areas, and delays in receipt of analytical data from certified analytical laboratories. The assessment is in progress as allowed under 40 CFR 257.96(a). An additional 60 days will enable the preparation of the ACM based on a more thorough evaluation of technical data to develop the most appropriate solutions for the protection of groundwater quality.

Pursuant to CFR Title 40 Chapter I Subchapter I Part 257 Subpart D §257.96(a), I certify that the optional 60-day extension to the deadline for the completion of the Assessment of Corrective measures is demonstrated, as described above. The certification submitted is, to the best of my knowledge accurate and complete.

HALEY & ALDRICH, INC.

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 22576 JEFFREY A. KLAIBER

Signature — Jeffrey A. Klaiber, P.E

Name

7/9/19 — 22576

Date — Professional Engineer Registration Number

Appendix B – Alternate Source Demonstration

www.haleyaldrich.com

REPORT ON

WINYAH GENERATING STATION
SLURRY POND 3 AND 4 – ALTERNATE SOURCE DEMONSTRATION
GEORGETOWN, SOUTH CAROLINA

by
Haley & Aldrich, Inc.
Greenville, South Carolina

for
Santee Cooper
Moncks Corner, South Carolina

File No. 132892-016
October 2019

HALEY ALDRICH

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9 October 2019
File No. 132892-016

Santee Cooper
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P.O. Box 2946101
Moncks Corner, SC 29461

Attention: Ms. Melanie Goings, P.G.

Subject: Alternate Source Demonstration – Arsenic and Lithium
Winyah Generating Station – Slurry Pond 3 and 4
Georgetown, South Carolina

Dear Ms. Goings:

Haley & Aldrich, Inc. is pleased to submit this Alternate Source Demonstration (ASD) for the Slurry Pond 3 and 4 at the Winyah Generating Station. This ASD was developed to comply with the United States Environmental Protection Agency (USEPA) Coal Combustion Residual (CCR) Rule effective 19 October 2015 (Rule), specifically Code of Federal Regulations Title 40, subsection § 257.90(e). This ASD presents the technical data and analysis documenting that a source other than the CCR unit caused the statistically significant level of arsenic and lithium identified at Slurry Pond 3 and 4 as required by 257.95 (g)(3)(ii).

We appreciate the opportunity to provide environmental consulting services on this project. Please do not hesitate to call if you have any questions or comments.

Sincerely yours,
HALEY & ALDRICH, INC.

Mark Miesfeldt
Senior Consultant

Enclosures:

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1. Introduction

In accordance with (40 CFR 257.95(g)(3)(ii)) owners and operators are provided with the opportunity to demonstrate that an alternate source is responsible for statistically significant levels (SSLs) of Appendix IV constituents identified above groundwater protection standards (GWPS) at CCR management units. According to the Rule, an owner or operator may:

- Demonstrate that a source other than the CCR unit caused the contamination, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Any such demonstration must be supported by a report that includes the factual or evidentiary basis for any conclusions and must be certified to be accurate by a qualified professional engineer.

As provided in 40 CFR 257.95(g)(3)(ii), this demonstration was conducted to show that Slurry Pond 3 and 4 is not the source of the arsenic and lithium identified and that the SSLs are the result of naturally occurring conditions.

1.1 BACKGROUND

The Winyah Generating Station (WGS) is located approximately ten (10) miles from the Atlantic Ocean between Pennyroyal Creek and Turkey Creek in Georgetown, South Carolina. WGS is located within the Lower Coastal Plain of the Atlantic Coastal Plain physiographic province in South Carolina. The Site and surrounding area is relatively flat with natural ground surface elevations between 15 and 30 feet above mean sea level (msl). The lower lying areas are typically marshy year-round.

The Winyah Slurry Pond 3 and 4 is an approximate 100-acre industrial wastewater treatment pond permitted by South Carolina Department of Health and Environmental Control (SC DHEC), National Pollutant Discharge Elimination System Permit (NPDES) Number SC0022471. It is permitted to receive flue gas desulfurization (FGD) sludge and gypsum wastewater from the four coal-fired generating units at WGS. It does not contain fly ash nor bottom ash.

Extensive earthwork across the site such as roads, dikes, and foundation preparation has altered much of the original grade in the vicinity of the plant and CCR management units. Nearly all surface and storm water on the Site is collected and directed to the industrial cooling pond. All other runoff ultimately flows to the Sampit River, located approximately two miles north of the Site. Pennyroyal Creek is a tributary to the Sampit River and borders the western boundary of the plant property. Another tributary, Turkey Creek, located east of the plant flows north and joins Pennyroyal Creek about one mile north of the Site. During plant construction, a portion of Turkey Creek was relocated to a man-made channel along the east side of the Industrial Cooling Pond.

1.2 SITE GEOLOGY

The WGS is located east of Pennyroyal Creek and west of Turkey Creek approximately ten miles from the Atlantic Ocean. In descending order, the subsurface soils at the WGS and its surrounding areas are classified into; fill soils (Fill), unconsolidated Pleistocene sediments (Pleistocene), Chicora Member (Chicora) of the Williamsburg Formations and Williamsburg Formation (Williamsburg) sediments. The three (3) geologic units encountered beneath the Site are described below for reference, with emphasis

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on the unconsolidated Pleistocene sediments and Chicora Member of the Williamsburg Formation, which make up the uppermost aquifer.

Formation Name	Age	Hydrogeologic Unit	Description	Thickness(ft)
Unconsolidated Sediments	Pleistocene	Uppermost Aquifer	Estuarine and barrier island deposits containing moderately to well-sorted sand, well-sorted clayey sand and sandy clay with broken shells and reworked Williamsburg Formation sediments, including cemented pieces of sand and dark grey to black silt and clay	1-50
Chicora Member	Pleistocene	Uppermost Aquifer	The upper section of the Williamsburg Formation consisting of a carbonate mud with fine to coarse quartz sand and silt with some fossiliferous clayey sand and mollusk-rich, limestone	0-10
Williamsburg Formation	Pleistocene	Lower Aquifer	Laterally continuous and competent stiff, dense, low permeability, black to dark gray clay with very fine quartz sand extending to a minimum elevation of at least -60 feet (NGVD29), which is the deepest penetration of the site investigations.	>30

Monitoring wells installed in the vicinity of WAP-14 indicated the presence of the unconsolidated sediments of reworked Williamsburg Formation sediments. Gray to black clayey sands was documented with a strong sulfur like smell. The presence of shell fragments was also noted in all three monitoring wells installed in the vicinity of WAP-14.

1.3 HYDROGEOLOGY

The uppermost aquifer at WGS includes saturated portions of the unconsolidated Pleistocene sediments and the Chicora Member of the Williamsburg Formation. The Chicora Member overlies the dense, low permeability clay of the Williamsburg Formation and varies in thickness at the Site from 0- to 10-feet. The dense clay deposits of the Williamsburg Formation are laterally continuous and competent separating the uppermost aquifer from deeper saturated units. Soil borings installed in the vicinity of WAP-14 indicated the presence of the unconsolidated Pleistocene sediments.

Groundwater flow within the surficial aquifer and Chicora Member is affected by the onsite ponds and regional topography. Recharge to the surficial aquifer occurs by direct surface infiltration as well as from surface water in the upper reaches of the discharge channel to the cooling pond adjacent to Ash Pond A. Regionally, groundwater flow is toward Pennyroyal Creek, Turkey Creek, and the Sampit River. In the vicinity of Slurry Pond 3 and 4, potentiometric data recorded from the on-site monitoring network suggests that groundwater flow in the unconfined, uppermost aquifer is radial.

1.4 SCOPE AND OBJECTIVE

The objective of this alternate source demonstration (ASD) is to present the data and technical analysis to document the naturally occurring conditions that exist within the uppermost shallow alluvial aquifer responsible for the mobilization of naturally occurring arsenic and lithium.

2. Alternate Source Demonstration for Arsenic and Lithium

During detection monitoring at Slurry Pond 3 and 4, statistically significant increases of one or more Appendix III constituent above background were identified in all of the downgradient wells monitoring Slurry Pond 3 and 4 triggering assessment monitoring. In assessment monitoring however, arsenic (WAP-14 only) and lithium (WAP-15 only) were the only Appendix IV constituents identified at SSLs above GWPS. Assuming that the source of arsenic and lithium was Slurry Pond 3 and 4 and knowing that Slurry Pond 3 and 4 only received FGD sludge, one would expect these constituents to be similarly distributed and co-located. Given that the occurrence of arsenic and lithium is isolated and not broadly distributed or collocated, as expected, an evaluation into possible explanations was pursued.

2.1 DATA COLLECTION ACTIVITIES

The ASD included the installation of three (3) additional monitoring wells to supplement the analytical results from WAP-14 downgradient of Slurry Pond 3 and 4. In addition, samples of soil and groundwater were collected and analyzed to determine if groundwater conditions proximal to the pond could be releasing naturally occurring arsenic and lithium into groundwater. Surface water samples were also collected to establish baseline water quality conditions in the pond.

The ASD evaluation included the following:

- Analyzed soil samples from soil borings installed downgradient of WAP-14 (WAP-14A, WAP-14B and WAP-14C) to document the presence and concentration of naturally occurring iron, arsenic and lithium in the subsurface.

- Collected groundwater samples from the four (4) monitoring wells (WAP-14, WAP-14A, WAP-14B and WAP-14C) to analyze geochemical indicator parameters in the aquifer (e.g., to evaluate whether or not iron-reducing conditions are present and could serve as a mechanism for release of arsenic and lithium to groundwater).

- Analyzed surface water impounded in Slurry Pond 3 and 4 to establish the surface water baseline quality and the absence/presence of arsenic and lithium concentrations coincident with the groundwater sampling events.

- Measured groundwater elevations to determine groundwater flow directions and variation in water table elevation.

- Evaluated historical analytical data, boring logs, and data gathered during the evaluation of the nature and extent from Slurry Pond 3 and 4 and other existing CCR management units onsite.

Figure 1 shows the locations of the monitoring wells, soil sample locations and surface water sample locations used in the ASD evaluation. Figure 2 shows the potentiometric surface map for Slurry Pond 3 and 4.

Groundwater sampling depths and well information is summarized in Table 1A while soil boring information is provided in Table 1B. Analytical results for groundwater are summarized in Table 2, surface water in Table 3, and soil analytical results are summarized in Table 4.

2.2 RESULTS AND TECHNICAL DISCUSSION

Alternate sources of arsenic and lithium have been identified in WGS site's subsurface. This section will present the data, technical analysis, and geochemical lines of evidence to support the ASD naturally occurring for Slurry Pond 3 and 4.

2.2.1 Alternate Source Demonstration for Arsenic (WAP-14)

Arsenic geochemistry was evaluated in surface water, soil, and groundwater; and several lines of evidence suggest that arsenic found in groundwater is associated with the reductive dissolution of naturally occurring arsenic. These mechanisms, and the lines of evidence that support them, are described below.

- Iron oxyhydroxides constitute the most common source of naturally occurring arsenic in groundwater. This is due to reductive dissolution that occurs following the reaction of naturally occurring iron oxyhydroxides with organic carbon which releases arsenic into solution. This mechanism is known as reductive dissolution, and likely occurs within the reddish and orange sand, silt, and clay units exposed to reducing conditions along the groundwater flow path. The contact between arsenic-bearing iron-oxides and organic bearing zones denoted by mention of black or gray units with a strong hydrogen sulfide smell is apparent in the boring logs for WAP-14A and WAP-14B (Appendix A).

- Arsenic is a metalloid listed in group V_A of the periodic table. It exists in nature in the oxidation states +V (arsenate), +III (arsenite), 0 (arsenic) and -III (arsine). In most natural aqueous systems, arsenic exhibits anionic behavior. The speciation and mobilization of arsenic in groundwater is controlled by two variables, pH and oxidation reduction potential (ORP) according to the standard hydrogen electrode (Eh). A Site-specific Eh-pH diagram constructed using water quality data is provided as Figure 3. Groundwater samples are plotted to predict the geochemical state of arsenic. In general, the arsenic present in groundwater is in its mobilized arsenite (+III) state while arsenic present in surface water plot predominantly as arsenate (As (V)). These results are the reason why concentrations of total arsenic in the samples are low. These differences in speciation are due to a different source of arsenic in groundwater. Naturally occurring arsenic is mobilized in groundwater due to the reaction with naturally occurring organic carbon, evidenced by the elevated TOC concentrations in soil (5-9 %), and in groundwater (as high as 48 mg/L) relative to surface water (5 mg/L).

- In oxygenated environments under oxidizing conditions of neutral pH, arsenic is typically found in the solid phase bound to iron oxyhydroxides (Figure 3 (tan polygon)). Under reducing conditions typically found in upgradient and downgradient groundwater (Eh < 0 Volts), arsenic is typically found in its mobilized, arsenite (+III) state. These observations suggest that the reducing conditions necessary to mobilize arsenic are naturally occurring, because they are observed in both upgradient and downgradient wells.

- The reductive dissolution pathway responsible for the occurrence of arsenic in groundwater is shown on Figure 3 (blue arrow), which shows that the solubility of arsenic in groundwater is controlled by naturally occurring oxidation reduction conditions. This conclusion is strongly supported by the graphs, shown on Figure 4, between groundwater arsenic and dissolved organic carbon (DOC) and total organic carbon (TOC). Figure 4 shows that the elevated arsenic concentrations correlate to elevated DOC and TOC concentrations indicative of reductive dissolution created under naturally occurring groundwater conditions.

- Piper plots are trilinear diagrams used to differentiate, or fingerprint, groundwater and surface water major ion composition by plotting analytical results, in percent milliequivalents per liter (meq/L), for each sample group of cations (Ca, Na, K, and Mg) and anions (HCO_3, SO_4, and Cl) that represent the percent of each ion. The lower part of the trilinear diagram is comprised of two triangles with relative percentages of the major anions and cations. The upper part of the trilinear diagram is a diamond shaped field. The separate ions relative positions in the two lower triangles project upward parallel to cation and anion triangle axes into the diamond and intersect to identify major ion water type (Piper, 1944).

- The four (4) Appendix III parameters which demonstrated an SSI during Detection Monitoring were used to differentiate effects from Slurry Pond 3 and 4 from naturally occurring effects. naturally occurring chloride, sulfate, TDS, and boron all demonstrated SSIs and can therefore provide a useful bivariate analysis with arsenic to differentiate between anthropogenic (Slurry Pond 3 and 4) and naturally occurring (reductive dissolution) sources. Arsenic sourced from Slurry Pond 3 and 4 should correlate to elevated chloride, sulfate, TDS, and boron concentrations. Conversely, naturally occurring naturally arsenic would correlate with lower chloride, sulfate, and TDS reflective of background conditions.

- As shown on Figure 6, samples with elevated concentrations of arsenic correlate to low concentrations of chloride, sulfate, TDS, and boron. Conversely, samples exhibiting elevated concentrations of chloride, sulfate, TDS, and boron correspond to significantly lower concentrations of arsenic.

2.2.2 Alternate Source Demonstration for Lithium (WAP-15)

Elevated lithium concentrations above the EPA regional screening level (RSL) (40 µg/L) have been detected at several sampling locations including WAP-15 located downgradient of Slurry Pond 3 and 4 (Table 2). Elevated lithium concentrations above the EPA tap water RSL were also detected in surface water samples SW-1, SW-2, and SW-3 collected in 2018 (Table 3). Lithium geochemistry was evaluated in surface water, soil, and groundwater; and several lines of evidence suggest that lithium found in groundwater samples collected at the Site is associated with the naturally occurring marine deposits. These lines of evidence that support the ASD, are described below.

- Although typically present in groundwater as a monovalent cation, lithium's small ionic and atomic size causes it to behave similarly to divalent alkaline earth metals like magnesium. Lithium is found in three main types of deposits 1) pegmatites, 2) brines/evaporites, and 3) hydrothermally altered clays (Munk et al.2016) with type 2 (brines and evaporites) being the most relevant to the WGS and this ASD. Lithium is a lithophilic element because it has a low density, an ionic charge of +1 and an ionic radius of 0.79 angstroms. The lithophilic characteristics of lithium are important because they control its fate and transport in groundwater. The fact that lithium is a trace element explains why it concentrates in late phases of evaporates and brines (i.e., coastal marine depositional environment). Given its unique geochemistry described above, lithium is largely conservative (non-reactive) in all water types.

- A lithium concentration soil depth profile for samples collected during the ASD investigation and nature and extent investigation is provided on Figure 7a. The lack of any spatial or vertical relationship with depth in boreholes completed at various distances to Slurry Pond 3 and 4 demonstrates that lithium concentrations are independent with respect to proximity to the ponds.

- To evaluate the potential contribution of surface water to groundwater, a piper diagram plotting surface water samples from Slurry Pond 3 and 4 (W-SW-WSP) and available groundwater results is provided on Figure 5. The Piper diagram shows that surface water clusters towards calcium-sulfate facies (red circle). Groundwater plots along four clusters, with only WAP-17 clustering within the red circle as a magnesium-sulfate type water. All other groundwater samples cluster in three other facies without mixing trends apparent in the diagram, suggesting that groundwater samples in many wells with elevated lithium are not sourced from the ponds, but from an alternate source. All other wells exhibiting elevated concentrations of lithium above the EPA RSL plot as a calcium-bicarbonate water type on Figure 5 (blue circle), suggesting an alternative naturally occurring source of lithium is present.

- Elevated lithium concentrations in groundwater and soil samples are compared to the abundance of shells observed in lithology logs (WAP-14A, WAP-14C, WAP-22, WAP-23 and WAP-24). Lithium was detected at elevated concentrations that correspond to depths where the presence of shells was noted in lithology logs. Conversely, there are no shells denoted in lithology logs at sample depths and screening intervals that exhibit low to non-detectible lithium concentrations in respective soil and groundwater samples. As summarized in Section 1.2, the presence of shells in the boring logs are indicative of a marine depositional environment. In this type of depositional environment, there are two likely alternative sources of lithium, which are described in detail below.

  - Alternative Source 1: Desorption of lithium-bearing clays in marine sediments

    Studies conducted on alkali earth metals of marine sediments (Rankama and Sahama (1949); (Welby (1958)) report very high concentrations of naturally occurring lithium (35-70 mg/Kg) in marine sediments. In comparison, concentrations of lithium found in soil underlying the WGS are below and within this range (< 5.6 to 46 mg/Kg). The concentration of a naturally occurring lithium in marine sediments similar to those underlying the WGS is a direct result of lithium's unique geochemistry described above. Lithium values reported for marine sediments very closely correspond with values reported by Rankama and Sahama (1949) for the naturally occurring lithium content of igneous rocks. Furthermore, there seems to be no essential difference between values reported for shale and values reported for marine sediments (Welby, 1958). This is due to the fact that lithium does not follow typical weathering patterns, but rather replaces magnesium and iron in clay mineral structures. Mitchell (cited in Rankama and Sahama, 1949) found a very definite enrichment trend of lithium in some soils. This suggests that lithium is concentrated in the weathering process and that it is transported to the marine environment in colloids and detrital material. The weathering of lithium is controlled by its small ionic radius; being smaller than most other analytes, it is retained more tightly in mineral structure than other analytes. Its structural position in clay minerals cause it to be relatively less easily hydrated than other analytes (Na, Cl, etc.), and will remain behind when other elements have weathered out of the structure or mineral grain. In general, naturally occurring lithium is removed far less rapidly than sodium and follows magnesium in the weathering cycle of slow leaching and weathering mechanisms.

Tardy and others (1972) showed that the retention of lithium in marine sediments is concentrated in magnesium-rich clay minerals. As described above, weathering of naturally occurring sources of lithium follows that of magnesium, and therefore a strong correlation between the two metals in soil would be expected and would demonstrate an alternative naturally occurring source. Figure 7c provides a bivariate analysis between lithium and magnesium and shows a very strong positive linear relationship (r^2 = 0.88), the second strongest coefficient of correlation found next to potassium.

– Alternative Source 2: Evapo-concentration of Naturally Occurring Lithium in Subsurface

Evapo-concentration is another important geochemical mechanism responsible for concentration and release of naturally occurring lithium above the GWPS. These concentrating processes are effective for lithium because it is relatively incompatible and geochemically conservative in water, both in magmatic systems and low-temperature solutions.

In these types of shallow marine deposits, evapo-concentration is a likely geochemical mechanism. Evapo-concentration of seawater into brines or evaporites can concentrate lithium by many orders of magnitude. This would explain the abundance of shells and elevated lithium concentrations at depth in soil and groundwater samples and is a likely source of naturally occurring lithium.

During evapo-concentration, lithium is reported to remain in solution until a late stage and is precipitated with potassium (Stewart, 1963). As a result, lithium and potassium are often found together in elevated concentrations in evaporites and brines. A close correlation of lithium and potassium in soil would be expected. To test the evapo-concentration mechanism for naturally occurring lithium, a bivariate plot of lithium vs potassium concentrations in soil is provided on Figure 7b. This figure shows a correlation coefficient (R^2) of 0.9, the strongest positive bivariate relationship observed between lithium and any other indicator parameter sampled for the ASD.

The lines of evidence provided above describes two alternate, naturally occurring sources of lithium. These alternate sources are the desorption of lithium from clay minerals in marine sediments, and dissolution of marine evaporites present as a function of evapo-concentration of seawater. The data and literature review provided in this document strongly support both mechanisms, and it is likely that both provide an alternative naturally occurring source of lithium to soil and groundwater throughout the subsurface of the WGS.

- Four (4) Appendix III parameters which demonstrated an SSI during Detection Monitoring and triggered Assessment Monitoring of Appendix IV parameters were used as geochemical differentiators to support the naturally occurring lithium assessment provided above. Chloride, sulfate, TDS, and boron all demonstrated SSIs and can therefore provide a useful bivariate analysis with lithium to differentiate between anthropogenic (Slurry Pond 3 and 4 leakage) and naturally occurring sources (lithium desorption and evaporite dissolution). Lithium sourced from ponds should correlate to elevated chloride, sulfate, TDS, and boron concentrations. Conversely, naturally occurring lithium would correlate with lower chloride, sulfate, TDS, and boron reflective of background conditions. Figure 6 provides the bivariate analysis of chloride (A), sulfate (B), TDS (C), and boron (D) concentrations against lithium concentrations. The GWPS of 0.04 mg/L is provided (red line) for context. With the exception of WAP-17, samples with elevated concentrations of lithium correlate to low concentrations of chloride, sulfate, TDS, and boron. All samples exhibiting elevated concentrations of chloride, sulfate, TDS, and boron correspond to significantly lower concentrations of lithium.

- The law of conservation of mass states that mass in an isolated (groundwater system) is neither created nor destroyed by chemical reactions or physical transformation. The lack of linear correlation between lithium/indicator parameter bivariate plots (Figure 7) is a significant line of evidence that suggests an alternative source. In the geochemical environment underlying the Site, lithium solubility would act conservatively, and lithium should remain in solution subject only to advective processes. Similarly, most of the indicator parameters shown on Figure 7 would also act conservatively in solution, and only be subjected to the same advective processes as lithium. Through the law of conservation of mass, a strong linear positive linear correlation would exist in the bivariate plots if the sources of indicator parameters and the source of lithium were the same. However, the negative linear relationship demonstrated by the data plotted on Figure 7 between Appendix III surface water indicator parameters and lithium is a very strong line of evidence that an alternate naturally occurring source of lithium exists in the subsurface.

3. ASD CONCLUSIONS AND DISCUSSION

This alternate source demonstration provides the data, analysis and interpretation for several significant geologic, hydrogeologic and geochemical lines of evidence that demonstrate an alternative source of arsenic and lithium. Collectively, these lines of evidence show that the source of arsenic and lithium in groundwater upgradient and downgradient of Slurry Ponds 3 and 4 are naturally occurring, and therefore this document is successful in demonstrating an ASD for Slurry Pond 3 and 4. This section provides a brief summary of these lines of evidence.

3.1 ARSENIC

3.1.1 Geologic Lines of Evidence

The goals of this ASD were to 1) identify the naturally occurring alternative source of arsenic, and 2) demonstrate that there are naturally occurring reducing agents responsible for the mobilization of naturally occurring arsenic in groundwater. A review of the regional geology and lithology records for on-site boreholes was conducted, and indicate that naturally occurring arsenic, and naturally reducing conditions responsible for the mobilization of naturally occurring arsenic exist. The result of this review is compelling in demonstrating an alternative source of arsenic. These conclusions are summarized below:

- Presence of "Red-brown silty sand" and "orange sandy clay" are ubiquitous throughout lithology logs and denotes significant abundance of naturally occurring arsenic-bearing iron oxyhydroxides.
- Presence of black and gray sand in lithology logs are both significant sources of naturally occurring organic carbon, that when reacted with oxyhydroxides mentioned above create the geochemical conditions conducive to the reductive dissolution of naturally occurring arsenic.
- Presence of "strong rotten egg smell" in logs and field sheets indicate that sulfate reduction is occurring, and the geochemical conditions necessary for the reductive dissolution of iron oxyhydroxides exist.

3.1.2 Soil Lines of Evidence

Soil samples strongly support geologic lines of evidence summarized above with the following lines of evidence:

- High TOC concentrations in WAP-22 and WAP-24 between 40-50 feet (6.8-7.3 %), and very high concentrations of organic carbon in WAP-14C (9.4 %) at 16 feet indicates presence of a naturally occurring reducing agent that would create conditions necessary for reductive dissolution of iron oxides and iron oxyhydroxides, and subsequently the mobilization of naturally occurring arsenic into groundwater
- Elevated arsenic soil concentrations in WAP-14C (11.6 mg/Kg) which correlates to elevated concentrations of arsenic (9.4%).

3.1.3 Surface Water Lines of Evidence

Of the three surface water samples collected during the ASD investigation the samples collected inside Slurry Pond 3 and 4 (SW-1, SW-2) were below the GWPS of 0.01 mg/L for arsenic. SW-3 exceeded the GWPS but was collected in the discharge canal and is not associated with Slurry Pond 3 and 4. Historic surface water sample (W-SW-WSP) collected in the West Slurry Pond which is now Slurry Pond 3 and 4 today is characterized by low arsenic concentrations; high concentrations of TDS, sulfate, and chloride; and low TOC and DOC concentrations (<5 mg/L). Because TDS, sulfate, and chloride tend to remain conservative is solution, they were used as a geochemical fingerprinting tool to differentiate between anthropogenic and naturally occurring sources. Surface water associated with elevated TDS, sulfate, and chloride all have low concentrations of arsenic. Conversely, groundwater results associated with elevated arsenic have low TDS, sulfate, and chloride. This method of geochemical differentiation is a widely recognized method and demonstrates that an alternative source exists for arsenic.

3.1.4 Groundwater Lines of Evidence

Groundwater samples collected for the ASD work plan were combined with the available groundwater dataset from the semi-annual Assessment Monitoring program to make the following conclusions:

- Piper diagrams suggest groundwater samples (water type: Ca-HCO_3) with arsenic concentrations above the GWPS are geochemically different from surface water samples (water type: Ca-SO_4).
- Elevated DOC and TOC concentrations in groundwater is naturally occurring, are significantly more elevated than surface water concentrations, and correlate with elevated TOC concentrations in soil samples.
- Elevated arsenic correlates to elevated TOC; arsenic is only observed in wells with high TOC concentrations (> 5 mg/L).
- Elevated arsenic correlates to low dissolved oxygen concentrations, low ORP values, and elevated DOC; arsenic is only observed in wells with high DOC concentrations.
- The bivariate relationship between the geochemical indicator parameters and arsenic is a good geochemical differentiator that demonstrates an alternate source. Chloride, sulfate, TDS and boron concentrations were used as a geochemical forensic tool to differentiate between anthropogenic source (Slurry Pond) and an alternate naturally occurring source(s) (reductive dissolution of iron oxyhydroxides). These analytes are useful indicator parameters because they are likely to remain conservative between groundwater and surface water and can be used to trace the contribution of surface water to groundwater. A review of the bivariate relationships between arsenic and these three indicator parameters clearly demonstrate a naturally occurring source of arsenic.
- Site specific Eh-pH diagrams generated for the Site demonstrate reducing conditions in all wells and arsenic present in its mobilized form at most upgradient locations.

3.2 LITHIUM

Two alternative sources of naturally occurring lithium have been evaluated and demonstrated during the ASD investigation. These mechanisms are fully described in Section 2.2.2 and include:

- Desorption of lithium-bearing marine sediments in the vadose and saturated zones, and
- Dissolution of evaporites and brines derived from the Evapo-concentration of naturally occurring lithium in seawater.

The section summarizes the lines of evidence for these two alternate sources of lithium in soil and groundwater.

3.2.1 Geologic Lines of Evidence

Important goals of this ASD were to identify the naturally occurring alternative source of lithium and demonstrate that naturally occurring geochemical conditions are conducive to the mobilization of naturally occurring lithium in groundwater. A review of the regional geology and lithology records for on-Site boreholes was conducted, and indicate that naturally occurring lithium, and the conditions responsible for the mobilization of naturally occurring lithium exist. The result of this review is compelling in demonstrating an alternate source of lithium. These conclusions are summarized below:

- The correlation between the depths where shells were encountered in the lithologic profile during drilling corresponding to elevated concentrations of lithium in groundwater and soil samples is a line of evidence to suggest the presence of naturally occurring lithium source in marine sediments.
- The presence of "White Sand" denoted in borehole logs is an indication that lithium-bearing evaporites may exist in the subsurface.
- The presence of black sand with "strong sulfur smell" containing shells is an indication that localized brackish depositional environments necessary for the concentration of seawater and evapo-concentration of naturally occurring lithium in sediments underlie the Site.

3.2.2 Soil Lines of Evidence

Soil data strongly support geologic lines of evidence summarized above with the following lines of evidence:

- Vertical and spatial analysis shows that lithium concentrations in soil are independent to proximity to Slurry Pond 3 and 4, with the highest results corresponding to the deepest samples.
- The range of lithium soil concentration results from the ASD investigations (<5.4 to 46 mg/Kg) is significantly lower than the range of naturally occurring lithium concentrations (35-70 mg/Kg) reported in studies of marine sediments (Welby, C.W., 1958).
- The strong positive linear correlation ($r^2 = 0.9$) between lithium and potassium is a significant indicator parameter that suggests dissolution of evaporites is an alternate naturally occurring source for lithium.
- The strong positive linear correlation ($r^2 = 0.88$) between lithium and magnesium is a significant indicator parameter that suggests desorption of lithium-bearing clays within marine sediments is an alternate naturally occurring source for lithium.

3.2.3 Surface Water Lines of Evidence

Although lithium concentrations in surface water is elevated, piper diagrams inclusive of surface water and groundwater samples suggest two separate sources for both media. This assessment is strongly supported by the geochemical fingerprinting analysis. Surface water in the pond is characterized by elevated concentrations of TDS, sulfate, and chloride; and low TOC concentrations (<5 mg/L). Because TDS, sulfate, and chloride tend to remain conservative is solution, they were used as a geochemical fingerprinting tool to differentiate between anthropogenic and naturally occurring sources. Groundwater associated with elevated TDS, sulfate, chloride, and boron all have low concentrations of lithium. Conversely, groundwater results associated with elevated lithium have low TDS, sulfate, and chloride. This method of geochemical differentiation is a widely recognized method and demonstrates that alternative sources exist for lithium

3.2.4 Groundwater Lines of Evidence

Groundwater samples collected for the ASD were combined with the available groundwater dataset from the nature and extent monitoring program to make the following conclusions:

1) Piper diagrams suggest groundwater samples (water type: Ca-HCO_3) with lithium concentrations above EPA RSLs are geochemically different form surface water samples (water type: Ca-SO_4).

2) The bivariate relationship between the geochemical indicator parameters and lithium is a good geochemical differentiator that demonstrates an alternative source. Chloride, sulfate, TDS, and boron concentrations were used as a geochemical forensic tool to differentiate between anthropogenic source (Slurry Pond) and an alternative naturally occurring source(s) (desorption of clay, dissolution of evaporites). These analytes are useful indicator parameters because they are likely to remain conservative between groundwater and surface water, and can be used to trace the contribution of surface water to groundwater. A review of the bivariate relationships between lithium and these three (3) indicator parameters clearly demonstrate a naturally occurring source of lithium.

4. Certification

Pursuant to 40 CFR §257.95(g)(3)(ii), Haley & Aldrich, Inc. conducted an alternative source evaluation to determine if a source other than Slurry Pond 3 and 4 caused the statistically significant level over background identified during assessment monitoring for this unit.

This alternate source demonstration supports the conclusion that a source other than the CCR unit Slurry Pond 3 and 4 is the cause of the statistically significant level over background for Appendix IV constituents detected during assessment monitoring of this Unit.

The certification statement for this ASD is provided as Appendix C.

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Tables

TABLE 1A
ASD BOREHOLE AND WELL SUMMARY TABLE
GROUNDWATER SAMPLING
WINYAH GENERATING STATION - SLURRY POND 3/4
GEORGETOWN, SOUTH CAROLINA

Location Name	Date of Completion	Top of Casing Elevation (ft msl)	Screen Zone (ft bgs)	Screen Zone Elevation (ft msl)	Depth to Water (ft btoc)	Groundwater Elevation (ft msl)	Sample/Screen Zone Lithology
WAP-4	November 2008	20.34	5.00 - 25.00	15.34 - -4.66	7.02	13.32	Tan SAND
WAP-11	Unknown	9.55	6.00 16.00	- -	5.15	4.40	Unknown
WAP-14	September 2015	14.69	9.00 - 19.00	5.69 - -4.31	4.65	10.04	Gray SAND
WAP-14A	May 2019	13.95	12.00 - 22.00	1.95 - -8.05	3.18	10.77	Gray SAND with shells
WAP-14B	May 2019	9.23	3.00 - 13.00	6.23 - -3.77	5.26	3.97	Gray SAND with shells
WAP-14C	May 2019	13.88	9.50 - 19.50	4.38 - -5.62	9.95	3.93	Gray SAND with shells
WAP-15	September 2015	20.41	10.00 - 20.00	10.41 - 0.41	6.74	13.67	White SAND
WAP-16	September 2015	25.08	9.00 - 19.00	16.08 - 6.08	6.91	18.17	Gray SAND

NOTES:
Groundwater Measurements were collected in June 2019
bgs = below ground surface
ft = feet
in = inches
btoc = below top of casing
msl = mean sea level
Datum of Elevations in NAVD 88

TABLE 1B
ASD BOREHOLE AND WELL SUMMARY TABLE
SOIL SAMPLING
WINYAH GENERATING STATION - SLURRY POND 3/4
GEORGETOWN, SOUTH CAROLINA

Location Name	Date of Completion	Top of Casing Elevation (ft msl)	Sample Depth (ft bgs)	Sample Elevation (ft msl)	Sample Lithology
WAP-14A	May 2019	13.95	15.00 - 17.00	-1.05 - -3.05	Gray SAND with shells
WAP-14B	May 2019	9.23	5.00 - 7.00	4.23 - 2.23	Gray SAND with shells
WAP-14C	May 2019	13.88	15.00 - 17.00	-1.12 - -3.12	Gray SAND with shells

NOTES:
bgs = below ground surface
ft = feet
in = inches
btoc = below top of casing
msl = mean sea level
Datum of Elevations in NAVD 88

TABLE 2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
WINYAH GENERATING STATION
SANTEE COOPER
GEORGETOWN, SOUTH CAROLINA

			Chemical Group	Detection Monitoring - EPA Appendix III Constituents						Assessment Monitoring - EPA Appendix IV Constituents										Radiological			
			Chemical Name	Boron, Total	Calcium, Total	Chloride	Fluoride	Sulfate	Total Dissolved Solids (TDS)	Arsenic, Total	Barium, Total	Cadmium, Total	Chromium, Total	Cobalt, Total	Fluoride	Lead, Total	Lithium, Total	Molybdenum, Total	Selenium, Total	Radium-226	Radium-228	Radium-226 & 228	Conductivity
			MCL/RSL	-	-	-	4	-	-	0.01	2	0.005	0.1	0.006	4	0.015	0.04	0.1	0.05	-	-	5	-
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L	pCi/L	uS/cm
Impound-ment	Location	Sample Date	Sample Type																				
Background	WAP-1	05/30/2019	N	0.054	1.9	5.09	< 0.1	10	43.75	< 0.005	0.0389	< 0.0005	< 0.005	0.00059	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	0.742	-	1.37	73
Background	WBW-1	05/30/2019	N	0.085	< 0.5	2.71	< 0.1	5.64	21.25	< 0.005	0.0124	< 0.0005	< 0.005	< 0.0005	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	-	-	0.564	37
Ash Pond A	WAP-9	05/30/2019	N	5.6	130	92.3	< 0.1	82.2	737.5	0.189 / 0.18	0.079 / 0.077	< 0.002 / < 0.004	< 0.01 / < 0.01	-	< 0.1	< 0.002 / < 0.05	0.862	< 0.01	< 0.005 / < 0.05	1.07	-	1.07	1070
Ash Pond A	WAP-17	05/30/2019	N	3.7	340	249	0.23	739	1658	0.119 / 0.11	0.052 / 0.048	-	-	-	0.23	-	0.25	-	-	-	-	0.475	2210
Ash Pond A	WAP-17	05/30/2019	FD	3.6	340	262	0.14	780	1632	0.117 / 0.11	0.051 / 0.048	-	-	-	0.14	-	0.24	-	-	-	-	0.65	-
Ash Pond A	WAP-16	06/05/2019	N	-	302	7.63	0.12	6.69	1532	0.492	0.0945	-	-	-	0.12	-	0.33	-	-	-	-	1.38	1860
Ash Pond B	WAP-10	05/30/2019	N	8.6	490	745	< 0.1	670	3309	0.0059	0.254	< 0.0005	< 0.005	< 0.0005	< 0.1	< 0.01	0.021	< 0.01	< 0.01	2.27	-	3.47	3700
Ash Pond B	WAP-10	05/30/2019	FD	8.8	472	747	< 0.1	676	3338	0.0060	0.235	< 0.0005	< 0.005	< 0.0005	< 0.1	< 0.01	0.022	< 0.01	< 0.01	2.01	-	3.59	-
Ash Pond B	WAP-19	06/05/2019	N	-	250	213	0.23	586	1411	0.123	0.0401	-	-	-	0.23	-	0.24	-	-	1.5	-	2.16	2000
Ash Pond B	WAP-20	06/05/2019	N	-	78.3	24.8	0.66	172	443.8	0.0025	0.0389	-	-	< 0.001	0.68	-	0.15	0.0366	-	-	-	1.68	783
Ash Pond B	WAP-21	06/11/2019	N	4.2	178	172	< 0.1	468	985	< 0.005	0.043	-	-	< 0.01	< 0.1	-	< 0.01	< 0.01	-	-	-	0.845	1400
Slurry Pond 3&4	WAP-4	06/18/2019	N	0.17	52	8.53	< 0.1	20.6	238.8	< 0.005	0.052	< 0.002	< 0.01	-	< 0.1	< 0.002	< 0.01	-	< 0.005	1.31	-	2.29	379
Slurry Pond 3&4	WAP-14	06/18/2019	N	8.2	940	1240	0.37	831	4588	0.023	0.051	-	-	-	0.37	< 0.002	< 0.01	-	-	-	-	2.17	5510
Slurry Pond 3&4	WAP-14	06/18/2019	FD	8.7	980	1230	0.38	798	4780	0.023	0.049	-	-	-	0.38	< 0.002	< 0.01	-	-	-	-	1.68	-
Slurry Pond 3&4	WAP-14A	06/18/2019	N	-	-	1010	0.11	791	4076	< 0.005	-	-	-	-	0.11	-	0.034	-	-	-	-	-	4540
Slurry Pond 3&4	WAP-14B	06/19/2019	N	-	-	792	-	698	3172	< 0.005	-	-	-	-	-	-	< 0.01	-	-	-	-	-	3770
Slurry Pond 3&4	WAP-14C	06/18/2019	N	-	-	205	0.1	52.7	943.8	< 0.005	-	-	-	-	0.1	-	< 0.01	-	-	-	-	-	986
Slurry Pond 3&4	WAP-15	06/11/2019	N	4.1	-	428	0.1	155	990	< 0.005	0.121	-	-	< 0.01	0.1	< 0.002	0.027	-	-	1.09	-	2.84	1650
Slurry Pond 3&4	WAP-16	06/19/2019	N	-	-	180	-	174	977.5	< 0.005	0.082	-	-	-	-	< 0.002	< 0.01 / < 0.01	-	-	1.08	-	1.37	1530
Ash Pond A&B	WAP-22	06/05/2019	N	-	270	330	-	415	1611	0.0146	-	-	-	-	-	-	0.051	-	-	-	-	-	2230
Ash Pond A&B	WAP-23	06/05/2019	N	-	140	70.9	-	105	642.5	< 0.005	-	-	-	-	-	-	0.034	< 0.01	-	-	-	-	987
Ash Pond A&B	WAP-24	06/19/2019	N	-	43	28.5	-	< 2	277.5	< 0.005	-	-	-	-	-	-	< 0.01	< 0.01	-	-	-	-	327
Ash Pond A&B	WAP-25	06/06/2019	N	-	59.2	11.1	-	2.09	260	< 0.005	-	-	-	-	-	-	< 0.01	0.00147	-	-	-	-	400
Ash Pond A&B	WAP-26	06/11/2019	N	-	22.5	7.8	-	73.2	165	< 0.005	-	-	-	-	-	-	< 0.01	-	-	-	-	-	240

ABBREVIATIONS AND NOTES:
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uS/cm: microSiemen per centimeter
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-: Not Analyzed
MCL/RSL: The applicable Maximum Contaminant Level (MCL) or Regional Screening Level (RSL) is shown. Dashed where a standard is not provided.
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- Highlighted where a result exceeds the applicable MCL/RSL.
- Criteria used for cobalt, lithium, and molybdenum are RSL for Tapwater where THQ=1.0 (May 2018).
- USEPA. 2015. Final Rule: Disposal of Coal Combustion Residuals from Electric Utilities. July 26. 40 CFR Part 257. https://www.epa.gov/coalash/coal-ash-rule

QUALIFIERS:
J: Estimated result

TABLE 2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
WINYAH GENERATING STATION
SANTEE COOPER
GEORGETOWN, SOUTH CAROLINA

			Chemical Group	Field Parameters					Speciation			Dissolved Metals					Dissolved Metals								
			Chemical Name	Dissolved Oxygen	ORP	pH	Temperature	Turbidity	Arsenic	Arsenic (III)+	Arsenic (V)	Arsenic, Dissolved	Barium, Dissolved	Calcium, Dissolved	Cobalt, Dissolved	Iron, Dissolved	Lithium, Dissolved	Magnesium, Dissolved	Manganese, Dissolved	Molybdenum, Dissolved	Potassium, Dissolved	Sodium, Dissolved	Aluminum, Total	Copper, Total	Iron, Total
			MCL/RSL	-	-	-	-	-	0.01	-	-	0.01	2	-	0.006	-	0.04	-	-	0.1	-	-	-	1.3	-
			Units	mg/L	mv	pH units	Deg C	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Impound-ment	Location	Sample Date	Sample Type																						
Background	WAP-1	05/30/2019	N	0.78	164	4.58	20.25	0.4	-	-	-	< 0.005	-	1.7	-	1.53	< 0.01	0.55	0.0083	< 10	< 0.5	4.1	1.3	< 0.005	1.71
Background	WBW-1	05/30/2019	N	0.57	173	4.02	28.28	0	-	-	-	< 0.005	-	< 0.5	-	0.215	< 0.01	0.24	0.008	< 10	< 0.5	2	< 0.5	< 0.005	0.303
Ash Pond A	WAP-9	05/30/2019	N	0.69	39	5.85	26.71	0.5	-	-	-	0.192 / 0.19	-	130	-	1.05	0.063	28 / 29	0.185 / 0.19	-	18.4 / 16	60	0.877 / 0.72	< 0.01 / < 0.01	1.21 / 1.1
Ash Pond A	WAP-17	05/30/2019	N	0.64	30	6.09	27.38	0	-	-	-	0.114 / 0.1	-	330	-	8.8	0.24	48 / 49	0.098 / 0.084	-	12.7 / 11	85	-	-	0.906 / 0.89
Ash Pond A	WAP-17	05/30/2019	FD	-	-	-	-	-	-	-	-	0.114 / 0.11	-	330	-	0.78	0.24	46.8 / 48	0.061 / 0.061	-	12.5 / 12	85	-	-	0.853 / 0.85
Ash Pond A	WAP-18	06/05/2019	N	0.86	-69	6.57	21.33	57.6	-	-	-	0.383	0.0845	310	-	0.991	0.31	24	0.7	-	11.5	37.6	-	-	1.51
Ash Pond B	WAP-10	05/30/2019	N	0.87	-45	6.46	23.32	0.1	-	-	-	0.0054	-	486	-	18	0.021	62.7	0.545	< 10	20	135	< 0.5	< 0.005	19.3
Ash Pond B	WAP-10	05/30/2019	FD	-	-	-	-	-	-	-	-	0.0062	-	493	-	16.1	0.022	64	0.583	< 10	21	137	< 0.5	< 0.005	19.1
Ash Pond B	WAP-19	06/05/2019	N	0.47	-16	6.37	22.46	1.3	-	-	-	0.0787	0.0354	237	-	2.07	0.23	34.6	0.44	-	12.9	72.9	-	-	0.00356
Ash Pond B	WAP-20	06/05/2019	N	0.87	-42	6.07	24.63	151	-	-	-	0.0224	0.0435	65.8	< 0.001	16.4	0.1	13.2	0.119	0.0208	7.2	18.9	-	-	11.8
Ash Pond B	WAP-21	06/11/2019	N	0.5	-1	6.1	20.05	8.7	-	-	-	< 0.005	-	178	-	4.32	< 0.01	30	0.244	< 10	13.8	60.6	-	-	6.38
Slurry Pond 3&4	WAP-4	06/18/2019	N	0.46	7	6.56	20.39	25.9	< 0.000375	< 0.000375	< 0.000375	< 0.005	-	-	-	-	< 0.01	-	-	-	-	-	0.307	< 0.01	3.57
Slurry Pond 3&4	WAP-14	06/18/2019	N	0.66	-401	7.3	22.58	0	0.000829	0.00341 J	< 0.000375	0.023	-	-	-	-	< 0.01	-	-	-	-	-	-	-	-
Slurry Pond 3&4	WAP-14	06/18/2019	FD	-	-	-	-	-	0.00562	0.0129 J	< 0.000375	0.024	-	-	-	-	< 0.01	-	-	-	-	-	-	-	-
Slurry Pond 3&4	WAP-14A	06/18/2019	N	0.34	-359	6.87	21.84	0	0.000408	< 0.000375	0.000195 J	< 0.005	-	-	-	-	0.034	-	-	-	-	-	-	-	-
Slurry Pond 3&4	WAP-14B	06/19/2019	N	0.44	-370	6.53	19.33	110	0.000427	< 0.000375	< 0.000375	< 0.005	-	-	-	-	< 0.01	-	-	-	-	-	-	-	-
Slurry Pond 3&4	WAP-14C	06/18/2019	N	0.3	-154	6.78	22.48	0	< 0.000375	0.00082 J	< 0.000375	< 0.005	-	-	-	-	< 0.01	-	-	-	-	-	-	-	-
Slurry Pond 3&4	WAP-15	06/11/2019	N	0.38	53	5.82	25.03	104	0.0036	0.00312	0.000483	< 0.005	-	-	-	-	0.027	-	-	-	-	-	-	-	-
Slurry Pond 3&4	WAP-16	06/19/2019	N	0.33	-121	6.68	25.42	0	0.000561	< 0.000375	0.000561	< 0.005	-	-	-	-	< 0.01	-	-	-	-	-	-	-	-
Ash Pond A&B	WAP-22	06/05/2019	N	3.25	-64	6.73	25.4	67.1	-	-	-	< 0.005	-	267	-	2.57	0.091	21.2	0.33	-	8.45	144	-	-	5.54
Ash Pond A&B	WAP-23	06/05/2019	N	0.52	-72	6.52	22.53	111	-	-	-	0.00562	-	144	-	1.32	0.032	6.74	0.201	-	2.01	45.4	-	-	2.74
Ash Pond A&B	WAP-24	06/19/2019	N	0.48	-203	7.55	23.8	65.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.228
Ash Pond A&B	WAP-25	06/06/2019	N	0.35	-125	6.86	20.62	14.5	-	-	-	< 0.005	-	55.6	-	0.265	< 0.01	3.43	0.125	0.00369	2.56	12.2	-	-	1.59
Ash Pond A&B	WAP-26	06/11/2019	N	0.45	-19	5.49	22.26	0	-	-	-	< 0.005	-	20.4	-	2.38	< 0.01	1.84	0.048	-	1.29	15	-	-	2.4

ABBREVIATIONS AND NOTES:
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QUALIFIERS:
J: Estimated result

TABLE 2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
WINYAH GENERATING STATION
SANTEE COOPER
GEORGETOWN, SOUTH CAROLINA

			Chemical Group	Total Metals					Other				
			Chemical Name	Magnesium, Total	Manganese, Total	Potassium, Total	Sodium, Total	Zinc, Total	Alkalinity, Bicarbonate	Alkalinity, Total (as CaCO3)	Dissolved Organic Carbon (DOC)	Sulfide	Total Organic Carbon (TOC)
			MCL/RSL	-	-	-	-	-	-	-	-	-	-
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Impound-ment	Location	Sample Date	Sample Type										
Background	WAP-1	05/30/2019	N	0.62	0.0084	< 0.5	4.7	< 0.01	< 4	< 4	2.64	< 0.1	2.82
Background	WBW-1	05/30/2019	N	0.24	0.0084	< 0.5	2.1	0.0161	< 4	< 4	1.13	< 0.1	1.02
Ash Pond A	WAP-8	05/30/2019	N	28.1 / 29	0.10 / 0.10	18.9 / 18	59	0.028 / 0.017	327	327	56.9	< 0.1	48.5
Ash Pond A	WAP-17	05/30/2019	N	45.7 / 48	0.085 / 0.084	12.8 / 12	85	-	35.8	35.8	9.63	< 0.1	9.53
Ash Pond A	WAP-17	05/30/2019	FD	47.4 / 49	0.082 / 0.082	12.4 / 12	88	-	35.4	35.4	10.1	< 0.1	10.1
Ash Pond A	WAP-18	06/05/2019	N	29.4	0.869	13.9	42.6	-	199	199	16.5	< 0.1	17.5
Ash Pond B	WAP-10	05/30/2019	N	72.8	0.568	22.9	151	< 0.01	261	261	1.73	< 0.1	1.79
Ash Pond B	WAP-10	05/30/2019	FD	71.9	0.569	22.4	151	< 0.01	263	263	1.46	< 0.1	1.83
Ash Pond B	WAP-19	06/06/2019	N	43.1	0.547	15.7	77.1	-	209	209	5.27	< 0.1	5.61
Ash Pond B	WAP-20	06/05/2019	N	12.2	0.118	8.34	12.4	-	110	110	5.13	< 0.1	5.44
Ash Pond B	WAP-21	06/11/2019	N	28.9	0.239	13.6	69	-	135	135	8.3	< 0.1	8.37
Slurry Pond 3&4	WAP-4	06/18/2019	N	4.55	-	-	-	< 0.05	161	161	1.32	< 0.1	1.31
Slurry Pond 3&4	WAP-14	06/18/2019	N	-	-	-	-	-	317	317	3.47	151	5.88
Slurry Pond 3&4	WAP-14	06/18/2019	FD	-	-	-	-	-	318	318	3.77	197	6.4
Slurry Pond 3&4	WAP-14A	06/18/2019	N	-	-	-	-	-	175	175	2.62	< 100	4.2
Slurry Pond 3&4	WAP-14B	06/19/2019	N	-	-	-	-	-	138	138	2.81	< 0.1	2.81
Slurry Pond 3&4	WAP-14C	06/18/2019	N	-	-	-	-	-	135	135	1.24	< 0.1	1.4
Slurry Pond 3&4	WAP-15	06/11/2019	N	-	-	-	-	-	81.5	81.5	1.72	< 0.1	1.92
Slurry Pond 3&4	WAP-16	06/19/2019	N	-	-	-	-	-	361	361	17.3	< 0.1	19.2
Ash Pond A&B	WAP-22	06/05/2019	N	22.6	0.35	8.98	145	-	358	358	4.77	< 0.1	5.04
Ash Pond A&B	WAP-23	06/05/2019	N	7.09	0.211	2.08	44.2	-	312	312	2.24	< 0.1	2.41
Ash Pond A&B	WAP-24	06/19/2019	N	3.89	0.01	2.61	17	-	135	135	1.12	< 0.1	1.02
Ash Pond A&B	WAP-25	06/06/2019	N	2.83	0.108	2.19	11.7	-	198	198	2.84	< 0.1	2.92
Ash Pond A&B	WAP-26	06/11/2019	N	1.61	0.047	1.24	18.2	-	14.7	14.7	2.61	< 0.1	2.41

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QUALIFIERS:
J: Estimated result

TABLE 3
SUMMARY OF SURFACE WATER DATA
WINYAH GENERATING STATION
SANTEE COOPER
GEORGETOWN, SOUTH CAROLINA

		Chemical Group	Detection Monitoring - EPA Appendix III Constituents					
		Chemical Name	Calcium, Total	Chloride	Fluoride	pH (lab)	Sulfate	Total Dissolved Solids (TDS)
		MCL/RSL	-	-	4	-	-	-
		Units	mg/L	mg/L	mg/L	SU	mg/L	mg/L
Location	Sample Date	Sample Name						
W-SW-APB	06/19/2013	W-SW-APB-20130619	440.4	528	-	8.37	758	2709
W-SW-SAP	06/20/2013	W-SW-SAP-20130620	645.3	830	-	7.16	1250	4142
W-SW-WSP	06/19/2013	W-SW-WSP-20130619	869.2	1050	-	7.7	1510	5322
SW-1	03/29/2018	SW-1-20180329	-	-	4.8	-	-	-
SW-2	03/29/2018	SW-2-20180329	-	-	4.1	-	-	-
SW-3	03/29/2018	SW-3-20180329	-	-	0.79	-	-	-

		Chemical Group	Assessment Monitoring - EPA Appendix IV Constituents														
		Chemical Name	Antimony, Total	Arsenic, Total	Barium, Total	Beryllium, Total	Cadmium, Total	Chromium, Total	Cobalt, Total	Fluoride	Lead, Total	Lithium, Total	Mercury, Total	Molybdenum, Total	Selenium, Total	Thallium, Total	Radium-226
		MCL/RSL	0.006	0.01	2	0.004	0.005	0.1	0.006	4	0.015	0.04	0.002	0.1	0.05	0.002	-
		Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L
Location	Sample Date	Sample Name															
W-SW-APB	06/19/2013	W-SW-APB-20130619	0.012	0.2918	0.321	< 0.0005	< 0.005	0.0508	-	-	< 0.01	-	< 0.0002	0.23	0.063	0.0016	-
W-SW-SAP	06/20/2013	W-SW-SAP-20130620	< 0.005	< 0.01	0.0679	< 0.0005	< 0.005	< 0.005	-	-	< 0.01	-	< 0.0002	0.048	0.0686	< 0.001	-
W-SW-WSP	06/19/2013	W-SW-WSP-20130619	< 0.005	< 0.01	0.0787	< 0.0005	< 0.005	< 0.005	-	-	< 0.01	-	0.0009	0.071	0.2588	0.0013	-
SW-1	03/29/2018	SW-1-20180329	0.0024	0.0041	0.076	0.00018 J	0.0037	0.0029 B	0.01	4.8	0.00022 J	0.44 J	0.00043	< 0.4	0.12	0.0014	0.242 ± 0.0892
SW-2	03/29/2018	SW-2-20180329	0.0024	0.0031	0.077	0.00022 J	0.005	0.0035 B	0.011	4.1	0.00027 J	0.44 J	0.0007	< 0.4	0.13	0.0012	0.414 ± 0.114
SW-3	03/29/2018	SW-3-20180329	0.0049	0.058	0.11	< 0.001	< 0.001	0.0017 JB	0.00052	0.79	< 0.001	0.21 J	< 0.0002	< 0.4	0.0021 J	< 0.001	0.438 ± 0.119

ABBREVIATIONS AND NOTES:
mg/L: milligram per liter
uS/cm: microSiemen per centimeter
mv: millivolt
NTU: Nephelometric Turbidity Units
pCi/L: picocurie per liter
< 0.005: Analyte not detected above detection limit
-: Not Analyzed
MCL/RSL: The applicable Maximum Contaminant Level (MCL) or Regional Screening Level (RSL) is shown. Dashed where a standard is not provided.

- Highlighted where a result exceeds the applicable MCL/RSL.
- Criteria used for cobalt, lithium, and molybdenum are RSL for Tapwater where THQ=1.0 (May 2018).
- USEPA. 2015. Final Rule: Disposal of Coal Combustion Residuals from Electric Utilities. July 26. 40 CFR Part 257. https://www.epa.gov/coalash/coal-ash-rule

QUALIFIERS:
B: Compound detected in the sample and the associated blank.
J: Estimated result.
U: Not detected, value is the reporting limit.

TABLE 3
SUMMARY OF SURFACE WATER DATA
WINYAH GENERATING STATION
SANTEE COOPER
GEORGETOWN, SOUTH CAROLINA

		Chemical Group	Radiological		Field Parameters					Dissolved Metals	Total Metals										Total Metals	
		Chemical Name	Radium-226	Radium-226 & 228	Conductivity	Dissolved Oxygen	ORP	Temperature	Turbidity	Arsenic, Dissolved	Aluminum, Total	Copper, Total	Iron, Total	Magnesium, Total	Manganese, Total	Nickel, Total	Potassium, Total	Silver, Total	Sodium, Total	Strontium, Stable, Total	Vanadium, Total
		MCL/RSL	-	5	-	-	-	-	-	0.01	-	1.3	-	-	-	-	-	-	-	-	-
		Units	pCi/L	pCi/L	uS/cm	mg/L	mv	Deg C	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Location	Sample Date	Sample Name																			
W-SW-APB	06/19/2013	W-SW-APB-20130619	-	-	3110	7.24	133	28.16	120	0.2581	3.4882	< 0.01	1.2061	79.02	33.5	0.011	31.7926	< 0.01	99.79	2.6	0.14
W-SW-SAP	06/20/2013	W-SW-SAP-20130620	-	-	4420	7.36	224	28.06	26.1	< 0.01	< 0.05	< 0.01	0.1508	132.4	203.2	0.015	32.2711	< 0.01	133.7	3.2	< 0.01
W-SW-WSP	06/19/2013	W-SW-WSP-20130619	-	-	5110	7.51	98	28.28	55.5	< 0.01	0.0737	< 0.01	0.0715	169.6	2231	0.034	38.0693	< 0.01	138.2	3.3	< 0.01
SW-1	03/29/2018	SW-1-20180329	0.100 U ± 0.219	0.343 U ± 0.236	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW-2	03/29/2018	SW-2-20180329	0.274 U ± 0.262	0.688 ± 0.286	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW-3	03/29/2018	SW-3-20180329	0.828 ± 0.297	1.28 ± 0.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ABBREVIATIONS AND NOTES:
mg/L: milligram per liter
uS/cm: microSiemen per centimeter
mv: millivolt
NTU: Nephelometric Turbidity Units
pCi/L: picocurie per liter
< 0.005: Analyte not detected above detection limit
-: Not Analyzed
MCL/RSL: The applicable Maximum Contaminant Level (MCL) or Regional Screening Level (RSL) is shown. Dashed where a standard is not provided.

- Highlighted where a result exceeds the applicable MCL/RSL.
- Criteria used for cobalt, lithium, and molybdenum are RSL for Tapwater where THQ=1.0 (May 2018).
- USEPA. 2015. Final Rule: Disposal of Coal Combustion Residuals from Electric Utilities. July 26. 40 CFR Part 257. https://www.epa.gov/coalash/coal-ash-rule

QUALIFIERS:
B: Compound detected in the sample and the associated blank
J: Estimated result.
U: Not detected, value is the reporting limit.

TABLE 3
SUMMARY OF SURFACE WATER DATA
WINYAH GENERATING STATION
SANTEE COOPER
GEORGETOWN, SOUTH CAROLINA

		Chemical Group		Other			
		Chemical Name	Zinc, Total	Alkalinity, Bicarbonate	Nitrate	Sulfide	Total Organic Carbon (TOC)
		MCL/RSL	-	-	-	-	-
		Units	mg/L	mg/L	mg/L	mg/L	mg/L
Location	Sample Date	Sample Name					
W-SW-APB	06/19/2013	W-SW-APB-20130619	22.1	67.6	< 0.0001	< 0.1	3.33
W-SW-SAP	06/20/2013	W-SW-SAP-20130620	< 10	34	< 0.0001	< 0.5	5.71
W-SW-WSP	06/19/2013	W-SW-WSP-20130619	< 10	21	< 0.0001	< 0.5	6.43
SW-1	03/29/2018	SW-1-20180329	-	-	-	-	-
SW-2	03/29/2018	SW-2-20180329	-	-	-	-	-
SW-3	03/29/2018	SW-3-20180329	-	-	-	-	-

ABBREVIATIONS AND NOTES:
mg/L: milligram per liter
uS/cm: microSiemen per centimeter
mv: millivolt
NTU: Nephelometric Turbidity Units
pCi/L: picocurie per liter
< 0.005: Analyte not detected above detection limit
-: Not Analyzed
MCL/RSL: The applicable Maximum Contaminant Level (MCL) or Regional Screening Level (RSL) is shown. Dashed where a standard is not provided.

- Highlighted where a result exceeds the applicable MCL/RSL.
- Criteria used for cobalt, lithium, and molybdenum are RSL for Tapwater where THQ=1.0 (May 2018).
- USEPA. 2015. Final Rule: Disposal of Coal Combustion Residuals from Electric Utilities. July 26. 40 CFR Part 257. https://www.epa.gov/coalash/coal-ash-rule

QUALIFIERS:
B: Compound detected in the sample and the associated blank
J: Estimated result.
U: Not detected, value is the reporting limit.

TABLE 4
SUMMARY OF SOIL ANALYTICAL RESULTS
WINYAH GENERATING STATION
SANTEE COOPER
GEORGETOWN, SOUTH CAROLINA

			Chemical Group	Inorganic Compounds									Other	SPLP Inorganics								
			Chemical Name	Arsenic	Calcium	Iron	Lithium	Magnesium	Manganese	Molybdenum	Potassium	Sodium	Total Organic Carbon (TOC)	Arsenic	Calcium	Iron	Lithium	Magnesium	Manganese	Molybdenum	Potassium	Sodium
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Location	Sample Date	Sample Type	Sample Name																			
WAP-14A	05/21/2019	N	WAP-14A-SO-052119	< 3.54	-	-	22	-	-	-	-	-	94700	< 0.3	-	-	< 0.05	-	-	-	-	-
WAP-14B	05/21/2019	N	WAP-14B-SO-052119	< 3.6	-	-	< 5.6	-	-	-	-	-	870	< 0.3	-	-	< 0.05	-	-	-	-	-
WAP-14C	05/20/2019	N	WAP-14C-SO-052019	11.6	-	-	20	-	-	-	-	-	48000	< 0.3	-	-	< 0.05	-	-	-	-	-
WAP-22	05/22/2019	N	WAP-22-SO-052219	3.58	172000	6260	25	2930	82	-	548	869	73200	< 0.3	24	< 1	< 0.05	< 3	< 0.1	-	< 1.5	5.74
WAP-23	05/23/2019	N	WAP-23-SO-052319	< 3.64	107000	4040	6	800	30.3	1.36	282	1100	35500	< 0.3	45.1	< 1	< 0.05	< 3	< 0.1	< 0.1	< 1.5	29.5
WAP-24	05/23/2019	N	WAP-24-SO-052319	< 3.61	97200	9350	46	3300	48.7	1.22	2390	261	68200	< 0.3	39.6	< 1	< 0.05	< 3	< 0.1	< 0.1	< 1.5	< 3
WAP-25	05/21/2019	N	WAP-25-SO-052119	< 3.91	17800	1010	< 5.3	72.8	8.15	< 1.3	57.3	200	2790	< 0.3	23.2	9.25	< 0.05	< 3	< 0.1	< 0.1	< 1.5	3.61
WAP-26	05/21/2019	N	WAP-26-SO-052119	5.9	203	2240	< 5.4	101	8.94	-	64.9	< 33.8	9980	< 0.3	5.19	< 1	< 0.05	< 3	< 0.1	-	< 1.5	26.4

ABBREVIATIONS AND NOTES:
mg/kg: milligrams per kilogram
mg/L: milligrams per liter
< 0.005: Analyte not detected above detection limit
-: Not Analyzed
- Results in bold are detected.

Figures

LEGEND

- CCR MONITORING WELL FOR SLURRY POND 3&4
- ALTERNATE SOURCE DEMONSTRATION MONITORING WELL
- OTHER MONITORING WELL
- SURFACE WATER LOCATION
- PROPERTY BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: ESRI

0 600 1,200
SCALE IN FEET

HALEY ALDRICH

SANTEE COOPER
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

SAMPLE LOCATION MAP

SEPTEMBER 2019

FIGURE 1

LEGEND

- CCR MONITORING WELL FOR SLURRY POND 3&4
- ALTERNATE SOURCE DEMONSTRATION MONITORING WELL
- OTHER MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR 1-FT INTERVAL
- INFIRRED GROUNDWATER ELEVATION CONTOUR 1-FT INTERVAL
- PROPERTY BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. WATER LEVELS MEASURED IN JUNE 2019
3. AERIAL IMAGERY SOURCE: ESRI

0 600 1,200
SCALE IN FEET

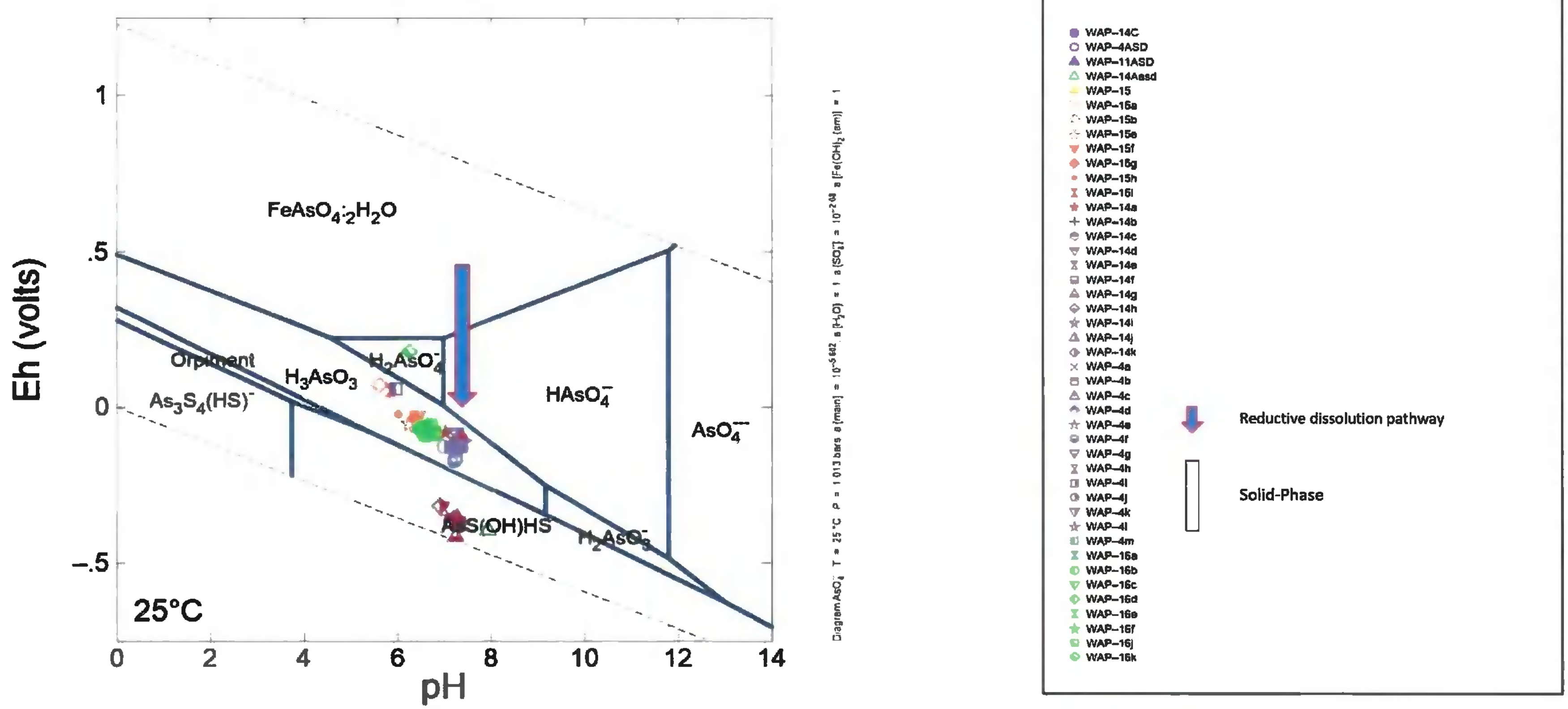
HALEY ALDRICH

SANTEE COOPER
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

POTENTIOMETRIC SURFACE MAP

OCTOBER 2019

FIGURE 2



Notes:
1) Field ORP measurements used as Standard Hydrogen Electrode (SHE).
2) Field pH measurements plotted for accuracy.
3) Assumptions: Solute activities = measured concentrations in mols/L
4) Modelled system Fe-As-S-O-H using Site-specific laboratory obtained data
5) Thermodynamic Database: Minteq.dat for GWB (Compiled by J.P. Gustafsson, 2005)
6) System in equilibrium with the amorphous $Fe(OH)_2$

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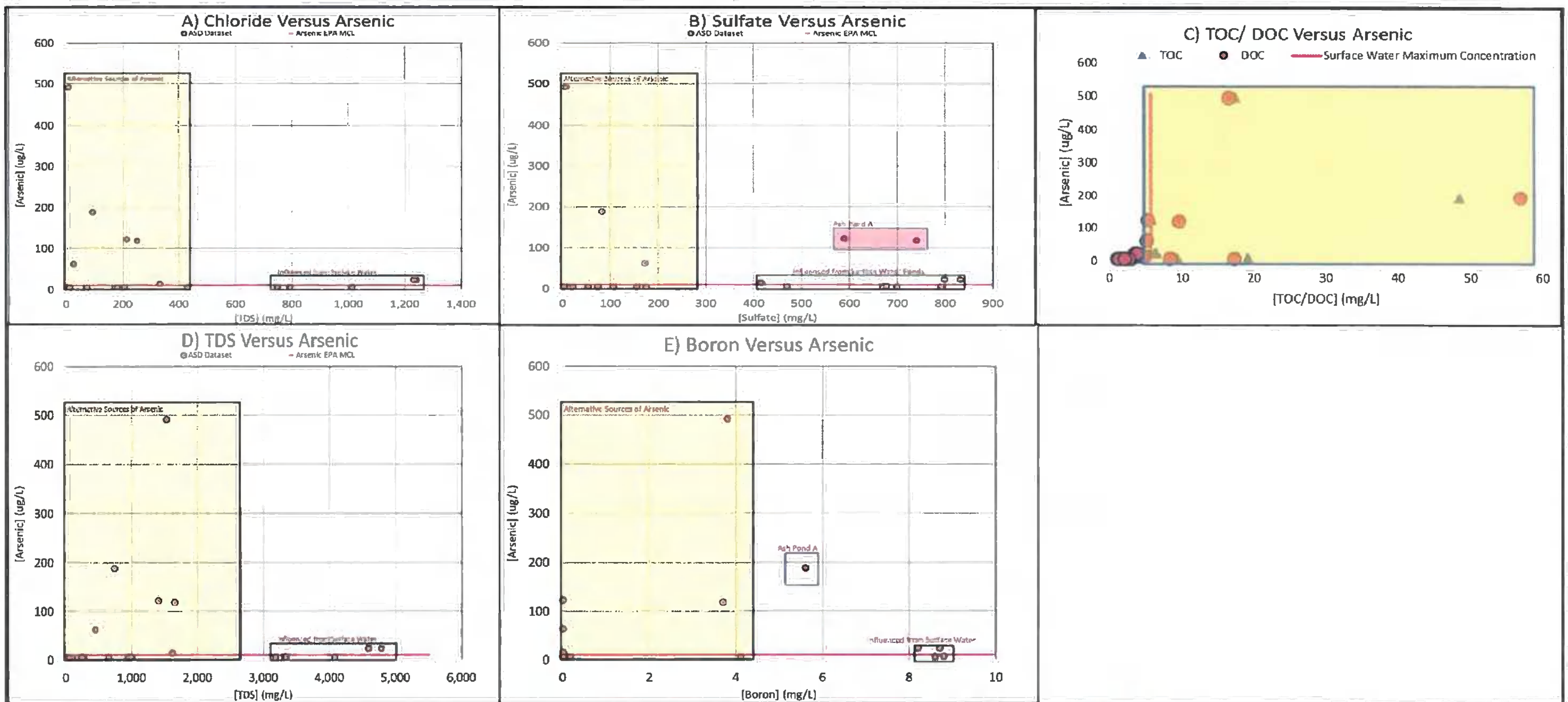
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

EH-PH STABILITY DIAGRAM - ARSENIC

SEPTEMBER 2019

FIGURE 3



Notes:

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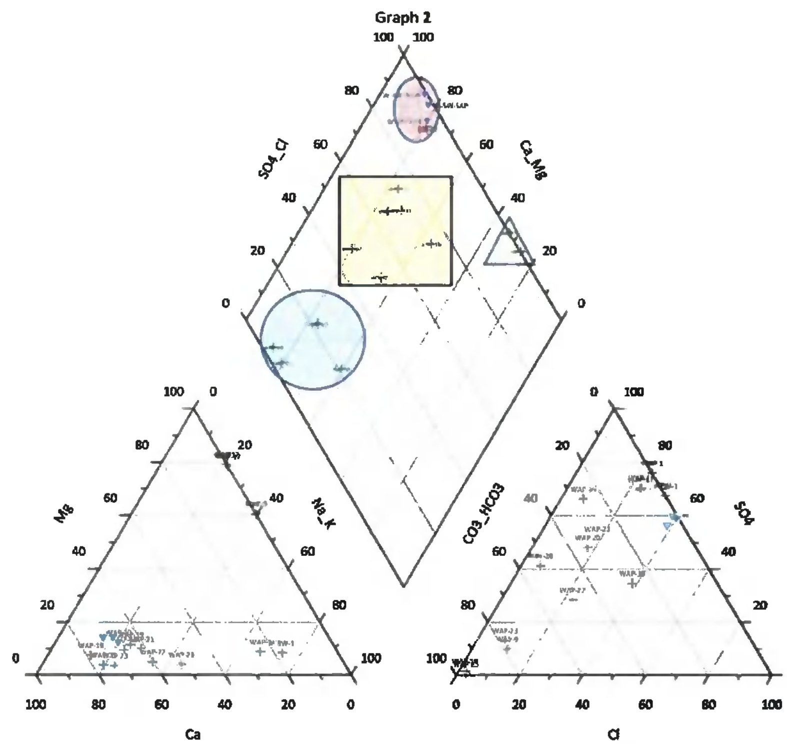
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

GEOCHEMICAL DIFFERENTIATORS OF ARSENIC

SEPTEMBER 2019

FIGURE 4



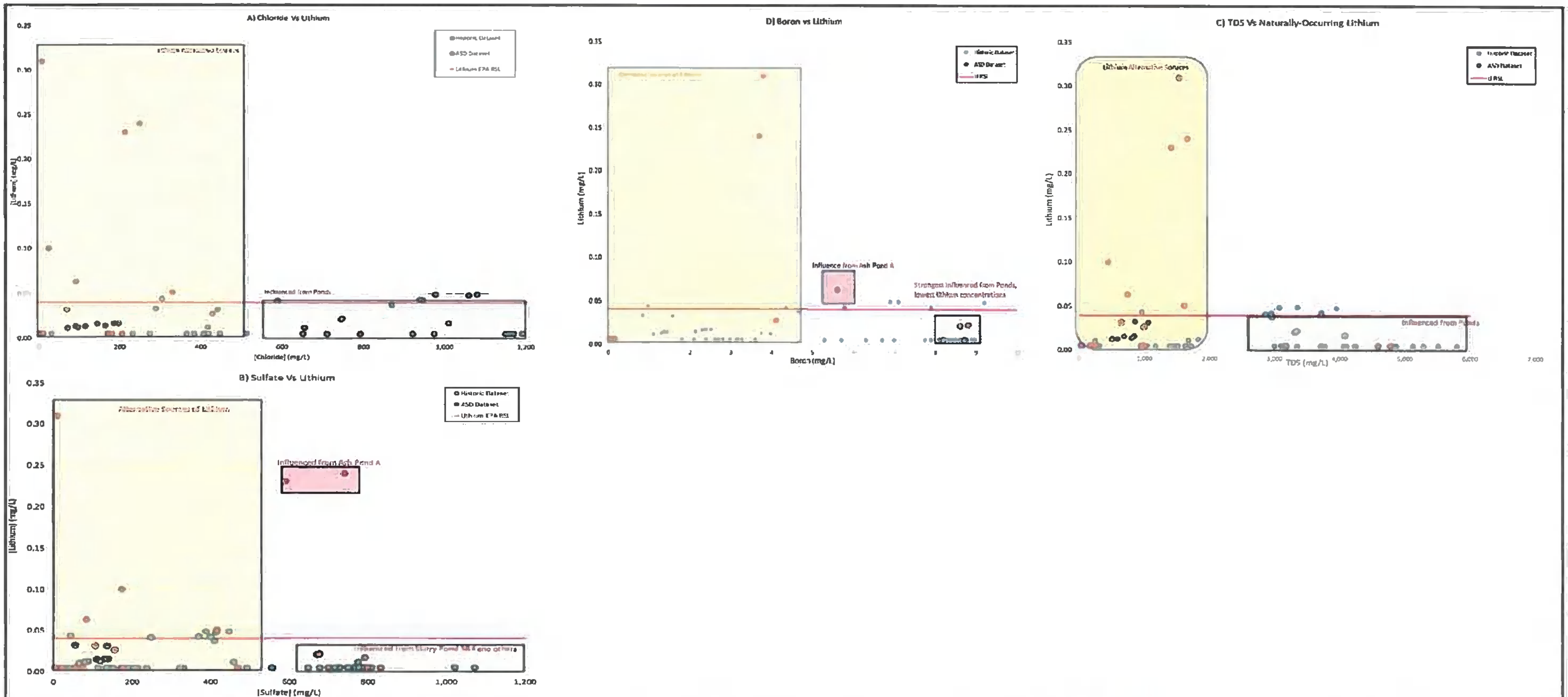
Notes:

SANTEE COOPER
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

PIPER DIAGRAM FOR WGS SURFACE WATER AND GROUNDWATER

SEPTEMBER 2019

FIGURE 5



Notes:

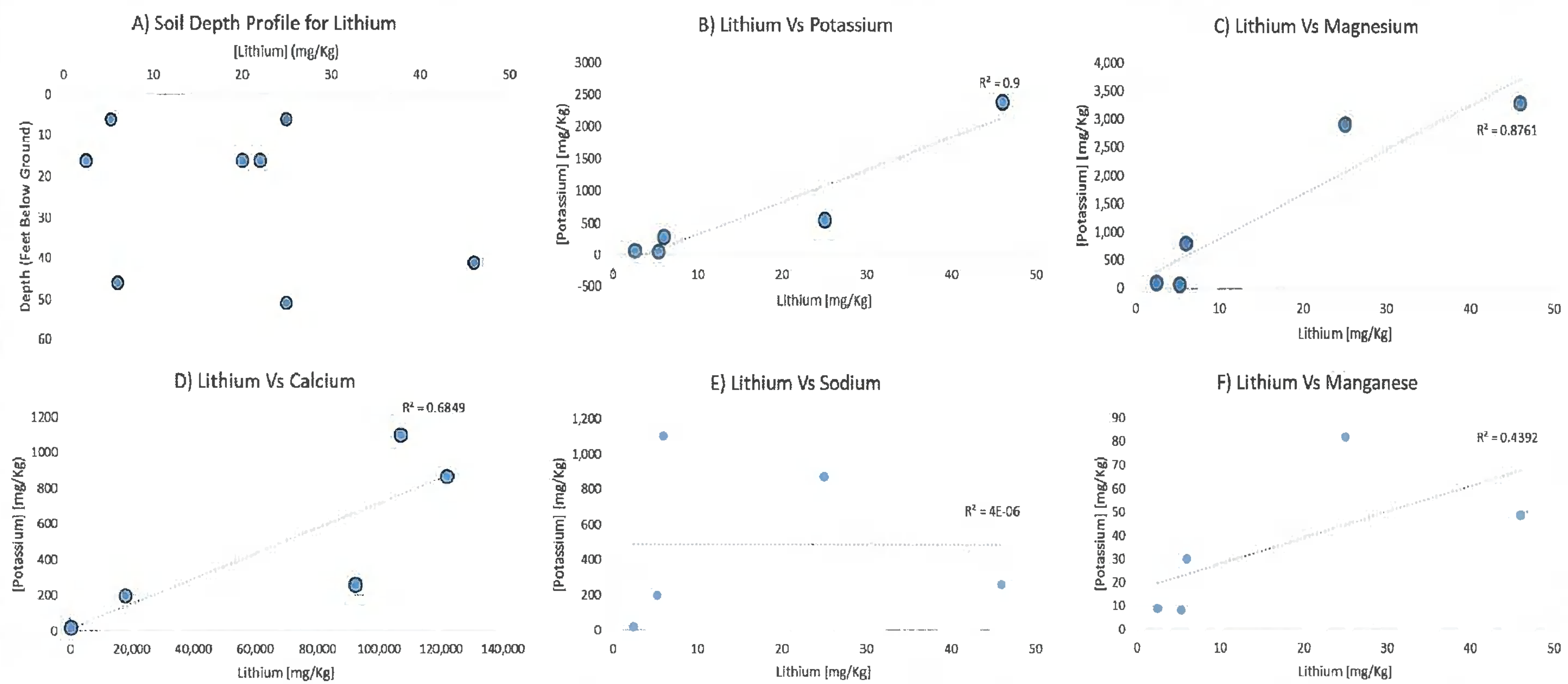
HALEY ALDRICH

SANTEE COOPER
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

GEOCHEMICAL DIFFERENTIATORS - LITHIUM

SEPTEMBER 2019

FIGURE 6



Notes:

HALEY ALDRICH

SANTEE COOPER
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

BIVARIATE ANALYSIS FOR LITHIUM IN SOIL

SEPTEMBER 2019

FIGURE 7

APPENDIX A

Boring Well Construction Logs

HALEY ALDRICH

TEST BORING REPORT

Boring No. WAP-14A

Project	Nature and Extent, Winyah Generating Station	File No.	132892-018
Client	Santee Cooper	Sheet No.	1 of 1
Contractor	Saedacco	Start	May 21, 2019
		Finish	May 21, 2019
		Driller	Richy Lemire
		H&A Rep.	J. Yonts

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	S	–	Rig Make & Model: Diedrich D-50 Turbo
Inside Diameter (in.)	4.25	1 3/8	–	Bit Type: Cutting Head; Drill Mud: None
Hammer Weight (lb)	-	140	-	Casing: Spun
Hammer Fall (in.)	-	30	-	Hoist/Hammer: Winch Automatic Hammer; PID Make & Model: -

Elevation
Datum
Location Approximately 200-ft N of WAP-14

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0				CL			Brown and tan sandy CLAY (CL), mps 2.0 mm, no odor, moist, medium to fine-grained sand				10	15	75				
				SC-CL		2.0	Gray and red-brown sandy CLAY (CL) to clayey SAND (SC), mps 2.0 mm, no odor, wet at 4.0-ft				20	30	50				
				CL		4.5	Black sandy CLAY (CL), mps 1.0 mm, strong sulfur-like odor, wet					30	70				
5				SC		5.0	Black clayey SAND (SC), mps 2.0 mm, strong sulfur-like odor, wet					60	40				
10	1 1 1 2	S1 6	10.0 12.0	SC		10.0	Very loose gray clayey SAND (SC), mps 1.0 mm, strong sulfur-like odor, wet				30	40	30				
15	4 5 5 5	S2 22	15.0 17.0	SC		15.0	Loose gray to black clayey SAND (SC), mps 8.0 mm, strong sulfur-like odor, wet, abundant shell fragments starting at 16.4-ft	5	5	15	20	30	25				
							Note: Rig chatter at ~19.0 ft bgs.										
20	4 5 17 5	S3 0	20.0 22.0				No recovery										
						22.0	BOTTOM OF EXPLORATION 22.0 FT										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID
- O - Open End Rod
- T - Thin Wall Tube
- U - Undisturbed Sample
- S - Split Spoon Sample

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

Summary
- Overburden (ft) 22
- Rock Cored (ft) -
- Samples 3S

Boring No. WAP-14A

Field Tests: Dilatancy: R - Rapid S - Slow N - None; Toughness: L - Low M - Medium H - High; Plasticity: N - Nonplastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High V - Very High

†Note: Maximum particle size is determined by direct observation within the limitations of sampler size.

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY ALDRICH

TEST BORING REPORT

Boring No. WAP-14B

Project	Nature and Extent, Winyah Generating Station	File No.	132892-018
Client	Santee Cooper	Sheet No.	1 of 1
Contractor	Saedacco	Start	May 21, 2019
		Finish	May 21, 2019
		Driller	Richy Lemire
		H&A Rep.	J. Yonts
		Elevation	
		Datum	
		Location	Approximately 250-ft WNW of WAP-14

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	S	–	Rig Make & Model: Diedrich D-50 Turbo
Inside Diameter (in.)	4.25	1 3/8	–	Bit Type: Cutting Head; Drill Mud: None
Hammer Weight (lb)	-	140	-	Casing: Spun
Hammer Fall (in.)	-	30	-	Hoist/Hammer: Winch Automatic Hammer; PID Make & Model: -

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0				SM			Tan silty SAND (SM), mps 0.3 mm, no odor, wet at 4-ft					70	30				
5	8 9 7 7	S2 8	5.0 7.0	SP		5.0	Medium dense gray and tan poorly-graded SAND (SP), mps 1.0 mm, no odor, wet				10	80	10				
10	4 3 2 1	S1 4	10.0 12.0	SM		10.0	Loose gray silty SAND (SM), mps 1.5 mm, faint sulfur-like odor, wet, trace shell fragments at 11.8-ft Note: Rig chatter at ~12.0 ft bgs.										
		S3 50/1"	13.0 15.0			13.1	Similar to above except consolidated BOTTOM OF EXPLORATION 13.1 FT										

Water Level Data						Sample ID	Well Diagram	Summary
Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water	O - Open End Rod	Riser Pipe	Overburden (ft) 13.1
						T - Thin Wall Tube	Screen	Rock Cored (ft) -
						U - Undisturbed Sample	Filter Sand	Samples 3S
						S - Split Spoon Sample	Cuttings	**Boring No. WAP-14B**
							Grout	
							Concrete	
							Bentonite Seal	

Field Tests: Dilatancy: R - Rapid S - Slow N - None; Toughness: L - Low M - Medium H - High; Plasticity: N - Nonplastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High V - Very High

†Note: Maximum particle size is determined by direct observation within the limitations of sampler size.

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY ALDRICH

TEST BORING REPORT

Boring No. WAP-14C

Project	Nature and Extent, Winyah Generating Station
Client	Santee Cooper
Contractor	Saedacco

File No.	132892-018
Sheet No.	1 of 1
Start	May 20, 2019
Finish	May 20, 2019
Driller	Richy Lemire
H&A Rep.	J. Yonts
Elevation	
Datum	
Location	Approximately 250-ft SE of WAP-14

	Casing	Sampler	Barrel
Type	HSA	S	--
Inside Diameter (in.)	4.25	1 3/8	--
Hammer Weight (lb)	-	140	-
Hammer Fall (in.)	-	30	-

Drilling Equipment and Procedures

- Rig Make & Model: Diedrich D-50 Turbo
- Bit Type: Cutting Head
- Drill Mud: None
- Casing: Spun
- Hoist/Hammer: Winch Automatic Hammer
- PID Make & Model: -

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0				SC		Red-brown, brown and tan clayey SAND (SC), mps 0.4 mm, no odor, moist					70	30				
10	3 2 3 1	S1 8	10.0 12.0	SC	10.0	Loose gray and red-brown silty SAND (SC), mps 6.0 mm, stratified, no odor, wet, angular gravel and coarse sand	5	5	15	20	30	25				
15	4 5 5 5	S2 20	15.0 17.0	SC	15.0	Loose gray and dark gray clayey SAND (SC), mps 2.0 mm, no odor, wet, abundant white and tan shell fragments	10	10	20	20	15	25				
						Note: Rig chatter at ~19.5 ft bgs.										
					19.5	BOTTOM OF EXPLORATION 19.5 FT										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID

- O - Open End Rod
- T - Thin Wall Tube
- U - Undisturbed Sample
- S - Split Spoon Sample

Well Diagram: Riser Pipe, Screen, Filter Sand, Cuttings, Grout, Concrete, Bentonite Seal

Summary

Overburden (ft)	19.5
Rock Cored (ft)	-
Samples	3S

Boring No. WAP-14C

Field Tests: Dilatancy: R - Rapid S - Slow N - None Toughness: L - Low M - Medium H - High Plasticity: N - Nonplastic L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High V - Very High

†Note: Maximum particle size is determined by direct observation within the limitations of sampler size.

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY ALDRICH

TEST BORING REPORT

Boring No. WAP-22

Project	Nature and Extent, Winyah Generating Station
Client	Santee Cooper
Contractor	Saedacco

File No.	132892-018
Sheet No.	1 of 2
Start	May 22, 2019
Finish	May 22, 2019
Driller	Richy Lemire
H&A Rep.	J. Yonts
Elevation	
Datum	
Location	7-ft East of WAP-18

	Casing	Sampler	Barrel
Type	HSA	S	--
Inside Diameter (in.)	4.25	1 3/8	--
Hammer Weight (lb)	-	140	-
Hammer Fall (in.)	-	30	-

Drilling Equipment and Procedures

Rig Make & Model: Diedrich D-50 Turbo
Bit Type: Cutting Head
Drill Mud: None
Casing: Spun
Hoist/Hammer: Winch Automatic Hammer
PID Make & Model: -

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0				SM			Brown silty SAND (SM), no odor, mps 1.0mm, dry, 1/4-in thick and 8-in long metal wire and plastic trash in cuttings					70	30				
5				SM			Dark brown silty SAND (SM), no odor, mps 1.0mm, moist, abundant wood and roots					60	40				
10				SM			Similar to above					60	40				
15				SM		16.0	Tan silty SAND (SM), no odor, mps 1.0mm, moist, no wood in cuttings					65	35				
20	10 17 24 28	S1 18	20.0 22.0	SM			Dense dark brown silty SAND (SM), no odor, no structure, moist				5	60	35				
25																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (ft)	54
Rock Cored (ft)	-
Samples	8S

Boring No. WAP-22

Field Tests: Dilatancy: R - Rapid S - Slow N - None; Toughness: L - Low M - Medium H - High; Plasticity: N - Nonplastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High V - Very High

†Note: Maximum particle size is determined by direct observation within the limitations of sampler size.

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY ALDRICH

TEST BORING REPORT

Boring No. WAP-22
File No. 132892-018
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25	11 7 7 7	S2 12	25.0 27.0	SM			Similar to above except wet										
				SM		26.0	Medium dense red-brown silty SAND (SM), no odor, wet, less cohesion than soil above, 2-in thick wood separating layer from above				5	75	20				
30	7 3 3 4	S3 4	30.0 32.0	SM			No soil recovery, 4-in long wood stuck in shoe										
							Cuttings turn dark brown with abundant wood										
35	5 4 4 6	S4 20	35.0 37.0	SM		35.0	Loose brown silty SAND (SM), no odor, wet				5	70	25				
				SM		36.8	Loose gray silty SAND (SM), no odor, wet				10	70	20				
40	2 3 3 7	S5 12	41.0 43.0	SC		41.0	Loose blue-gray and gray clayey SAND (SC), mps 3.0mm, no odor, wet, abundant shell fragments		5	20	45	15	15				
45	2 5 3 5	S6 24	46.0 48.0	SM		46.0	Loose brown and gray-brown silty SAND (SM), no odor, wet				40	30	30				
							Similar to above except abundant shell fragments										
50	9 7 8 10	S7 19	50.0 52.0	GP- GC		50.0	Medium dense blue-gray poorly-graded GRAVEL with clay and sand (GP-GC), no odor, mps 28mm, abundant shell fragments	25	25	20	10	10	10				
	16 36 10 50/2"	S8 24	55.0 57.0	GP- GC GP- GC			Similar to above except abundant wood Similar to above										
						57.0	BOTTOM OF EXPLORATION 57.0 FT										

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. WAP-22

TEST BORING REPORT

Boring No. WAP-23

Project	Nature and Extent, Winyah Generating Station
Client	Santee Cooper
Contractor	Saedacco

File No.	132892-018
Sheet No.	1 of 2
Start	May 23, 2019
Finish	May 23, 2019
Driller	Richy Lemire
H&A Rep.	J. Yonts
Elevation	
Datum	
Location	8-ft South of WAP-20

	Casing	Sampler	Barrel
Type	HSA	S	–
Inside Diameter (in.)	4.25	1 3/8	–
Hammer Weight (lb)	-	140	-
Hammer Fall (in.)	-	30	-

Drilling Equipment and Procedures

- Rig Make & Model: Diedrich D-50 Turbo
- Bit Type: Cutting Head
- Drill Mud: None
- Casing: Spun
- Hoist/Hammer: Winch Automatic Hammer
- PID Make & Model: -

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size[†], structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0				SC			Orange and orange-brown clayey SAND (SC), no odor, mps 1.0 mm, moist				10	50	40				
5				SC			Cuttings become dark brown				5	60	35				
				SC			Cuttings become dark brown to black				10	60	30				
				SC			Cuttings become dark gray to gray-brown				10	55	35				
10				SM		11.0	Cuttings become brown silty SAND (SM), no odor, moist, mps 2.0 mm, moist				15	50	35				
15				SM			Cuttings become brown to gray-brown silty SAND (SM), no odor, moist, mps 2.0 mm, moist				15	60	25				
20	2 6 5 6	S1 12	20.0 22.0	SM			Medium dense gray-brown silty SAND (SM), no odor, mps 2.0 mm, wet				10	60	30				
							Note: Rig chatter at ~24.0 ft bgs.										
25																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID

- O - Open End Rod
- T - Thin Wall Tube
- U - Undisturbed Sample
- S - Split Spoon Sample

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

Summary

- Overburden (ft) 49
- Rock Cored (ft) -
- Samples 7S

Boring No. WAP-23

Field Tests: Dilatancy: R - Rapid S - Slow N - None; Toughness: L - Low M - Medium H - High; Plasticity: N - Nonplastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High V - Very High

[†]Note: Maximum particle size is determined by direct observation within the limitations of sampler size.

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY ALDRICH	TEST BORING REPORT	Boring No. WAP-23 File No. 132892-018 Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25	0 3 5 5	S2 12	25.0 27.0	SC		25.0	Loose gray clayey SAND (SC), no odor, mps 2.0 mm, wet Note: Rig chatter 26.0 ft bgs to 27.5 ft bgs				20	50	30				
30	10 6 3 4	S3 15	30.0 32.0				Similar to above										
				SC		30.5	Loose brown and tan clayey SAND (SC), mps 3.0 mm, wet, wood at 31.0 ft			15	55	15	15				
				SM		31.3	Loose tan silty SAND (SM), no structure, no odor, mps 2.0 mm, wet, subrounded quartz sand with trace mica				20	50	30				
35	6 7 6 10	S4 13	35.0 37.0	SP-SM		35.0	Medium dense tan and gray poorly-graded SAND with silt (SP-SM), no odor, mps 8.0 mm, wet, spoon filled with 6-in of wood		10	40	20	10	10				
40	5 5 5 5	S5 14	40.0 42.0	SP-SM			Similar to above with wood and shell fragments	5	15	30	20	10	10				
				SC		41.0	Loose gray clayey SAND (SC), no odor, mps 2.0 mm, wet, trace wood and shell fragments				10	50	40				
45	3 2 5 4	S6 20	45.0 47.0	SC			Loose gray clayey SAND (SC) with abundant shell fragments, no odor, mps 5.0 mm, wet Note: Rig chatter ~49.0 ft bgs		5	15	45	20	15				
	7 7 10 22	S7 20	50.0 52.0	SC			Similar to above except more consolidated										
						52.0	BOTTOM OF EXPLORATION 52.0 FT										

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. WAP-23

HALEY ALDRICH

TEST BORING REPORT

Boring No. WAP-24

Project	Nature and Extent, Winyah Generating Station	File No.	132892-018
Client	Santee Cooper	Sheet No.	1 of 2
Contractor	Saedacco	Start	May 23, 2019
		Finish	May 23, 2019
		Driller	Richy Lemire
		H&A Rep.	J. Yonts

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	S	–	Rig Make & Model: Diedrich D-50 Turbo
Inside Diameter (in.)	4.25	1 3/8	–	Bit Type: Cutting Head; Drill Mud: None
Hammer Weight (lb)	-	140	-	Casing: Spun
Hammer Fall (in.)	-	30	-	Hoist/Hammer: Winch Automatic Hammer; PID Make & Model: -

Elevation
Datum
Location Between WAP-9 and WAP-10

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size[†], structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0				SM			Dark brown and gray silty SAND (SM), no odor, mps 1.5 mm, moist, abundant roots and wood				5	55	40				
5																	
10																	
							Cuttings become wet										
15																	
20	1 1 2 4	S1 8	20.0 22.0	SM		20.0	Very loose interbedded brown silty SAND (SM) and gray clayey SAND (SC), no odor, wet, trace wood Sample rod wet at 9 ft bgs				10	55	35				
25																	

Water Level Data						Sample ID	Well Diagram	Summary
Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water	O - Open End Rod	Riser Pipe	Overburden (ft) 45
						T - Thin Wall Tube	Screen	Rock Cored (ft) -
						U - Undisturbed Sample	Filter Sand	Samples 6S
						S - Split Spoon Sample	Cuttings	
							Grout	
							Concrete	Boring No. WAP-24
							Bentonite Seal	

Field Tests: Dilatancy: R - Rapid S - Slow N - None; Toughness: L - Low M - Medium H - High; Plasticity: N - Nonplastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High V - Very High

[†]Note: Maximum particle size is determined by direct observation within the limitations of sampler size.

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

TEST BORING REPORT

HALEY ALDRICH

Boring No. WAP-24
File No. 132892-018
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25	1 5 7 9	S2 12	25.0 27.0	SM		25.0	Medium dense gray and green silty SAND (SM) with abundant shell fragments, no odor, mps 3.0 mm, wet, shell fragments up to 10.0 mm and compose 40 to 50% of sample			30	25	25	20				
30	4 4 4 5	S3 24	30.0 32.0	SM		30.0	Loose gray and green silty SAND (SM), no odor, mps 2.0 mm, wet, no shell and trace wood				15	50	35				
				SC		31.6	Loose green and gray clayey SAND (SC), no odor, mps 3.0 mm, wet, abundant shell fragments, no wood, shell fragments up to 8.0 mm			20	25	35	20				
35	6 9 20 50/6"	S4 15	35.0 37.0	SC		35.0	Medium dense green and gray clayey SAND (SC), no odor, mps 3.0 mm, wet			10	30	40	20				
				CL		36.4	Dense gray sandy CLAY (CL), no structure, no odor, mps 1.0 mm, wet					30	70				
40	6 11 14 19	S5 20	40.0 42.0	CL			Similar to above except frequent shell fragments				5	30	65				
45	50/2"	S6 2	45.0 47.0			45.2	Note: Rig chatter at ~45.0 ft bgs. Similar to above except consolidated Refusal at 45.2 ft.										

BOTTOM OF EXPLORATION 45.2 FT

HALEY ALDRICH

TEST BORING REPORT

Boring No. WAP-25

Project	Nature and Extent, Winyah Generating Station	File No.	132892-018
Client	Santee Cooper	Sheet No.	1 of 2
Contractor	Saedacco	Start	May 21, 2019
		Finish	May 21, 2019
		Driller	Richy Lemire
		H&A Rep.	J. Yonts
		Elevation	
		Datum	
		Location	See Plan; East side of Cooling Water Pond

	Casing	Sampler	Barrel
Type	HSA	S	--
Inside Diameter (in.)	4.25	1 3/8	--
Hammer Weight (lb)	-	140	-
Hammer Fall (in.)	-	30	-

Drilling Equipment and Procedures

Rig Make & Model: Diedrich D-50 Turbo
Bit Type: Cutting Head
Drill Mud: None
Casing: Spun
Hoist/Hammer: Winch Automatic Hammer
PID Make & Model: -

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0				SM			Tan silty SAND (SM), no odor, moist				25	45	30				
5				SM		5.0	Light tan to yellow silty SAND (SM), no odor, moist			5	20	50	25				
				SM			Cuttings become light tan										
10																	
				SM		13.5	Cuttings become gray										
15	1 1 0 1	S1 24	15.0 17.0	CH		15.0	Very soft gray fat CLAY (CH), no structure, no odor, mps <0.075mm, moist to wet						100				
20	1 1 1 2	S2 24	20.0 22.0														
25																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 37
Rock Cored (ft) -
Samples 4S

Boring No. WAP-25

Field Tests: Dilatancy: R - Rapid S - Slow N - None; Toughness: L - Low M - Medium H - High; Plasticity: N - Nonplastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High V - Very High

†Note: Maximum particle size is determined by direct observation within the limitations of sampler size.

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY ALDRICH

TEST BORING REPORT

Boring No. WAP-25
File No. 132892-018
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25	2 7 8 9	S3 23	25.0 27.0	CH			Similar to above										
				SM		26.3	Medium dense gray silty SAND (SM), no odor, mps 1.0 mm, <1.0 in. broken shell layer separating gray clay and gray sand				10	65	25				
30	1 2 4 4	S4 24	30.0 32.0	SM			Loose gray silty SAND (SM), no odor, mps 2.0 mm, wet				55	20	25				
35																	
						37.0	BOTTOM OF EXPLORATION 37.0 FT										

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. WAP-25

TEST BORING REPORT

HALEY ALDRICH

Boring No. WAP-26

Project	Nature and Extent, Winyah Generating Station
Client	Santee Cooper
Contractor	Saedacco

File No.	132892-018
Sheet No.	1 of 1
Start	May 21, 2019
Finish	May 2, 2019
Driller	Richy Lemire
H&A Rep.	J. Yonts
Elevation	
Datum	
Location	See Plan; NW corner of Cooling Water Pond

	Casing	Sampler	Barrel
Type	HSA	S	--
Inside Diameter (in.)	4.25	1 3/8	--
Hammer Weight (lb)	-	140	-
Hammer Fall (in.)	-	30	-

Drilling Equipment and Procedures

- Rig Make & Model: Diedrich D-50 Turbo
- Bit Type: Cutting Head
- Drill Mud: None
- Casing: Spun
- Hoist/Hammer: Winch Automatic Hammer
- PID Make & Model: -

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0				SM			Brown and orange silty SAND (SM), no odor, mps 1.0 mm, moist				10	60	30				
5							Cutting become dark brown										
10							Cutting become wet										
15	4 3 3 4	S1 8	15.0 17.0				Loose brown and dark brown silty SAND (SM), stratified, no odor, mps 1.0 mm, wet, red root at 16.5-ft				15	50	25				
20	1 1 1 0	S2 0	20.0 22.0				No recovery										
						22.0	BOTTOM OF EXPLORATION 22.0 FT										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID

- O - Open End Rod
- T - Thin Wall Tube
- U - Undisturbed Sample
- S - Split Spoon Sample

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

Summary

Overburden (ft)	22
Rock Cored (ft)	-
Samples	2S

Boring No. WAP-26

Field Tests: Dilatancy: R - Rapid S - Slow N - None; Toughness: L - Low M - Medium H - High; Plasticity: N - Nonplastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High V - Very High

†Note: Maximum particle size is determined by direct observation within the limitations of sampler size.

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-09 REV 132892_HA-LIB09.GLB HA-TB+CORE+WELL-07-2 W FENCE.GDT G:\131539 - SANTEE COOPER\WINYAH GENERATING STATION\PROJECT DATA\GINT\2019_0606_HAI_N&E WGS_D1.GPJ Sep 5, 19

APPENDIX B

Laboratory Analytical Reports

santee cooper

One Riverwood Drive
P.O. Box 2946101
Moncks Corner, SC 29461-2901
(843) 761-8000

SANTEE COOPER ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

LAB CERTIFICATION #08552

Sample # AE43648 **Location:** GW Well WAP-14A **Date:** 05/21/2019 **Sample Collector:** AY

Loc. Code WAP-14A SOIL **Time:** 08:15

Analysis	Result	Units	Test Date	Analyst	Method
Arsenic	<3.54	mg/kg	06/04/2019	GEL	SW846 6010D
SPLP Arsenic	<0.3	mg/L	06/03/2019	GEL	SW846 1312/6010D
Lithium	22	mg/kg	06/06/2019	TESTAMERICA	SW846 6010D
SPLP Lithium	<0.050	mg/L	06/06/2019	TESTAMERICA	SW846 1312/6010D
Total Organic Carbon	94700	mg/L	06/04/2019	GEL	SM 5310B

Comments:

Independent Laboratory Results: "GEL" - GEL Laboratories LLC - Lab ID # 10120; "Test America" - TestAmerica Laboratories, Inc. - Lab ID# 98001; "DavisBrown"- Davis & Brown Lab ID # 21117; "Shealy"- Shealy Environmental Services, Inc.- Lab ID# 32010, "ROGERSNCALLC"- Rogers & Callcott, Inc. - Lab ID: 23105001

Analysis Validated:

Linda Williams - Supervisor Analytical Services

santee cooper

One Riverwood Drive
P.O. Box 2946101
Moncks Corner, SC 29461-2901
(843) 761-8000

SANTEE COOPER ANALYTICAL SERVICES
CERTIFICATE OF ANALYSIS
LAB CERTIFICATION #08552

Sample # AE43649 **Location:** GW Well WAP-14B **Date:** 05/21/2019 **Sample Collector:** AY

Loc. Code WAP-14B SOIL **Time:** 10:20

Analysis	Result	Units	Test Date	Analyst	Method
Arsenic	<3.6	mg/kg	06/04/2019	GEL	SW846 6010D
SPLP Arsenic	<0.3	mg/L	06/03/2019	GEL	SW846 1312/6010D
Lithium	<5.6	mg/kg	06/06/2019	TESTAMERICA	SW846 6010D
SPLP Lithium	<0.050	mg/L	06/06/2019	TESTAMERICA	SW846 1312/6010D
Total Organic Carbon	870	mg/L	06/04/2019	GEL	SM 5310B

Comments:
Independent Laboratory Results: "GEL" - GEL Laboratories LLC - Lab ID # 10120; "Test America" - TestAmerica Laboratories, Inc. - Lab ID# 98001; "DavisBrown"- Davis & Brown Lab ID # 21117; "Shealy"- Shealy Environmental Services, Inc.- Lab ID# 32010, "ROGERSNCALLC"- Rogers & Callcott, Inc. - Lab ID: 23105001

Analysis Validated:

Linda Williams - Supervisor Analytical Services

santee cooper

One Riverwood Drive
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Moncks Corner, SC 29461-2901
(843) 761-8000

SANTEE COOPER ANALYTICAL SERVICES
CERTIFICATE OF ANALYSIS
LAB CERTIFICATION #08552

Sample # AE43647 **Location:** GW Well WAP-14C **Date:** 05/20/2019 **Sample Collector:** AY

Loc. Code WAP-14C SOIL **Time:** 16:25

Analysis	Result	Units	Test Date	Analyst	Method
Arsenic	11.6	mg/kg	06/04/2019	GEL	SW846 6010D
SPLP Arsenic	<0.3	mg/L	06/03/2019	GEL	SW846 1312/6010D
Lithium	20	mg/kg	06/06/2019	TESTAMERICA	SW846 6010D
SPLP Lithium	<0.050	mg/L	06/06/2019	TESTAMERICA	SW846 1312/6010D
Total Organic Carbon	48000	mg/L	06/04/2019	GEL	SM 5310B

Comments:
Independent Laboratory Results: "GEL" - GEL Laboratories LLC - Lab ID # 10120; "Test America" - TestAmerica Laboratories, Inc. - Lab ID# 98001; "DavisBrown"- Davis & Brown Lab ID # 21117; "Shealy"- Shealy Environmental Services, Inc.- Lab ID# 32010, "ROGERSNCALLC"- Rogers & Callcott, Inc. - Lab ID: 23105001

Analysis Validated:

Linda Williams - Supervisor Analytical Services

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SANTEE COOPER ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

LAB CERTIFICATION #08552

Sample # AE45913 **Location:** GW Well WAP-4 **Date:** 06/18/2019 **Sample Collector:** MA/BB

Loc. Code WAP-4 **Time:** 09:08

Analysis	Result	Units	Test Date	Analyst	Method
Calcium	52	mg/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Cadmium	<2	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Spec. Cond.	379	uS	06/18/2019	MA, BB	
Chromium	<10	ug/L	07/15/2019	ROGERSNCALLC	EPA 6020B
Copper	<10	ug/L	07/15/2019	ROGERSNCALLC	EPA 6020B
Depth	7.02	Feet	06/18/2019	MA, BB	
Dissolved Oxygen	0.460	ppm	06/18/2019	MA, BB	
Elevation	13.32	Feet	06/18/2019	MA, BB	
Iron	3570	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Magnesium	4.55	mg/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Oxidation Reduction Potential	7.00	mv	06/18/2019	MA, BB	SM2580
pH	6.56	SU	06/18/2019	MA, BB	
Radium 226/228 Combined Calculation	2.29	pCi/L	07/19/2019	GEL	EPA 903.1 Mod
Selenium	<5	ug/L	07/15/2019	ROGERSNCALLC	EPA 6020B
Temp	20.39	C	06/18/2019	MA, BB	
Turbidity	25.9	NTU	06/18/2019	MA, BB	
Zinc	<50	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B

Comments:

Independent Laboratory Results: "GEL" - GEL Laboratories LLC - Lab ID # 10120; "Test America" - TestAmerica Laboratories, Inc. - Lab ID# 98001; "DavisBrown"- Davis & Brown Lab ID # 21117; "Shealy"- Shealy Environmental Services, Inc.- Lab ID# 32010, "ROGERSNCALLC"- Rogers & Callcott, Inc. - Lab ID: 23105001

Analysis Validated: Linda Williams

Linda Williams - Supervisor Analytical Services

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CERTIFICATE OF ANALYSIS

LAB CERTIFICATION #08552

Sample # AE45913 **Location:** GW Well WAP-4 **Date:** 06/18/2019 **Sample Collector:** MA/BB

Loc. Code WAP-4 **Time:** 09:08

Analysis	Result	Units	Test Date	Analyst	Method
Aluminum	0.307	mg/L	07/15/2019	ROGERSNCALLC	EPA 6020B
Alkalinity	161	mg/L	06/25/2019	GEL	SM 2320B
Bicarbonate Alkalinity	161	mg/L	06/25/2019	GEL	SM 2320B
Arsenic	<5	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Arsenic Dissolved	<5	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Arsenic Speciation	See Attached	ug/L	07/01/2019	TESTAMERICA	1730
Boron	170	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Barium	52	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Chloride	9.53	mg/L	06/20/2019	KCWELLS	EPA 300.0
Dissoloved Organic Carbon	1.32	mg/L	06/26/2019	GEL	SM 5310B
Fluoride	<0.10	mg/L	06/20/2019	KCWELLS	EPA 300.0
Lithium	<10	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Lithium Dissolved	<10	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Lead	<2	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Radium 226	1.31	pCi/L	07/17/2019	GEL	EPA 903.1 Mod
Radium 228	<3.00	pCi/L	07/11/2019	GEL	EPA 904.0
Sulfate	20.6	mg/L	06/20/2019	KCWELLS	EPA 300.0
Sulfide	<0.100	mg/L	06/26/2019	GEL	EPA 9034
Total Dissolved Solids	238.8	mg/L	06/28/2019	SJBROWN	SM 2540C
Total Organic Carbon	1.31	mg/L	06/24/2019	GEL	SM 5310B

Comments:

Independent Laboratory Results: "GEL" - GEL Laboratories LLC - Lab ID # 10120; "Test America" - TestAmerica Laboratories, Inc. - Lab ID# 98001; "DavisBrown"- Davis & Brown Lab ID # 21117; "Shealy"- Shealy Environmental Services, Inc.- Lab ID# 32010, "ROGERSNCALLC"- Rogers & Callcott, Inc. - Lab ID: 23105001

Analysis Validated: Linda Williams

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CERTIFICATE OF ANALYSIS

LAB CERTIFICATION #08552

Sample # AE45914 **Location:** GW Well WAP-14 **Date:** 06/18/2019 **Sample Collector:** MA/BB

Loc. Code WAP-14 **Time:** 11:20

Analysis	Result	Units	Test Date	Analyst	Method
Alkalinity	317	mg/L	06/25/2019	GEL	SM 2320B
Bicarbonate Alkalinity	317	mg/L	06/25/2019	GEL	SM 2320B
Arsenic	23	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Arsenic Dissolved	23	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Arsenic Speciation	See Attached	ug/L	07/01/2019	TESTAMERICA	1730
Boron	8200	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Barium	51	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Calcium	940	mg/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Chloride	1240	mg/L	06/20/2019	KCWELLS	EPA 300.0
Spec. Cond.	5510	uS	06/18/2019	MA, BB	
Depth	4.65	Feet	06/18/2019	MA, BB	
Dissolved Oxygen	0.660	ppm	06/18/2019	MA, BB	
Dissoloved Organic Carbon	3.47	mg/L	06/26/2019	GEL	SM 5310B
Elevation	10.04	Feet	06/18/2019	MA, BB	
Fluoride	0.37	mg/L	06/20/2019	KCWELLS	EPA 300.0
Lithium	<10	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Lithium Dissolved	<10	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Oxidation Reduction Potential	-401	mv	06/18/2019	MA, BB	SM2580
Lead	<2	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
pH	7.30	SU	06/18/2019	MA, BB	
Radium 226	<1.00	pCi/L	07/17/2019	GEL	EPA 903.1 Mod
Radium 228	<3.00	pCi/L	07/11/2019	GEL	EPA 904.0
Radium 226/228 Combined Calculation	2.17	pCi/L	07/19/2019	GEL	EPA 903.1 Mod
Sulfate	831	mg/L	06/20/2019	KCWELLS	EPA 300.0
Sulfide	151	mg/L	06/26/2019	GEL	EPA 9034
Total Dissolved Solids	4588	mg/L	06/28/2019	SJBROWN	SM 2540C
Temp	22.58	C	06/18/2019	MA, BB	
Total Organic Carbon	5.86	mg/L	06/26/2019	GEL	SM 5310B
Turbidity	0	NTU	06/18/2019	MA, BB	

Comments:
Independent Laboratory Results: "GEL" - GEL Laboratories LLC - Lab ID # 10120; "Test America" - TestAmerica Laboratories, Inc. - Lab ID# 98001; "DavisBrown"- Davis & Brown Lab ID # 21117; "Shealy"- Shealy Environmental Services, Inc.- Lab ID# 32010, "ROGERSNCALLC"- Rogers & Callcott, Inc. - Lab ID: 23105001

Analysis Validated: Linda Williams

Linda Williams - Supervisor Analytical Services

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CERTIFICATE OF ANALYSIS

LAB CERTIFICATION #08552

Sample # AE45915 **Location:** GW Well WAP-14 DUP **Date:** 06/18/2019 **Sample Collector:** MA/BB

Loc. Code WAP-14 **Time:** 11:25

Analysis	Result	Units	Test Date	Analyst	Method
Alkalinity	318	mg/L	06/25/2019	GEL	SM 2320B
Bicarbonate Alkalinity	318	mg/L	06/25/2019	GEL	SM 2320B
Arsenic	23	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Arsenic Dissolved	26	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Arsenic Speciation	See Attached	ug/L	07/01/2019	TESTAMERICA	1730
Boron	8700	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Barium	49	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Calcium	980	mg/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Chloride	1230	mg/L	06/20/2019	KCWELLS	EPA 300.0
Dissoloved Organic Carbon	3.77	mg/L	06/26/2019	GEL	SM 5310B
Fluoride	0.38	mg/L	06/20/2019	KCWELLS	EPA 300.0
Lithium	<10	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Lithium Dissolved	<10	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Lead	<2	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Radium 226	<1.00	pCi/L	07/17/2019	GEL	EPA 903.1 Mod
Radium 228	<3.00	pCi/L	07/11/2019	GEL	EPA 904.0
Radium 226/228 Combined Calculation	1.68	pCi/L	07/19/2019	GEL	EPA 903.1 Mod
Sulfate	798	mg/L	06/20/2019	KCWELLS	EPA 300.0
Sulfide	197	mg/L	06/26/2019	GEL	EPA 9034
Total Dissolved Solids	4780	mg/L	06/28/2019	SJBROWN	SM 2540C
Total Organic Carbon	6.40	mg/L	06/24/2019	GEL	SM 5310B

Comments:

Independent Laboratory Results: "GEL" - GEL Laboratories LLC - Lab ID # 10120; "Test America" - TestAmerica Laboratories, Inc. - Lab ID# 98001; "DavisBrown"- Davis & Brown Lab ID # 21117; "Shealy"- Shealy Environmental Services, Inc.- Lab ID# 32010, "ROGERSNCALLC"- Rogers & Callcott, Inc. - Lab ID: 23105001

Analysis Validated: Linda Williams

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LAB CERTIFICATION #08552

Sample # AE45916 **Location:** GW Well WAP-14A **Date:** 06/18/2019 **Sample Collector:** MA/BB

Loc. Code WAP-14A **Time:** 10:26

Analysis	Result	Units	Test Date	Analyst	Method
Alkalinity	175	mg/L	06/25/2019	GEL	SM 2320B
Bicarbonate Alkalinity	175	mg/L	06/25/2019	GEL	SM 2320B
Arsenic	<5	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Arsenic Dissolved	<5	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Arsenic Speciation	See Attached	ug/L	07/01/2019	TESTAMERICA	1730
Chloride	1010	mg/L	06/20/2019	KCWELLS	EPA 300.0
Spec. Cond.	4540	uS	06/18/2019	MA, BB	
Depth	3.18	Feet	06/18/2019	MA, BB	
Dissolved Oxygen	0.340	ppm	06/18/2019	MA, BB	
Dissoloved Organic Carbon	2.62	mg/L	06/27/2019	GEL	SM 5310B
Elevation	10.77	Feet	07/12/2019	MJABSHER	
Fluoride	0.11	mg/L	06/20/2019	KCWELLS	EPA 300.0
Lithium	34	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Lithium Dissolved	34	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Oxidation Reduction Potential	-359	mv	06/18/2019	MA, BB	SM2580
pH	6.87	SU	06/18/2019	MA, BB	
Sulfate	791	mg/L	06/20/2019	KCWELLS	EPA 300.0
Sulfide	<100	mg/L	06/26/2019	GEL	EPA 9034
Total Dissolved Solids	4076	mg/L	06/28/2019	SJBROWN	SM 2540C
Temp	21.84	C	06/18/2019	MA, BB	
Total Organic Carbon	4.20	mg/L	06/24/2019	GEL	SM 5310B
Turbidity	0	NTU	06/18/2019	MA, BB	

Comments:

Independent Laboratory Results: "GEL" - GEL Laboratories LLC - Lab ID # 10120; "Test America" - TestAmerica Laboratories, Inc. - Lab ID# 98001; "DavisBrown"- Davis & Brown Lab ID # 21117; "Shealy"- Shealy Environmental Services, Inc.- Lab ID# 32010, "ROGERSNCALLC"- Rogers & Callcott, Inc. - Lab ID: 23105001

Analysis Validated: Linda Williams

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CERTIFICATE OF ANALYSIS

LAB CERTIFICATION #08552

Sample # AE45990 **Location:** GW Well WAP-14B **Date:** 06/19/2019 **Sample Collector:** MA/CT

Loc. Code WAP-14B **Time:** 10:14

Analysis	Result	Units	Test Date	Analyst	Method
Alkalinity	138	mg/L	06/25/2019	GEL	SM 2320B
Bicarbonate Alkalinity	138	mg/L	06/25/2019	GEL	SM 2320B
Arsenic	<5	ug/L	07/04/2019	ROGERSNCALLC	EPA 6020B
Arsenic Dissolved	<5	ug/L	07/04/2019	ROGERSNCALLC	EPA 6020B
Arsenic Speciation	See Attached	ug/L	07/01/2019	TESTAMERICA	1730
Chloride	792	mg/L	06/20/2019	KCWELLS	EPA 300.0
Spec. Cond.	3770	uS	06/19/2019	MA, CT	
Depth	5.26	Feet	06/19/2019	MA, CT	
Dissolved Oxygen	0.440	ppm	06/19/2019	MA, CT	
Dissoloved Organic Carbon	2.01	mg/L	06/26/2019	GEL	SM 5310B
Elevation	3.97	Feet	07/12/2019	LCWILLIA	
Lithium	<10	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Lithium Dissolved	<10	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Oxidation Reduction Potential	-370	mv	06/19/2019	MA, CT	SM2580
pH	6.53	SU	06/19/2019	MA, CT	
Sulfate	698	mg/L	06/20/2019	KCWELLS	EPA 300.0
Sulfide	<0.100	mg/L	06/26/2019	GEL	EPA 9034
Total Dissolved Solids	3172	mg/L	06/28/2019	SJBROWN	SM 2540C
Temp	19.33	C	06/19/2019	MA, CT	
Total Organic Carbon	2.61	mg/L	06/24/2019	GEL	SM 5310B
Turbidity	110	NTU	06/19/2019	MA, CT	

Comments:

Independent Laboratory Results: "GEL" - GEL Laboratories LLC - Lab ID # 10120; "Test America" - TestAmerica Laboratories, Inc. - Lab ID# 98001; "DavisBrown"- Davis & Brown Lab ID # 21117; "Shealy"- Shealy Environmental Services, Inc.- Lab ID# 32010, "ROGERSNCALLC"- Rogers & Callcott, Inc. - Lab ID: 23105001

Analysis Validated: *Linda Williams*

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CERTIFICATE OF ANALYSIS

LAB CERTIFICATION #08552

Sample # AE45917 **Location:** GW Well WAP-14C **Date:** 06/18/2019 **Sample Collector:** MA/BB

Loc. Code WAP-14C **Time:** 13:33

Analysis	Result	Units	Test Date	Analyst	Method
Alkalinity	135	mg/L	06/25/2019	GEL	SM 2320B
Bicarbonate Alkalinity	135	mg/L	06/25/2019	GEL	SM 2320B
Arsenic	<5	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Arsenic Dissolved	<5	ug/L	07/09/2019	ROGERSNCALLC	EPA 6020B
Arsenic Speciation	See Attached	ug/L	07/01/2019	TESTAMERICA	1730
Chloride	205	mg/L	06/20/2019	KCWELLS	EPA 300.0
Spec. Cond.	986	uS	06/18/2019	MA, BB	
Depth	9.95	Feet	06/18/2019	MA, BB	
Dissolved Oxygen	0.300	ppm	06/18/2019	MA, BB	
Dissoloved Organic Carbon	1.24	mg/L	06/27/2019	GEL	SM 5310B
Elevation	3.93	Feet	07/12/2019	MJABSHER	
Fluoride	0.10	mg/L	06/20/2019	KCWELLS	EPA 300.0
Lithium	<10	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Lithium Dissolved	<10	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Oxidation Reduction Potential	-154	mv	06/18/2019	MA, BB	SM2580
pH	6.78	SU	06/18/2019	MA, BB	
Sulfate	52.7	mg/L	06/20/2019	KCWELLS	EPA 300.0
Sulfide	<0.100	mg/L	06/26/2019	GEL	EPA 9034
Total Dissolved Solids	943.8	mg/L	06/28/2019	SJBROWN	SM 2540C
Temp	22.48	C	06/18/2019	MA, BB	
Total Organic Carbon	1.40	mg/L	06/25/2019	GEL	SM 5310B
Turbidity	0	NTU	06/18/2019	MA, BB	

Comments:

Independent Laboratory Results: "GEL" - GEL Laboratories LLC - Lab ID # 10120; "Test America" - TestAmerica Laboratories, Inc. - Lab ID# 98001; "DavisBrown"- Davis & Brown Lab ID # 21117; "Shealy"- Shealy Environmental Services, Inc.- Lab ID# 32010, "ROGERSNCALLC"- Rogers & Callcott, Inc. - Lab ID: 23105001

Analysis Validated: Linda Williams

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CERTIFICATE OF ANALYSIS

LAB CERTIFICATION #08552

Sample # AE45381 **Location:** GW Well WAP-15 **Date:** 06/11/2019 **Sample Collector:** MA/CT

Loc. Code WAP-15 **Time:** 12:56

Analysis	Result	Units	Test Date	Analyst	Method
Alkalinity	81.5	mg/L	06/20/2019	GEL	SM 2320B
Bicarbonate Alkalinity	81.5	mg/L	06/20/2019	GEL	SM 2320B
Arsenic	<5	ug/L	06/28/2019	ROGERSNCALLC	EPA 6020B
Arsenic Dissolved	<5	ug/L	07/04/2019	ROGERSNCALLC	EPA 6020B
Arsenic Speciation	See Attached	ug/L	07/01/2019	TESTAMERICA	1730
Boron	4100	ug/L	06/17/2019	ROGERSNCALLC	EPA 6010D
Barium	121	ug/L	06/28/2019	ROGERSNCALLC	EPA 6020B
Chloride	428	mg/L	06/25/2019	KCWELLS	EPA 300.0
Cobalt	<10	ug/L	06/28/2019	ROGERSNCALLC	EPA 6020B
Spec. Cond.	1650	uS	06/11/2019	MA, CT	
Depth	6.74	Feet	06/11/2019	MA, CT	
Dissolved Oxygen	0.330	ppm	06/11/2019	MA, CT	
Dissoloved Organic Carbon	1.72	mg/L	06/19/2019	GEL	SM 5310B
Elevation	13.67	Feet	06/11/2019	MA, CT	
Fluoride	0.10	mg/L	06/28/2019	KCWELLS	EPA 300.0
Lithium	27	ug/L	06/17/2019	ROGERSNCALLC	EPA 6010D
Lithium Dissolved	27	ug/L	06/17/2019	ROGERSNCALLC	EPA 6010D
Oxidation Reduction Potential	53.0	mv	06/11/2019	MA, CT	SM2580
Lead	<2	ug/L	06/28/2019	ROGERSNCALLC	EPA 6020B
pH	5.82	SU	06/11/2019	MA, CT	
Radium 226	1.09	pCi/L	07/10/2019	GEL	EPA 903.1 Mod
Radium 228	<3.00	pCi/L	07/09/2019	GEL	EPA 904.0
Radium 226/228 Combined Calculation	2.84	pCi/L	07/10/2019	GEL	EPA 903.1 Mod
Sulfate	155	mg/L	06/25/2019	KCWELLS	EPA 300.0
Sulfide	<0.100	mg/L	06/18/2019	GEL	EPA 9034
Total Dissolved Solids	990.0	mg/L	06/20/2019	SJBROWN	SM 2540C
Temp	25.03	C	06/11/2019	MA, CT	
Total Organic Carbon	1.92	mg/L	06/18/2019	GEL	SM 5310B
Turbidity	104	NTU	06/11/2019	MA, CT	

Comments:

Independent Laboratory Results: "GEL" - GEL Laboratories LLC - Lab ID # 10120; "Test America" - TestAmerica Laboratories, Inc. - Lab ID# 98001; "DavisBrown"- Davis & Brown Lab ID # 21117; "Shealy"- Shealy Environmental Services, Inc.- Lab ID# 32010, "ROGERSNCALLC"- Rogers & Callcott, Inc. - Lab ID: 23105001

Analysis Validated: Linda Williams

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CERTIFICATE OF ANALYSIS

LAB CERTIFICATION #08552

Sample # AE45992 **Location:** GW Well WAP-16 **Date:** 06/19/2019 **Sample Collector:** MA/CT

Loc. Code WAP-16 **Time:** 12:59

Analysis	Result	Units	Test Date	Analyst	Method
Alkalinity	361	mg/L	06/25/2019	GEL	SM 2320B
Bicarbonate Alkalinity	361	mg/L	06/25/2019	GEL	SM 2320B
Arsenic	<5	ug/L	07/04/2019	ROGERSNCALLC	EPA 6020B
Arsenic Dissolved	<5	ug/L	07/04/2019	ROGERSNCALLC	EPA 6020B
Arsenic Speciation	See Attached	ug/L	07/01/2019	TESTAMERICA	1730
Barium	82	ug/L	07/04/2019	ROGERSNCALLC	EPA 6020B
Chloride	180	mg/L	06/20/2019	KCWELLS	EPA 300.0
Spec. Cond.	1530	uS	06/19/2019	MA, CT	
Depth	6.91	Feet	06/19/2019	MA, CT	
Dissolved Oxygen	0.330	ppm	06/19/2019	MA, CT	
Dissoloved Organic Carbon	17.3	mg/L	06/26/2019	GEL	SM 5310B
Elevation	18.17	Feet	06/19/2019	MA, CT	
Lithium	<10	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Lithium	<10	ug/L	06/26/2019	ROGERSNCALLC	EPA 6020B
Lithium Dissolved	<10	ug/L	06/26/2019	ROGERSNCALLC	EPA 6010D
Oxidation Reduction Potential	-121	mv	06/19/2019	MA, CT	SM2580
Lead	<2	ug/L	07/04/2019	ROGERSNCALLC	EPA 6020B
pH	6.68	SU	06/19/2019	MA, CT	
Radium 226	1.06	pCi/L	07/17/2019	GEL	EPA 903.1 Mod
Radium 228	<3.00	pCi/L	07/11/2019	GEL	EPA 904.0
Radium 226/228 Combined Calculation	1.37	pCi/L	07/19/2019	GEL	EPA 903.1 Mod
Sulfate	174	mg/L	06/20/2019	KCWELLS	EPA 300.0
Sulfide	<0.100	mg/L	06/26/2019	GEL	EPA 9034
Total Dissolved Solids	977.5	mg/L	06/28/2019	SJBROWN	SM 2540C
Temp	25.42	C	06/19/2019	MA, CT	
Total Organic Carbon	19.2	mg/L	06/24/2019	GEL	SM 5310B
Turbidity	0	NTU	06/19/2019	MA, CT	

Comments:
Independent Laboratory Results: "GEL" - GEL Laboratories LLC - Lab ID # 10120; "Test America" - TestAmerica Laboratories, Inc. - Lab ID# 98001; "DavisBrown"- Davis & Brown Lab ID # 21117; "Shealy"- Shealy Environmental Services, Inc.- Lab ID# 32010, "ROGERSNCALLC"- Rogers & Callcott, Inc. - Lab ID: 23105001

Analysis Validated: Linda Williams

Linda Williams - Supervisor Analytical Services

APPENDIX C

Certification Statement

HALEY & ALDRICH, INC.
400 Augusta Street
Suite 130
Greenville, SC 29601
864-214-8750

12 September 2019
File No. 132892-016

SUBJECT: Winyah Generating Station Appendix IV Alternative Source Demonstration for the Slurry Pond 3 and 4, Santee Cooper

Pursuant to 40 CFR §257.95(g)(3)(ii), Haley & Aldrich, Inc. conducted an alternative source evaluation to determine if a source other than Slurry Pond 3 and 4 caused the statistically significant level over background identified during assessment monitoring for this unit. I certify that this report and included attachments were prepared by me or under my direct supervision. I am a licensed professional engineer registered in the State of South Carolina.

This alternate source demonstration supports the conclusion that a source other than the CCR unit Slurry Pond 3 and 4 is the cause of the statistically significant level over background for Appendix IV constituents detected during assessment monitoring of this Unit.

The information contained in this evaluation is, to the best of my knowledge, true, accurate and complete.

HALEY & ALDRICH, INC.

SOUTH CAROLINA PROFESSIONAL ENGINEER No. 22576 JEFFREY A. KLAIBER

Signed: ______________________
Certifying Engineer

Print Name:	Jeffrey A. Klaiber, P.E.
South Carolina License No.:	22576
Title:	Principal Consultant
Company:	Haley & Aldrich, Inc.

Appendix C – Statistical Analysis

HALEY & ALDRICH, INC.
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Greenville, SC 29601
864.214.8750

TECHNICAL MEMORANDUM

January 30, 2020
File No. 132892-016

SUBJECT: 2019 Semi-annual Groundwater Assessment Monitoring Data
Statistical Evaluation
Winyah Generating Station
Slurry Pond 3 & 4

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 2019 semi-annual assessment monitoring groundwater sampling event for the Winyah Generating Station (WGS) Slurry Pond 3 & 4. 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 and intrawell evaluations, data from the groundwater sampling events for the downgradient monitoring wells were compared to the Groundwater Protection Standard (GWPS) established from the background dataset for the upgradient monitoring well (WAP-1 and WBW-1) for detected Appendix IV constituents. GWPS for each of the Appendix IV constituents have been set equal to the highest value of the maximum contaminant level, regional screening level, or background concentration. The Rule requires statistical evaluation of groundwater monitoring data to determine whether or not there is a statistically significant increase (SSI) above background values for each Appendix IV constituent and if one or more constituents are detected at SSLs above the GWPS. The results of the groundwater assessment monitoring statistical evaluation are discussed below and provided in Tables I and II.

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, as determined applicable for this sampling event, was used to evaluate potential SSLs above background. Background levels 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 event from each compliance well was compared to the corresponding background UTL to determine if a SSL existed.

STATISTICAL EVALUATION

Either an interwell or intrawell evaluation was used to determine SSLs. A successful alternate source demonstration was completed for arsenic (WAP-14) and lithium (WAP-15). As a result, an intrawell evaluation was used for these constituents at these locations. Interwell evaluations were performed for the other Appendix IV constituents detected downgradient of Slurry Pond 3 & 4. Interwell evaluation compares the most recent values from downgradient compliance wells against a background dataset composed of upgradient well data, and the intrawell evaluation compares the most recent values from each compliance well against a background dataset composed of its own historical 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 methods were 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 normalized data 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 a background dataset for all detected Appendix IV constituents using parametric TL. If an Appendix IV constituent concentration from the semi-annual sampling events of 2019 were 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 confident 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 (WAP-1 and WBW-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 based on statistical evaluation of analytical results collected through 2018.

RESULTS OF APPENDIX IV DOWNGRADIENT STATISTICAL COMPARISONS

The sample concentrations from the downgradient wells for each of the detected Appendix IV constituents from the first semi-annual assessment monitoring event of 2019 were compared to their respective background UTLs and GWPS (Tables I and II). A sample concentration greater than the GWPS is considered to represent a SSL. Based on previous compliance sampling event, statistical evaluations, and associated alternative source demonstrations, an intrawell comparison is utilized for WAP-14 and WAP-15 for arsenic and lithium respectively. Interwell comparisons are being utilized for all other well and constituent evaluations. Based on this statistical evaluation on the semi-annual groundwater sampling events in 2019, no SSLs above GWPS were identified at the WGS Slurry Pond 3&4.

Tables:

- Table I – Summary of Assessment Monitoring Statistical Evaluation – February 2019
- Table II – Summary of Assessment Monitoring Statistical Evaluation – June 2019

TABLES

Winyah Slurry Pond 3&4
Detection Monitoring Statistical Analysis Summary
Prepared: July 14, 2019

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 2019 Concentration	95% LCL	Inter-well Analysis: Upper Tolerance Limit	Inter-well Analysis: Background Limit (Higher of MCL/RSL or Upper Tolerance Limit)	Inter-well Analysis: Exceedance above Background at Individual Well	Intra-well Analysis: Upper Prediction Limits	Intra-well Analysis: Exceedance above Background at Individual Well	SSL
CCR Appendix-IV: Antimony, Total (mg/L)																											
WBW-1	0/10	100%	0.005-0.025	0.007	0.005	0.016		0.00004	0.006325	0.9035	0.006	mg/L	N	0	1							0.025	0.025				
WAP-01	0/10	100%	0.005-0.025	0.007	0.005	0.016		0.00004	0.006325	0.9035	0.006	mg/L	N	0	1												
WAP-04	0/11	100%	0.002-0.025	0.00655	0.005	0.015		0.00003827	0.006186	0.9452	0.006	mg/L	N	0	1					0.005							
WAP-14	1/11	91%	0.005-0.025	0.00655	0.005	0.015	0.002	0.00003827	0.006186	0.9452	0.006	mg/L	N	0	1					0.005							
WAP-15	0/11	100%	0.002-0.025	0.00655	0.005	0.015		0.00003827	0.006186	0.9452	0.006	mg/L	N	0	1					0.005							
WAP-16	0/11	100%	0.002-0.025	0.00655	0.005	0.015		0.00003827	0.006186	0.9452	0.006	mg/L	N	0	1					0.005							
CCR Appendix-IV: Arsenic, Total (mg/L)																											
WBW-1	0/11	100%	0.003-0.005	0.00464	0.005	0.005		6.545E-07	0.000809	0.1745	0.01	mg/L	N	0	0							0.005	0.010				
WAP-01	0/13	100%	0.003-0.005	0.00469	0.005	0.005		5.641E-07	0.0007511	0.1601	0.01	mg/L	N	0	0												
WAP-04	1/14	93%	0.003-0.005	0.00439	0.005	0.005	0.00044	0.000001812	0.001346	0.3068	0.01	mg/L	N	0	0					0.005					0.000	N	FALSE
WAP-14	10/12	17%	0.003-0.005	0.0192	0.01655	0.04722	0.0475	0.000205	0.01432	0.744	0.01	mg/L	Y	9	0					0.017				Y	0.081	N	FALSE
WAP-15	6/12	50%	0.005-0.005	0.00528	0.005	0.006145	0.0062	0.000000706	0.0008403	0.1591	0.01	mg/L	N	0	0					0.006					0.009	N	FALSE
WAP-16	1/12	92%	0.003-0.005	0.0043	0.005	0.005	0.00063	0.000001933	0.00139	0.3231	0.01	mg/L	N	0	0					0.005					0.005	N	FALSE
CCR Appendix-IV: Barium, Total (mg/L)																											
WBW-1	11/11	0%		0.0134	0.015	0.01575	0.016	0.00000786	0.002804	0.2092	2	mg/L	N	0								0.094	2.000				
WAP-01	13/13	0%		0.0276	0.0206	0.0706	0.094	0.0006666	0.02582	0.9352	2	mg/L	N	0	0												
WAP-04	14/14	0%		0.0452	0.04425	0.0565	0.063	0.00004114	0.006414	0.142	2	mg/L	N	0	0					0.039							
WAP-14	12/12	0%		0.061	0.0553	0.08585	0.093	0.0001956	0.01399	0.2291	2	mg/L	N	0	0					0.049							
WAP-15	12/12	0%		0.27	0.284	0.3322	0.335	0.003014	0.0549	0.2037	2	mg/L	N	0	0					0.302							
WAP-16	12/12	0%		0.133	0.131	0.18	0.18	0.00134	0.0366	0.2757	2	mg/L	N	0	0					0.092							
CCR Appendix-IV: Beryllium, Total (mg/L)																											
WBW-1	0/10	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.004	mg/L	N	0	0							0.0005	0.004				
WAP-01	0/10	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.004	mg/L	N	0	0												
WAP-04	0/11	100%	0.0005-0.001	0.000545	0.0005	0.00075		2.273E-08	0.0001508	0.2764	0.004	mg/L	N	0	0					0.0005							
WAP-14	0/11	100%	0.0005-0.001	0.000545	0.0005	0.00075		2.273E-08	0.0001508	0.2764	0.004	mg/L	N	0						0.0005							
WAP-15	4/11	64%	0.0005-0.0005	0.00102	0.0005	0.003045	0.00351	0.000001125	0.001061	1.037	0.004	mg/L	N	0	0					0.0005							
WAP-16	0/11	100%	0.0005-0.001	0.000545	0.0005	0.00075		2.273E-08	0.0001508	0.2764	0.004	mg/L	N	0	0					0.0005							
CCR Appendix-IV: Cadmium, Total (mg/L)																											
WBW-1	0/10	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0							0.0005	0.005				
WAP-01	0/12	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0												
WAP-04	0/13	100%	0.0005-0.001	0.000538	0.0005	0.0007		1.923E-08	0.0001387	0.2575	0.005	mg/L	N	0	0					0.0005							
WAP-14	0/11	100%	0.0005-0.001	0.000545	0.0005	0.00075		2.273E-08	0.0001508	0.2764	0.005	mg/L	N	0	0					0.0005							
WAP-15	0/11	100%	0.0005-0.001	0.000545	0.0005	0.00075		2.273E-08	0.0001508	0.2764	0.005	mg/L	N	0	0					0.0005							
WAP-16	0/11	100%	0.0005-0.001	0.000545	0.0005	0.00075		2.273E-08	0.0001508	0.2764	0.005	mg/L	N	0	0					0.0005							
CCR Appendix-IV: Chromium, Total (mg/L)																											
WBW-1	0/10	100%	0.005-0.005	0.005	0.005	0.005		1.205E-20	1.098E-10	2.195E-08	0.1	mg/L	N	0	0							0.0050	0.100				
WAP-01	0/12	100%	0.005-0.005	0.005	0.005	0.005		1.478E-20	1.216E-10	2.432E-08	0.1	mg/L	N	0													
WAP-04	1/13	92%	0.005-0.005	0.00471	0.005	0.005	0.0011	0.000001111	0.001054	0.2239	0.1	mg/L	N	0	0					0.005							
WAP-14	1/11	91%	0.005-0.005	0.00483	0.005	0.005	0.0031	3.282E-07	0.0005729	0.1187	0.1	mg/L	N	0	0					0.005							
WAP-15	1/11	91%	0.005-0.005	0.00468	0.005	0.005	0.0015	0.000001114	0.001055	0.2254	0.1	mg/L	N	0	0					0.005							
WAP-16	1/11	91%	0.005-0.005	0.00472	0.005	0.005	0.0019	8.736E-07	0.0009347	0.1981	0.1	mg/L	N	0	0					0.005							
CCR Appendix-IV: Cobalt, Total (mg/L)																											
WBW-1	0/11	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.006	mg/L	N	0	0							0.0005	0.006				
WAP-01	0/11	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.006	mg/L	N	0	0												
WAP-04	0/12	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.006	mg/L	N	0	0					0.0005							
WAP-14	2/12	83%	0.0005-0.0005	0.000553	0.0005	0.0008035	0.00093	1.744E-08	0.0001321	0.239	0.006	mg/L	N	0	0					0.0005							
WAP-15	5/12	58%	0.0005-0.0005	0.0012	0.0005	0.004664	0.0086	0.000003475	0.001864	1.558	0.006	mg/L	Y	1	0					0.0005							
WAP-16	4/12	67%	0.0005-0.0005	0.000481	0.0005	0.0005325	0.00056	8.681E-09	0.00009317	0.1938	0.006	mg/L	N	0	0					0.0005							
CCR Appendix-IV: Fluoride (mg/L)																											
WBW-1	1/12	92%	0.1-0.1	0.1	0.1	0.1	0.1	5.048E-18	2.246E-09	2.246E-08	4	mg/L	N	0	0							0.140	4.00				
WAP-01	2/12	83%	0.1-0.1	0.106	0.1	0.1345	0.14	0.0001902	0.01379	0.1303	4	mg/L	N	0	0												
WAP-04	7/13	46%	0.1-0.1	0.103	0.1	0.124	0.13	0.0005539	0.02354	0.2278	4	mg/L	N	0	0					0.100							
WAP-14	12/13	8%	0.1-0.1	0.592	0.68	0.928	1	0.07374	0.2715	0.4585	4	mg/L	N	0	0					0.540							
WAP-15	11/13	15%	0.1-0.1	0.193	0.2	0.284	0.29	0.003423	0.05851	0.303	4	mg/L	N	0						0.100							
WAP-16	12/13	8%	0.1-0.1	0.162	0.16	0.244	0.25	0.001964	0.04432	0.2744	4	mg/L	N	0	0					0.180							
CCR Appendix-IV: Lead, Total (mg/L)																											
WBW-1	0/10	100%	0.001-0.0025	0.0013	0.001	0.0025		0.0000004	0.0006325	0.4865	0.015	mg/L	N	0	0							0.0046	0.015				
WAP-01	4/12	67%	0.001-0.0025	0.00165	0.001145	0.003427	0.00456	0.000001155	0.001075	0.6496	0.015	mg/L	N	0	0												
WAP-04	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					0.0010							
WAP-14	1/11	91%	0.001-0.0025	0.00122	0.001	0.0025	0.00039	4.353E-07	0.0006598	0.542	0.015	mg/L	N	0	0					0.0010							
WAP-15	0/11	100%	0.001-0.0025	0.00127	0.001	0.0025		3.682E-07	0.0006068	0.4768	0.015	mg/L	N	0	0					0.0010							
WAP-16	1/11	91%	0.001-0.0025	0.00129	0.001	0.0025	0.0012	3.609E-07	0.0006008	0.4654	0.015	mg/L	N	0	0					0.0012							
CCR Appendix-IV: Lithium, Total (mg/L)																											
WBW-1	0/11	100%	0.01-0.01	0.01	0.01	0.01		4.337E-20	2.083E-10	2.083E-08	0.04	mg/L	N	0	0							0.012	0.040				
WAP-01	1/11	91%	0.01-0.01	0.0101	0.01	0.0108	0.0116	2.327E-07	0.0004824	0.04755	0.04	mg/L	N	0	0												
WAP-04	9/12	25%	0.01-0.01	0.0144	0.0131	0.02303	0.031	0.00003316	0.005758	0.4004	0.04	mg/L	N	0	0					0.010					0.023	N	FALSE
WAP-14	2/12	83%	0.01-0.05	0.0352	0.01	0.149	0.27	0.005599	0.07483	2.127	0.04	mg/L	Y	1	1					0.010					0.050	N	FALSE
WAP-15	12/12	0%		0.0577	0.04345	0.1282	0.22	0.002655	0.05152	0.8932	0.04	mg/L	Y	9	0					0.053				Y	0.071	N	FALSE
WAP-16	0/12	100%	0.01-0.25	0.03	0.01	0.118		0.0046	0.06928	2.309	0.04	mg/L	N	0	1					0.010					0.010	N	FALSE
CCR Appendix-IV: Mercury, Total (mg/L)																											
WBW-1	0/9	100%	0.0002-0.0002	0.0004	0.0004	0.0004		0	0	0	0.002	mg/L	N	0	0							0.0002	0.0020				
WAP-01	0/9	100%	0.0002-0.0002	0.0004	0.0004	0.0004		0	0	0	0.002	mg/L	N	0	0												
WAP-04	0/10	100%	0.0002-0.0002	0.0004	0.0004	0.0004		0	0	0	0.002	mg/L	N	0	0					0.0002							
WAP-14	0/10	100%	0.0002-0.0002	0.0004	0.0004	0.0004		0	0	0	0.002	mg/L	N	0	0					0.0002							
WAP-15	0/10	100%	0.0002-0.0002	0.0004	0.0004	0.0004		0	0	0	0.002	mg/L	N	0	0					0.0002							
WAP-16	0/10	100%	0.0002-0.0002	0.0004	0.0004	0.0004		0	0	0	0.002	mg/L	N	0	0					0.0002							

Winyah Slurry Pond 3&4

Detection Monitoring Statistical Analysis Summary

Prepared: July 14, 2019

CCR Appendix-IV: Molybdenum, Total (mg/L)																			
WBW-1	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				
WAP-01	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			0.050	0.10
WAP-04	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	0.010			
WAP-14	0/11	100%	0.01 0.4	0.0455	0.01	0.205		0.01383	0.1176	2.587	0.1	mg/L	N	0	1	0.010			
WAP-15	0/12	100%	0.01-0.4	0.0458	0.01	0.2075		0.01257	0.1121	2.446	0.1	mg/L	N	0	1	0.010			
WAP-16	0/11	100%	0.01-0.2	0.0273	0.01	0.105		0.003282	0.05729	2.101	0.1	mg/L	N	0	1	0.010			
CCR Appendix-IV: Radium-226 & 228 (pCi/L)																			
WBW-1	5/11	55%	4-4	3.85	4	4.31	4.33	0.661	0.8136	0.2113	5	pCi/L	N	0	0				
WAP-01	5/11	45%	4-4	4.19	4	5.855	5.97	1.22	1.105	0.2637	5	pCi/L	Y	2	0			6.0	6.0
WAP-04	9/12	25%	4-4	4.13	4.075	5.803	5.99	1.806	1.344	0.3257	5	pCi/L	Y	3	0	2.340	3.580		
WAP-14	10/12	17%	4-4	4.6	4.455	6.564	7.4	2.066	1.437	0.3123	5	pCi/L	Y	4	0	3.220	4.001		
WAP-15	12/12	0%		5.3	5.09	6.733	6.92	0.7184	0.8476	0.1598	5	pCi/L	Y	6	0	6.580	4.987		
WAP-16	11/12	8%	4-4	5.02	5.155	7.597	8.4	1.975	1.725	0.3438	5	pCi/L	Y	8	0	2.770	4.233		
CCR Appendix-IV: Selenium, Total (mg/L)																			
WBW-1	0/10	100%	0.01-0.02	0.012	0.01	0.02		0.00001778	0.004216	0.3514	0.05	mg/L	N	0	0				
WAP-01	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			0.020	0.050
WAP-04	0/13	100%	0.005-0.02	0.0112	0.01	0.02		0.00001731	0.00416	0.373	0.05	mg/L	N	0	0	0.010			
WAP-14	1/11	91%	0.01-0.02	0.0111	0.01	0.02	0.0021	0.00002491	0.004991	0.4496	0.05	mg/L	N	0	0	0.010			
WAP-15	1/11	91%	0.01-0.02	0.011	0.01	0.02	0.00095	0.0000271	0.005206	0.4734	0.05	mg/L	N	0	0	0.010			
WAP-16	0/11	100%	0.005-0.02	0.0114	0.01	0.02		0.00002045	0.004523	0.398	0.05	mg/L	N	0	0	0.010			
CCR Appendix-IV: Thallium, Total (mg/L)																			
WBW-1	0/10	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0				
WAP-01	0/10	100%	0.0001-0.001	0.00091	0.001	0.001		0.000000081	0.0002846	0.3128	0.002	mg/L	N	0	0			0.001	0.002
WAP-04	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	0.001			
WAP-14	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	0.001			
WAP-15	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	0.001			
WAP-16	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	0.001			

Winyah Slurry Pond 3&4
Assessment Monitoring Statistical Analysis Summary
Prepared: January 29, 2020

																					Interwell Analysis			Intra-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[a]	February 2019 / June 2019 Concentration	Upper Tolerance Limit	Background Limit (Higher of MCL/RSL or Upper Tolerance Limit)	Exceedance above Background at Individual Well	Upper Prediction Limits	Exceedance above Background at Individual Well	SSL
CCR Appendix-IV: Antimony, Total (mg/L)																										
WBW-1	0/10	100%	0.005-0.025	0.007	0.005	0.016		0.00004	0.006325	0.9035	0.006	mg/L	N	0	1											
WAP-01	0/10	100%	0.005-0.025	0.007	0.005	0.016		0.00004	0.006325	0.9035	0.006	mg/L	N	0	1						0.025	0.025				
WAP-04	0/11	100%	0.002-0.025	0.00655	0.005	0.015		0.00003827	0.006186	0.9451	0.006	mg/L	N	0	[illegible]					0.005						FALSE
WAP-14	1/11	91%	0.005-0.025	0.00655	0.005	0.015	0.002	0.00003827	0.006186	0.9451	0.006	mg/L	N	0	1					0.005						FALSE
WAP-15	0/11	100%	0.002-0.025	0.00655	0.005	0.015		0.00003827	0.006186	0.9452	0.006	mg/L	N	0	1					0.005						FALSE
WAP-16	0/11	100%	0.002-0.025	0.00655	0.005	0.015		0.00003827	0.006186	0.9452	0.006	mg/L	N	0	1					0.005						FALSE
CCR Appendix-IV: Arsenic, Total (mg/L)																										
WBW-1	0/12	100%	0.003-0.005	0.00467	0.005	0.005		6.061E-07	0.0007785	0.1668	0.01	mg/L	N	0	0											
WAP-01	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						0.005	0.010				
WAP-04	1/15	93%	0.003-0.005	0.00443	0.005	0.005	0.00044	0.000001708	0.001307	0.295	0.01	mg/L	N	0	0					0.005				0.005	N	FALSE
WAP-14	11/13	15%	0.003-0.005	0.0195	0.0166	0.0472	0.0475	0.000189	0.01375	0.7038	0.01	mg/L	Y	10	0					0.023			Y	0.081	N	FALSE
WAP-15	6/13	54%	0.005-0.005	0.00526	0.005	0.00614	0.0062	6.533E-07	0.0008083	0.1536	0.01	mg/L	N	[illegible]	[illegible]					0.005				0.009	N	FALSE
WAP-16	1/13	92%	0.003-0.005	0.00436	0.005	0.005	0.00063	0.000001809	0.001345	0.3088	0.01	mg/L	N	0	0					0.005				0.005	N	FALSE
CCR Appendix-IV: Barium, Total (mg/L)																										
WBW-1	12/12	0%		0.0133	0.01485	0.01572	0.016	0.000007229	0.002689	0.2019	2	mg/L	N	0	0											
WAP-01	14/14	0%		0.0185	0.0219	0.06865	0.094	0.0006261	0.02502	0.8784	2	mg/L	N	0	0						0.094	2.000				
WAP-04	15/15	0%		0.0456	0.0449	0.056	0.063	0.00004131	0.006428	0.1409	2	mg/L	N	0	0					0.052						FALSE
WAP-14	13/13	0%		0.0603	0.0534	0.0852	0.093	0.0001871	0.01368	0.2269	2	mg/L	N	0	0					0.051						FALSE
WAP-15	13/13	0%		0.258	0.26	0.332	0.335	0.004461	0.06679	0.2587	2	mg/L	N	0	0					0.121						FALSE
WAP-16	13/13	0%	-	0.129	0.13	0.18	0.18	0.001426	0.03777	0.2931	2	mg/L	N	0	0					0.082						FALSE
CCR Appendix-IV: Beryllium, Total (mg/L)																										
WBW-1	0/10	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.004	mg/L	N	0	0											
WAP-01	0/10	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.004	mg/L	N	0	0						0.0005	0.004				
WAP-04	0/11	100%	0.0005-0.001	0.000545	0.0005	0.00075		2.273E-08	0.0001508	0.2764	0.004	mg/L	[illegible]	[illegible]	0					0.0005						FALSE
WAP-14	0/11	100%	0.0005-0.001	0.000545	0.0005	0.00075		2.273E-08	0.0001508	0.2764	0.004	mg/L	N	0	0					0.0005						FALSE
WAP-15	4/11	64%	0.0005-0.0005	0.00102	0.0005	0.003045	0.00351	0.000001125	0.001061	1.037	0.004	mg/L	N	0	0					0.0005						FALSE
WAP-16	0/11	100%	0.0005-0.001	0.000545	0.0005	0.00075		2.273E-08	0.0001508	0.2764	0.004	mg/L	N	0	0					0.0005						FALSE
CCR Appendix-IV: Cadmium, Total (mg/L)																										
WBW-1	0/11	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	0	0											
WAP-01	0/13	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.005	mg/L	N	[illegible]	0						0.0005	0.005				
WAP-04	0/14	100%	0.0005-0.002	0.000643	0.0005	0.00135		1.703E-07	0.0004127	0.642	0.005	mg/L	N	0	0					0.0005						FALSE
WAP-14	0/11	100%	0.0005-0.001	0.000545	0.0005	0.00075		2.273E-08	0.0001508	0.2764	0.005	mg/L	N	0	0					0.0005						FALSE
WAP-15	0/11	100%	0.0005-0.001	0.000545	0.0005	0.00075		2.273E-08	0.0001508	0.2764	0.005	mg/L	[illegible]	[illegible]	0					0.0005						FALSE
WAP-16	0/11	100%	0.0005-0.001	0.000545	0.0005	0.00075		2.273E-08	0.0001508	0.2764	0.005	mg/L	N	0	0					0.0005						FALSE
CCR Appendix-IV: Chromium, Total (mg/L)																										
WBW-1	0/11	100%	0.005-0.005	0.005	0.005	0.005		1.084E-20	1.041E-10	2.083E-08	0.1	mg/L	N	0	0											
WAP-01	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						0.0050	0.100				
WAP-04	1/14	93%	0.005-0.01	0.00509	0.005	0.00675	0.0012	0.000003026	0.00174	0.342	0.1	mg/L	N	0	0					0.005						FALSE
WAP-14	1/11	91%	0.005-0.005	0.00483	0.005	0.005	0.0031	3.281E-07	0.0005729	0.1187	0.1	mg/L	N	0	0					0.005						FALSE
WAP-15	1/11	91%	0.005-0.005	0.00468	0.005	0.005	0.0015	0.000001114	0.001055	0.2254	0.1	mg/L	N	0	0					0.005						FALSE
WAP-16	1/11	91%	0.005-0.005	0.00472	0.005	0.005	0.0019	8.736E-07	0.0009347	0.1981	0.1	mg/L	N	0	0					0.005						FALSE
CCR Appendix-IV: Cobalt, Total (mg/L)																										
WBW-1	0/12	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.006	mg/L	N	0	0											
WAP-01	1/12	92%	0.0005-0.0005	0.000508	0.0005	0.0005405	0.00059	6.75E-10	0.00002598	0.05119	0.006	mg/L	N	0	0						0.0005	0.006				
WAP-04	0/12	100%	0.0005-0.0005	0.0005	0.0005	0.0005		0	0	0	0.006	mg/L	N	0	0					0.0005						FALSE
WAP-14	2/12	83%	0.0005-0.0005	0.000553	0.0005	0.0008035	0.00093	1.744E-08	0.0001321	0.239	0.006	mg/L	N	0	0					0.0005						FALSE
WAP-15	5/13	62%	0.0005-0.01	0.00188	0.0005	0.00796	0.0066	0.000009145	0.003024	1.612	0.006	mg/L	Y	1	1					0.0005						FALSE
WAP-16	4/12	67%	0.0005-0.0005	0.000481	0.0005	0.0005325	0.00056	8.681E-09	0.00009317	0.1938	0.006	mg/L	N	0	0					0.0005						FALSE
CCR Appendix-IV: Fluoride (mg/L)																										
WBW-1	1/13	92%	0.1-0.1	0.1	0.1	0.1	0.1	4.626E-18	2.151E-09	2.151E-08	4	mg/L	N	0	0											
WAP-01	2/13	85%	0.1-0.1	0.105	0.1	0.134	0.14	0.0001769	0.0133	0.1262	4	mg/L	N	0	0						0.140	4.00				
WAP-04	7/14	50%	0.1-0.1	0.103	0.1	0.1235	0.13	0.0005121	0.02263	0.2195	4	mg/L	N	0	0					0.100						FALSE
WAP-14	13/14	7%	0.1-0.1	0.576	0.635	0.922	[illegible]	0.07159	0.2676	0.4642	4	mg/L	N	0	0					0.370						FALSE
WAP-15	12/14	14%	0.1-0.1	0.186	0.195	0.2835	0.29	0.003779	0.06147	0.3297	4	mg/L	N	0	0					0.100						FALSE
WAP-16	12/13	8%	0.1-0.1	0.162	0.16	0.244	0.25	0.001964	0.04432	0.2744	4	mg/L	N	0	0					0.180						FALSE
CCR Appendix-IV: Lead, Total (mg/L)																										
WBW-1	0/11	100%	0.001-0.01	0.00209	0.001	0.00625		0.000007241	0.002691	1.287	0.015	mg/L	N	0	[illegible]											
WAP-01	4/13	69%	0.001-0.01	0.0023	0.00129	0.006736	0.00456	0.000006416	0.002533	1.103	0.015	mg/L	N	0	0						0.0046	0.015				
WAP-04	0/14	100%	0.001-0.0025	0.00129	0.001	0.0025		3.352E-07	0.0005789	0.4503	0.015	mg/L	N	0	0					0.0020						FALSE
WAP-14	1/12	92%	0.001-0.0025	0.00128	0.001	0.0025	0.00039	4.468E-07	0.0006684	0.5212	0.015	mg/L	N	0	[illegible]					0.0020						FALSE
WAP-15	0/12	100%	0.001-0.0025	0.00133	0.001	0.0025		3.788E-07	0.0006155	0.4616	0.015	mg/L	N	0	0					0.0020						FALSE
WAP-16	1/12	92%	0.001-0.0025	0.00135	0.001	0.0025	0.0012	0.00000037	0.0006083	0.4506	0.015	mg/L	N	0	0					0.0020						FALSE
CCR Appendix-IV: Lithium, Total (mg/L)																										
WBW-1	0/12	100%	0.01-0.01	0.01	0.01	0.01		5.914E-20	2.432E-10	2.432E-08	0.04	mg/L	N	0	0											
WAP-01	1/12	92%	0.01-0.01	0.0101	0.01	0.01072	0.0116	2.133E-07	0.0004619	0.04558	0.04	mg/L	N	0	0						0.012	0.040				
WAP-04	9/13	31%	0.01-0.01	0.014	0.0129	0.0223	0.031	0.00003187	0.005646	0.4019	0.04	mg/L	N	0	0					0.010				0.023	N	FALSE
WAP-14	2/13	85%	0.01-0.05	0.0332	0.01	0.138	0.27	0.005182	0.07198	2.165	0.04	mg/L	Y	1	1					0.010				0.050	N	FALSE
WAP-15	13/13	0%		0.0553	0.043	0.1198	0.22	0.002506	0.05006	0.9048	0.04	mg/L	Y	9	0					0.027				0.071	N	FALSE
WAP-16	0/13	100%	0.01-0.25	0.0285	0.01	0.094		0.004114	0.06414	2.363	0.04	mg/L	N	0	1					0.010				0.010	N	FALSE

Winyah Slurry Pond 3&4
Assessment Monitoring Statistical Analysis Summary
Prepared: January 29, 2020

								CCR Appendix-IV: Mercury, Total (mg/L)											
WBW-1	0/10	100%	0.0002-0.0002	0.0002	0.0002	0.0002		0	0	0	0.002	mg/L	N	0	0				
WAP-01	0/10	100%	0.0002-0.0002	0.0002	0.0002	0.0002		0	0	0	0.002	mg/L	N	0	0		0.0002	0.0020	
WAP-04	0/11	100%	0.0002-0.0002	0.0002	0.0002	0.0002		0	0	0	0.002	mg/L	N	0	0	0.0002			FALSE
WAP-14	0/11	100%	0.0002-0.0002	0.0002	0.0002	0.0002		0	0	0	0.002	mg/L	N	0	[illegible]	0.0002			FALSE
WAP-15	0/11	100%	0.0002-0.0002	0.0002	0.0002	0.0002		0	0	0	0.002	mg/L	N	0	0	0.0002			FALSE
WAP-16	0/11	100%	0.0002-0.0002	0.0002	0.0002	0.0002		0	0	0	0.002	mg/L	N	0	0	0.0002			FALSE
								CCR Appendix-IV: Molybdenum, Total (mg/L)											
WBW-1	0/12	100%	0.01-0.05	0.0133	0.01	0.026		0.0001333	0.01155	0.866	0.1	mg/L	N	0	0				
WAP-01	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		0.050	0.10	
WAP-04	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	0.010			FALSE
WAP-14	0/11	100%	0.01-0.4	0.0455	0.01	0.205		0.01383	0.1176	2.587	0.1	mg/L	N	0	1	0.010			FALSE
WAP-15	0/12	100%	0.01-0.4	0.0458	0.01	0.2075		0.01257	0.1121	2.446	0.1	mg/L	N	0	1	0.010			FALSE
WAP-16	0/11	100%	0.01-0.2	0.0273	0.01	0.105		0.003282	0.05729	2.101	0.1	mg/L	N	0	1	0.010			FALSE
								CCR Appendix-IV: Radium-226 & 228 (pCi/L)											
WBW-1	6/12	50%	4-4	3.58	4	4.308	4.33	1.502	1.225	0.3427	5	pCi/L	N	0	0				
WAP-01	7/12	42%	4-4	3.95	4	5.844	5.97	1.771	1.331	0.3366	5	pCi/L	Y	2	0		6.0	6.0	
WAP-04	10/13	23%	4-4	3.98	4.06	5.786	5.99	1.915	1.384	0.3473	5	pCi/L	Y	3	0	2.290			FALSE
WAP-14	11/13	15%	4-4	4.41	4.39	6.488	7.4	2.348	1.532	0.3471	5	pCi/L	Y	[illegible]	0	2.170			FALSE
WAP-15	13/13	0%	[illegible]	5.12	4.96	6.716	6.92	1.126	1.061	0.2074	5	pCi/L	Y	6	0	2.840			FALSE
WAP-16	12/13	8%	4-4	4.74	4.99	7.524	8.4	3.75	1.937	0.4086	5	pCi/L	Y	6	0	1.370			FALSE
								CCR Appendix-IV: Selenium, Total (mg/L)											
WBW-1	0/11	100%	0.01-0.02	0.0118	0.01	0.02		0.00001636	0.004045	0.3423	0.05	mg/L	N	0	0				
WAP-01	0/13	100%	0.01-0.02	0.0115	0.01	0.02		0.0000141	0.003755	0.3255	0.05	mg/L	N	0	0		0.020	0.050	
WAP-04	0/14	100%	0.005-0.02	0.0107	0.01	0.02		0.00001868	0.004322	0.4034	0.05	mg/L	N	0	0	0.010			FALSE
WAP-14	1/11	91%	0.01-0.02	0.0111	0.01	0.02	0.0021	0.00002491	0.004991	0.4496	0.05	mg/L	N	0	0	0.010			FALSE
WAP-15	1/11	91%	0.01-0.02	0.011	0.01	0.02	0.00095	0.0000271	0.005206	0.4734	0.05	mg/L	N	0	0	0.010			FALSE
WAP-16	0/11	100%	0.005-0.02	0.0114	0.01	0.02		0.00002045	0.004523	0.398	0.05	mg/L	N	0	0	0.010			FALSE
								CCR Appendix-IV: Thallium, Total (mg/L)											
WBW-1	0/10	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0				
WAP-01	0/10	100%	0.0001-0.001	0.00091	0.001	0.001		0.000000081	0.0002846	0.3128	0.002	mg/L	N	0	0		0.001	0.002	
WAP-04	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	0.001			FALSE
WAP-14	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	0.001			FALSE
WAP-15	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	0.001			FALSE
WAP-16	0/11	100%	0.001-0.001	0.001	0.001	0.001		0	0	0	0.002	mg/L	N	0	0	0.001			FALSE