CCR COMPLIANCE
GROUNDWATER MONITORING AND CORRECTIVE ACTION
ANNUAL REPORT
ASH FILTER PONDS AND ASH/REFUSE DISPOSAL SITE

Prepared for:

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1.0 Introduction

Title 40 Code of Federal Regulations (CFR) §257.90 mandates that existing Coal Combustion Residuals (CCR) landfills and surface impoundments, also known as CCR units, be subject to groundwater monitoring and corrective action requirements as further detailed in §257.91 through §257.98. These requirements are part of the overall CCR Rule (or Rule) which was published in the Federal Register on April 17, 2015 and which became effective on October 19, 2015. Specific obligations for Owners and Operators of existing CCR units regarding the preparation of "Annual Groundwater Monitoring and Corrective Action Reports (Annual Report)" are outlined in §257.90(e)(1-5). The first of these Annual Reports was completed no later than January 31, 2018, and provided information to address the following aspects for the preceding calendar year:

- Document the status of the groundwater monitoring and corrective action program for the respective CCR units;
- Summarize key actions completed;
- Describe any problems encountered and actions taken to resolve the problems; and
- Offer a projection of key activities for the upcoming year.

At a minimum, the Annual Report must contain the following information to the extent applicable and available:

- A map, aerial image, or diagram showing the CCR unit and all background/upgradient and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program;
- 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;
- 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/upgradient and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs;
- 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
- Any other information required to be included as specified in §257.90 through §257.98.

The Conemaugh Generating Station (Station), operated by GenOn Northeast Management Company (GenOn), is an electric generating station located in New Florence, Pennsylvania. The Station operates two coal-fired boilers each with a steam turbine-driven electric generator that provides electricity to the regional electric grid. The Rule applies to this facility due to the management/disposal of CCR materials that are generated from the combustion of coal. CCR units associated with Station operations include the Conemaugh Ash/Refuse Disposal Site and four Ash Filter Ponds (Ponds "A," "B," "C," and "D") used for the management of bottom ash. Each of these CCR units has a dedicated groundwater monitoring system that was originally installed to comply with Commonwealth of Pennsylvania Residual Waste Regulations, and was subsequently evaluated and modified (as needed) for use under the CCR program. Additionally, in accordance with the provisions of §257.91(d) of the Rule, the groundwater monitoring system for the Ash Filter Ponds has been designated to provide coverage in the context of a multiunit system encompassing all four ponds collectively.

In summary, this second Annual Report has been prepared to comply with the requirements of §257.90(e), addressing each of the Conemaugh Station's CCR Units with respect to the groundwater monitoring and corrective actions undertaken during Calendar Year 2018. This Annual Report and all subsequent reports thereto will be placed in the Station's operating record per §257.105(h)(1), noticed to the State Director per §257.106(h)(1), and posted to the publicly accessible internet site per §257.107(h)(1).

2.0 Ash Filter Ponds

2.1 Groundwater Monitoring Network

The CCR groundwater monitoring system for the Ash Filter Ponds is comprised of five wells, including Wells MW-1B and MW-2 (upgradient), and Wells MW-3, MW-4, and MW-23 (downgradient). All five wells communicate with the alluvium, which is the uppermost aquifer. The locations of the groundwater monitoring wells are shown on Figure 1, along with depiction of the generalized groundwater flow direction in the area of the ponds. Each of these wells was already existing, and no new wells were added nor were any existing wells abandoned/replaced during the 2018 reporting period.

2.2 Summary of Previously-Reported Monitoring Activities

In accordance with the requirements under §257.94(b) for existing CCR surface impoundments, a minimum of eight independent samples from each background and downgradient well were collected and analyzed for the constituents listed in Appendices III and IV of the Rule prior to October 17, 2017. The results from these samples, which were collected during the period from December 2015 through July 2017, are presented in Table 1 (Appendix III constituents) and Table 2 (Appendix IV constituents). In addition, a ninth round of samples was collected (October 1-4, 2017) and analyzed for Appendix III constituents only. The results from these samples (also shown in Table 1) served as the first point of comparison to determine if concentrations in any of the downgradient wells are at levels representing a statistically significant increase (SSI) over the background concentrations established in the upgradient well(s).

2.3 2018 Data Collection

During January 2018, the results from the October 2017 Detection Monitoring event were reviewed, and subsequent determination made that one downgradient well (MW-4) showed an Appendix III constituent (sulfate) at levels representing an SSI above corresponding background concentrations (see Table 1). Accordingly, and per the provisions of §257.94(e)(2), efforts were undertaken to conduct an Alternate Source Demonstration in an attempt to identify a potential source other than the Ash Filter Ponds which was responsible for the observed SSI. This Alternate Source Demonstration, further discussed below in Section 2.3 and included in Appendix A, was ultimately successful and determined that incidental gypsum deposition in the area of Well MW-4 was causing the elevated sulfate readings in the localized groundwater. As a result, the Ash Filter Ponds were deemed to remain in the CCR Detection Monitoring Program, and were additionally sampled in May 2018 and October 2018 with continuing observations of SSIs only for sulfate in Well MW-4 (see Table 1).

2.4 Alternate Source Demonstration

As noted above, an Alternate Source Demonstration was conducted in early-2018 which resolved the observed SSI for sulfate in downgradient Well MW-4, relative to the levels measured during the October 2017 Detection Monitoring event. This Demonstration, which was completed in April 2018 and certified by APTIM's qualified professional engineer, provided the necessary documentation to confirm that the Ash Filter Ponds are not creating unacceptable impacts to groundwater. Considering the May 2018 and October 2018 Detection Monitoring events again showed elevated sulfate only as the lone SSI in MW-4, the findings from the April 2018 Demonstration remain relevant and applicable.

2.5 2018 Monitoring Program Transitions

During 2018, there were no transitions between monitoring programs. As a result of the successful Alternate Source Demonstration, only activities in support of the Detection Monitoring program were conducted.

2.6 2018 Corrective Actions

During 2018, there were no problems identified or corrective actions undertaken.

2.7 2019 Projected Activities

It is anticipated that Detection Monitoring activities will continue for the Ash Filter Ponds during 2019, with continued review of Appendix III constituent concentrations and comparison with the calculated background values.

3.0 Ash Disposal Site

3.1 Groundwater Monitoring Network

The CCR groundwater monitoring system for the Ash Disposal Site is comprised of four wells, including Well MW-31 (upgradient) and Wells MW-9, MW-10, and MW-11 (downgradient). Monitoring Wells MW-9 and MW-11 communicate with the shallow unconfined groundwater in bedrock and Monitoring Wells MW-10 and MW-31 communicate with shallow groundwater across the soil/bedrock interface. Hence, all four wells monitor the uppermost aquifer in the area of the Ash Disposal Site. The locations of the groundwater monitoring wells are shown on Figure 2, along with depiction of the generalized groundwater flow direction in the area of the disposal site. Each of these wells was already existing, and no new wells were added nor were any existing wells abandoned/replaced during the 2018 reporting period.

3.2 Summary of Previously-Reported Monitoring Activities

In accordance with the requirements under §257.94(b) for existing CCR landfills, a minimum of eight independent samples from each background and downgradient well were collected and analyzed for the constituents listed in Appendices III and IV of the Rule prior to October 17, 2017. The results from these samples, which were collected during the period from December 2015 through July 2017, are presented in Table 3 (Appendix III constituents) and Table 4 (Appendix IV constituents). In addition, a ninth round of samples was collected (October 2-3, 2017) and analyzed for Appendix III constituents only. The results from these samples (also shown in Table 3) served as the first point of comparison to determine if concentrations in any of the downgradient wells are at levels representing an SSI over the background concentrations established in the upgradient well(s).

3.3 2018 Data Collection

During January 2018, the results from the October 2017 Detection Monitoring event were reviewed, and subsequent determination made that all three downgradient wells showed several Appendix III constituents at levels representing an SSI above corresponding background concentrations (see Table 3). Accordingly, the Ash Disposal Site was transitioned into the CCR Assessment Monitoring, and an initial round of samples covering all Appendix IV constituents was collected in March 2018 (see Table 4) per §257.95(b). From these results, the detected Appendix IV constituents were carried forward and analyzed during continued Assessment Monitoring events conducted in May 2018 and October 2018. As shown in Table 4, none of the Appendix IV constituents from the May and October 2018 events were measured at concentrations representing a statistically significant level (SSL) above the corresponding site-specific groundwater protection standards. Detected concentrations of at least one Appendix IV constituent

(total barium); however, do remain above calculated background, and thus providing the basis for continued Assessment Monitoring into 2019.

It is additionally noted that the May 2018 Assessment Monitoring event yielded an erroneous result for Radium-226/228 in downgradient Well MW-9. The initially reported value (103.6 pCi/L) was generated via an incorrect laboratory analytical method. Following this determination, a new sample (for Radium analysis only) was collected from MW-9 in July 2018 and reanalyzed using the correct analytical method. The revised result from the July 2018 sampling is highlighted in Table 4.

3.4 2018 Monitoring Program Transitions

In 2018, the Ash Disposal Site transitioned into the Assessment Monitoring Program based on review of the October 2017 Detection Monitoring results, and subsequent confirmation that several Appendix III constituents in downgradient wells were at levels representing SSIs above background. The transition to the Assessment Monitoring Program was implemented during late-March 2018, including placement of an appropriate notification into the facility's operating record per §257.105(h).

3.5 2018 Corrective Actions

On August 8, 2018, a surficial (non-groundwater) release of CCR materials from the Ash Disposal Site (associated with the Stage II active area) was discovered during the performance of a routine weekly inspection (as required by the Rule). Upon discovery, Conemaugh Station informed the Pennsylvania Department of Environmental Protection (PADEP), who conducted an inspection of the area on August 9, 2018. Following an initial investigation, the release most likely occurred during an extremely intense precipitation event on July 30, 2018.

Pursuant to the requirements of §257.96(a) and (f), GenOn initiated an assessment of corrective measures on August 8, 2018 (the date of discovery), including corresponding notification to PADEP [§257.106(h)(7)], placement of such into the Station's operating records [§257.105(h)(9)], and posting to the publicly accessible website [§257.107(h)(7)]. To minimize potential impacts to human health and/or the environment, Conemaugh Station conducted interim/corrective measures to stabilize/improve the areas which were affected by the release and to reclaim (via vacuum truck) the surficially-deposited CCR materials from along the reaches of the East Valley mitigation stream.

Soil and surface water sampling was conducted to confirm and document the adequacy of the overall cleanup efforts and corrective measures implementation. As required, an Assessment of Corrective Measures Report was prepared to further discuss the CCR release incident, the measures implemented and final resolution. Per the Rule, the Assessment of Corrective Measures Report must be included as part of the Annual Groundwater Monitoring and Corrective Action

Report, and as such, this report is presented in Appendix B. A standalone copy of the Assessment of Corrective Measures Report was placed in the Conemaugh Station's operating record per §257.105(h)(10), noticed to PADEP per §257.106(h)(8), and posted to the publicly accessible website per §257.107(h)(8).

3.6 2019 Projected Activities

It is anticipated that Assessment Monitoring activities will continue for the Ash Disposal Site during 2019, with continued review of Appendix III/Appendix IV constituent concentrations and comparison against calculated background and established groundwater protection standards.

Tables

Table 1
Conemaugh Generating Station
Ash Filter Ponds--Groundwater Analytical Data
CCR Appendix III Constituents

Monitoring Well	Date Sampled	Groundwater Elevation (ft. MSL)	Total Boron (mg/L)	Total Calcium (mg/L)	Total Chloride (mg/L)	Total Fluoride (mg/L)	Total Dissolved Solids (mg/L)	Sulfate (mg/L)	pH (S.U.)
			Calculated Background						
			0.58	376	1560	0.20	6975	788	4.59-7.42
MW-1B (Upgradient)	17-Dec-15	1070.99	0.29	333	1540	< 0.1	3620	544	5.49
	27-Jan-16	1071.19	0.31	288	1280	< 0.1	3180	583	5.87
	20-Apr-16	1071.69	0.28	170	652	< 0.5	2410	729	6.09
	19-Jul-16	1071.69	0.36	208	1310	0.1	2760	575	5.79
	11-Oct-16	1072.99	0.46	192	1010	0.2	2640	438	6.56
	17-Jan-17	1072.54	0.43	198	1030	< 0.1	2650	427	5.87
	24-Apr-17	1072.69	0.37	166	988	< 0.1	2470	548	5.27
	20-Jul-17	1072.04	0.39	345	1560	< 0.1	3740	388	5.00
	1-Oct-17	1070.84	0.36	430	2040	< 0.1	4930	427	5.68
	22-May-18	1074.94	0.39	120	640	< 0.1	1680	364	5.91
	18-Oct-18	1074.69	0.89	53	288	3.1	1340	543	7.56
MW-2 (Upgradient)	11-Oct-16	1072.72	0.30	191	251	< 0.1	1200	348	6.28
	16-Nov-16	1072.42	0.31	176	94	0.1	868	416	6.95
	21-Dec-16	1073.02	0.41	176	101	0.2	1050	519	7.03
	25-Jan-17	1073.72	0.21	137	68	0.2	726	316	6.93
	21-Mar-17	1073.82	0.33	158	75	0.1	828	387	6.40
	25-Apr-17	1072.92	0.29	136	69	< 0.1	792	373	6.28
	13-Jun-17	1073.02	0.30	150	60	< 0.1	768	369	6.15
	27-Jul-17	1072.57	0.28	133	67	< 0.1	684	310	6.45
	4-Oct-17	1071.17	0.32	138	58	< 0.1	768	330	6.80
	29-May-18	1075.57	0.10	98	22	0.4	606	185	7.10
	23-Oct-18	1075.37	0.18	105	21	0.4	550	192	6.97
MW-3 (Downgradient)	16-Dec-15	1065.24	< 0.05	123	363	< 0.1	882	227	5.74
	26-Jan-16	1065.89	< 0.05	132	392	< 0.1	970	250	5.94
	25-Apr-16	1066.14	< 0.05	203	505	< 0.1	1460	288	6.52
	25-Jul-16	1064.99	< 0.05	115	343	< 0.1	972	225	5.72
	24-Oct-16	1066.19	< 0.05	123	304	< 0.1	902	211	6.01
	17-Jan-17	1066.94	< 0.05	113	370	< 0.1	976	245	5.95
	25-Apr-17	1067.09	< 0.05	181	552	< 0.1	1740	314	5.57
	25-Jul-17	1065.99	< 0.05	151	389	< 0.1	1270	256	5.47
	1-Oct-17	1064.89	< 0.05	135	387	< 0.1	1140	255	6.30
	23-May-18	1067.79	< 0.05	175	455	< 0.1	1330	276	6.07
	23-Oct-18	1068.29	< 0.05	152	440	< 0.1	1150	293	5.75
MW-4 (Downgradient)	21-Dec-15	1069.53	0.15	301	643	< 0.1	2470	874	5.77
	4-Feb-16	1069.73	0.13	316	654	< 0.1	2580	870	5.83
	26-Apr-16	1070.08	0.13	426	932	< 0.1	3390	965	6.19
	25-Jul-16	1068.98	0.12	346	874	< 0.1	3120	1090	5.82
	26-Oct-16	1070.08	0.17	310	670	< 0.1	2530	865	6.27
	30-Jan-17	1070.88	0.15	301	736	< 0.1	2740	895	6.12
	26-Apr-17	1070.93	0.14	392	863	< 0.1	3310	996	6.68
	27-Jul-17	1070.23	0.19	403	977	< 0.1	3350	1170	5.63
	4-Oct-17	1068.83	0.14	335	814	< 0.2	3200	1050	6.02
	29-May-18	1070.53	0.13	345	842	< 0.1	3280	1010	5.96
	24-Oct-18	1071.93	0.14	290	589	< 0.1	2550	927	5.99
MW-23 (Downgradient)	20-Dec-15	1068.03	< 0.05	182	388	< 0.1	1580	653	5.59
	2-Feb-16	1069.08	< 0.05	176	344	< 0.1	1520	576	5.98
	25-Apr-16	1069.38	< 0.05	175	329	< 0.1	1540	557	5.16
	21-Jul-16	1067.93	0.34	173	371	< 0.1	1600	591	5.63
	24-Oct-16	1068.83	< 0.05	173	327	< 0.1	1540	509	6.14
	18-Jan-17	1070.13	0.11	165	368	< 0.1	1550	543	5.79
	24-Apr-17	1069.68	< 0.05	164	383	< 0.1	1520	558	5.21
	24-Jul-17	1069.18	< 0.05	183	378	< 0.1	1530	532	5.15
	1-Oct-17	1067.98	< 0.05	172	313	< 0.1	1520	575	6.25
	22-May-18	1071.18	< 0.05	181	347	< 0.1	1460	507	5.63
	22-Oct-18	1071.13	< 0.05	165	355	< 0.1	1450	538	5.70

Notes:

1. Cells with "<" are represented as non-detects. Values shown correspond to the laboratory reporting limit.
2. Background values based on statistical evaluation of initial eight rounds (Dec. 2015 thru July 2017) of groundwater sampling data for Wells MW-1B and MW-2.

Table 2
Conemaugh Generating Station
Ash Filter Ponds--Groundwater Analytical Data
CCR Appendix IV Constituents

Monitoring Well	Date Sampled	Total Antimony (mg/L)	Total Arsenic (mg/L)	Total Barium (mg/L)	Total Beryllium (mg/L)	Total Cadmium (mg/L)	Total Chromium (mg/L)	Total Cobalt (mg/L)	Total Fluoride (mg/L)	Total Lead (mg/L)	Total Lithium (mg/L)	Total Mercury (mg/L)	Total Molybdenum (mg/L)	Total Selenium (mg/L)	Total Thallium (mg/L)	Total Radium-226 and 228 (pCi/L)
		Calculated Background														
		0.001	0.001	0.04	0.001	0.005	0.01	0.013	0.2	0.001	0.03	0.0002	0.02	0.001	0.0002	4.24
		Groundwater Protection Standard														
		MCL	MCL	MCL	MCL	MCL	MCL	RSL	MCL	RSL	RSL	MCL	RSL	MCL	MCL	MCL
		0.006	0.01	2	0.004	0.005	0.1	0.006	4.0	0.015	0.04	0.002	0.10	0.05	0.002	5
MW-1B (Upgradient)	17-Dec-15	< 0.001	< 0.001	0.04	< 0.001	0.005	< 0.01	0.012	< 0.1	< 0.001	0.03	< 0.0002	< 0.02	< 0.001	< 0.0002	4.24
	27-Jan-16	< 0.001	< 0.001	0.03	< 0.001	0.005	< 0.01	< 0.005	< 0.1	< 0.001	0.02	< 0.0002	< 0.02	< 0.001	< 0.0002	0.29
	20-Apr-16	< 0.001	< 0.001	0.01	< 0.001	< 0.002	< 0.01	< 0.005	< 0.5	< 0.001	0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.72
	19-Jul-16	< 0.001	< 0.001	0.02	< 0.001	< 0.002	< 0.01	0.006	0.1	< 0.001	0.02	< 0.0002	< 0.02	< 0.001	< 0.0002	1.31
	11-Oct-16	< 0.001	< 0.001	0.02	< 0.001	0.002	< 0.01	< 0.005	0.2	< 0.001	0.02	< 0.0002	< 0.02	< 0.001	< 0.0002	0.78
	17-Jan-17	< 0.001	< 0.001	0.02	< 0.001	0.002	< 0.01	0.005	< 0.1	< 0.001	0.02	< 0.0002	< 0.02	< 0.001	< 0.0002	0.24
	24-Apr-17	< 0.001	< 0.001	0.02	< 0.001	0.002	< 0.01	0.005	< 0.1	< 0.001	0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.77
	20-Jul-17	< 0.001	< 0.001	0.03	< 0.001	0.005	< 0.01	0.013	< 0.1	< 0.001	0.02	< 0.0002	< 0.02	< 0.001	< 0.0002	1.03
MW-2 (Upgradient)	11-Oct-16	< 0.001	< 0.001	0.02	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.69
	16-Nov-16	< 0.001	< 0.001	0.02	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.44
	21-Dec-16	< 0.001	< 0.001	0.02	< 0.001	< 0.002	< 0.01	< 0.005	0.2	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.43
	25-Jan-17	< 0.001	< 0.001	0.01	< 0.001	< 0.002	< 0.01	< 0.005	0.2	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.88
	21-Mar-17	< 0.001	< 0.001	0.02	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.09
	25-Apr-17	< 0.001	< 0.001	0.02	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.35
	13-Jun-17	< 0.001	< 0.001	0.02	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	0.001	< 0.0002	0.80
	27-Jul-17	< 0.001	< 0.001	0.01	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.14
MW-3 (Downgradient)	16-Dec-15	< 0.001	< 0.001	0.04	< 0.001	< 0.002	< 0.01	0.009	< 0.1	< 0.001	0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.44
	26-Jan-16	< 0.001	< 0.001	0.03	< 0.001	< 0.002	< 0.01	0.011	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.86
	25-Apr-16	< 0.001	< 0.001	0.03	< 0.001	< 0.002	< 0.01	0.014	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.60
	25-Jul-16	< 0.001	< 0.001	0.03	< 0.001	< 0.002	< 0.01	0.009	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.46
	24-Oct-16	< 0.001	< 0.001	0.04	< 0.001	< 0.002	< 0.01	0.012	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	1.34
	17-Jan-17	< 0.001	< 0.001	0.03	< 0.001	< 0.002	< 0.01	0.008	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.28
	25-Apr-17	< 0.001	< 0.001	0.03	< 0.001	< 0.002	< 0.01	0.013	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.45
	25-Jul-17	< 0.001	< 0.001	0.03	< 0.001	< 0.002	< 0.01	0.010	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	1.33
MW-4 (Downgradient)	21-Dec-15	< 0.001	< 0.001	0.01	< 0.001	0.002	< 0.01	0.039	< 0.1	< 0.001	0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	1.20
	4-Feb-16	< 0.001	< 0.001	0.01	< 0.001	0.003	< 0.01	0.038	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.47
	26-Apr-16	< 0.001	< 0.001	0.02	< 0.001	0.003	< 0.01	0.039	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	1.15
	25-Jul-16	< 0.001	< 0.001	0.01	< 0.001	0.003	< 0.01	0.035	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.43
	26-Oct-16	< 0.001	< 0.001	0.01	< 0.001	0.003	< 0.01	0.037	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.72
	30-Jan-17	< 0.001	< 0.001	0.01	< 0.001	0.003	< 0.01	0.034	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.09
	26-Apr-17	< 0.001	< 0.001	0.01	< 0.001	0.004	< 0.01	0.041	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.73
	27-Jul-17	< 0.001	< 0.001	0.01	< 0.001	0.003	< 0.01	0.039	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	1.24
MW-23 (Downgradient)	20-Dec-15	< 0.001	< 0.001	0.01	< 0.001	0.002	< 0.01	0.114	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	6.87
	2-Feb-16	< 0.001	< 0.001	0.02	< 0.001	0.002	< 0.01	0.106	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	1.03
	25-Apr-16	< 0.001	0.001	0.01	< 0.001	0.002	< 0.01	0.123	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.56
	21-Jul-16	< 0.001	< 0.001	0.01	< 0.001	0.003	< 0.01	0.114	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.65
	24-Oct-16	< 0.001	0.001	0.02	< 0.001	< 0.002	< 0.01	0.099	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.12
	18-Jan-17	< 0.001	< 0.001	0.02	< 0.001	0.002	< 0.01	0.100	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.66
	24-Apr-17	< 0.001	< 0.001	0.01	< 0.001	< 0.002	< 0.01	0.097	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.40
	24-Jul-17	< 0.001	< 0.001	0.01	< 0.001	< 0.002	< 0.01	0.095	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.21

Notes:

1. Cells with "<" are represented as non-detects. Values shown correspond to the laboratory reporting limit.
2. Background values based on statistical evaluation of initial eight rounds (Dec. 2015 thru July 2017) of groundwater sampling data for Wells MW-1B and MW-2.
3. As indicated, Groundwater Protection Standards are either published MCLs or risk-based Regional Screening Levels (RSLs). For constituents where calculated background exceeds either the MCL or RSL, the background value is used.

Table 3
Conemaugh Generating Station
Ash Disposal Site--Groundwater Analytical Data
CCR Appendix III Constituents

Monitoring Well	Date Sampled	Groundwater Elevation (ft. MSL)	Total Boron (mg/L)	Total Calcium (mg/L)	Total Chloride (mg/L)	Total Fluoride (mg/L)	Total Dissolved Solids (mg/L)	Sulfate (mg/L)	pH (S.U.)
			Calculated Background						
			0.05	8.86	1	0.1	96.2	4	4.07-6.81
MW-31 (Upgradient)	20-Dec-15	1435.54	< 0.05	6.2	1	< 0.1	50	4	6.15
	1-Feb-16	1438.04	< 0.05	7.1	1	< 0.1	34	4	6.42
	20-Apr-16	1439.54	< 0.05	7.8	< 1	< 0.1	44	4	6.45
	20-Jul-16	1435.89	< 0.05	6.3	1	< 0.1	58	4	6.24
	25-Oct-16	1436.24	< 0.05	6.7	1	< 0.1	70	4	5.82
	19-Jan-17	1438.74	< 0.05	6.4	1	< 0.1	64	3	6.19
	12-Apr-17	1439.74	< 0.05	6.2	1	< 0.1	52	4	5.75
	25-Jul-17	1437.24	< 0.05	7.4	1	< 0.1	72	4	5.62
	3-Oct-17	1434.49	< 0.05	6.6	1	< 0.1	32	4	6.36
	24-May-18	1441.64	< 0.05	6.2	1	< 0.1	58	4	6.29
	22-Oct-18	1439.94	< 0.05	84.9	1	< 0.1	40	4	6.17
MW-9 (Downgradient)	17-Dec-15	1100.47	< 0.05	102	83	0.1	426	72	7.08
	28-Jan-16	1100.57	0.09	102	97	0.1	424	63	7.20
	21-Apr-16	1099.77	< 0.05	96	81	0.1	398	65	7.38
	20-Jul-16	1098.97	0.05	99	93	< 0.1	466	62	7.57
	16-Nov-16	1099.82	< 0.05	104	94	< 0.1	466	55	7.05
	23-Jan-17	1100.77	< 0.05	96	92	< 0.1	406	65	7.27
	12-Apr-17	1099.47	< 0.05	96	96	< 0.1	446	77	6.74
	24-Jul-17	1099.82	< 0.05	104	98	< 0.1	456	79	6.60
	2-Oct-17	1099.67	< 0.05	94	92	< 0.1	430	75	7.41
	23-May-18	1100.17	< 0.05	104	112	< 0.1	456	84	7.29
	17-Oct-18	1100.32	< 0.05	102	109	< 0.1	472	67	7.09
MW-10 (Downgradient)	16-Dec-15	1103.26	< 0.05	106	90	0.1	444	97	7.71
	1-Feb-16	1103.36	< 0.05	102	100	0.1	416	107	7.56
	19-Apr-16	1103.06	< 0.05	102	95	0.1	454	99	7.45
	25-Jul-16	1102.16	< 0.05	100	91	0.1	476	114	7.25
	25-Oct-16	1102.16	< 0.05	117	84	0.1	522	113	7.50
	25-Jan-17	1103.86	< 0.05	94	105	< 0.1	482	110	7.21
	13-Apr-17	1102.86	< 0.05	97	99	< 0.1	460	97	6.77
	26-Jul-17	1102.66	0.05	108	94	< 0.1	508	127	6.75
	3-Oct-17	1102.61	< 0.05	111	91	0.1	490	130	7.38
	29-May-18	1104.76	< 0.05	99	99	0.1	492	106	7.14
	17-Oct-18	1103.66	< 0.05	98	89	0.1	456	106	7.10
MW-11 (Downgradient)	21-Dec-15	1102.68	0.08	180	55	0.1	814	223	6.77
	27-Jan-16	1103.38	0.09	169	48	< 0.1	776	191	7.02
	21-Apr-16	1102.63	0.07	161	46	< 0.1	754	170	7.31
	21-Jul-16	1101.68	0.14	156	52	< 0.1	754	208	7.37
	20-Oct-16	1101.93	0.09	166	48	0.1	754	199	6.97
	23-Jan-17	1103.63	< 0.05	164	51	0.1	770	207	6.98
	13-Apr-17	1103.28	0.07	170	49	< 0.1	774	183	6.65
	26-Jul-17	1102.33	0.10	150	60	< 0.1	700	182	6.35
	2-Oct-17	1102.48	0.07	151	61	0.1	732	210	7.20
	24-May-18	1103.08	< 0.05	139	54	0.1	736	192	7.02
	18-Oct-18	1102.93	0.07	169	60	0.1	750	194	6.94

Notes:
1. Cells with "<" are represented as non-detects. Values shown correspond to the laboratory reporting limit.
2. Background values based on statistical evaluation of initial eight rounds (Dec. 2015 thru July 2017) of groundwater sampling data for Well MW-31.

Table 4
Conemaugh Generating Station
Ash Disposal Site--Groundwater Analytical Data
CCR Appendix IV Constituents

Monitoring Well	Date Sampled	Total Antimony (mg/L)	Total Arsenic (mg/L)	Total Barium (mg/L)	Total Beryllium (mg/L)	Total Cadmium (mg/L)	Total Chromium (mg/L)	Total Cobalt (mg/L)	Total Fluoride (mg/L)	Total Lead (mg/L)	Total Lithium (mg/L)	Total Mercury (mg/L)	Total Molybdenum (mg/L)	Total Selenium (mg/L)	Total Thallium (mg/L)	Total Radium-226 and 228 (pCi/L)
		Calculated Background														
		0.001	0.001	0.02	0.001	0.002	0.01	0.005	0.1	0.001	0.01	0.0002	0.02	0.001	0.0002	1.89
		Groundwater Protection Standard														
		MCL	MCL	MCL	MCL	MCL	MCL	RSL	MCL	RSL	RSL	MCL	RSL	MCL	MCL	MCL
		0.006	0.01	2	0.004	0.005	0.1	0.006	4.0	0.15	0.04	0.002	0.10	0.05	0.002	5
MW-31 (Upgradient)	20-Dec-15	< 0.001	< 0.001	0.02	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	14.1
	1-Feb-16	< 0.001	< 0.001	0.01	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.08
	20-Apr-16	< 0.001	< 0.001	0.01	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.75
	20-Jul-16	< 0.001	< 0.001	0.01	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.77
	25-Oct-16	< 0.001	< 0.001	0.01	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.42
	19-Jan-17	< 0.001	< 0.001	0.01	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.03
	12-Apr-17	< 0.001	< 0.001	< 0.01	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.51
	25-Jul-17	< 0.001	< 0.001	< 0.01	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	-0.05
	28-Mar-18	< 0.001	< 0.001	< 0.01	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.63
	24-May-18	Not Analyzed	Not Analyzed	< 0.01	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	< 0.1	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	0.40
	22-Oct-18	Not Analyzed	Not Analyzed	0.01	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	< 0.1	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	0.71
MW-9 (Downgradient)	17-Dec-15	< 0.001	< 0.001	0.17	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	3.66
	28-Jan-16	< 0.001	< 0.001	0.05	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.18
	21-Apr-16	< 0.001	< 0.001	0.04	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	3.90
	20-Jul-16	< 0.001	< 0.001	0.04	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	-0.05
	16-Nov-16	< 0.001	< 0.001	0.05	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.78
	23-Jan-17	< 0.001	< 0.001	0.04	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.70
	12-Apr-17	< 0.001	< 0.001	0.04	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.03
	24-Jul-17	< 0.001	< 0.001	0.05	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.74
	28-Mar-18	< 0.001	< 0.001	0.05	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.37
	23-May-18	Not Analyzed	Not Analyzed	0.04	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	< 0.1	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	0.32
	17-Oct-18	Not Analyzed	Not Analyzed	0.05	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	< 0.1	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	0.67
MW-10 (Downgradient)	16-Dec-15	< 0.001	< 0.001	0.06	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	-0.04
	1-Feb-16	< 0.001	< 0.001	0.06	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.25
	19-Apr-16	< 0.001	< 0.001	0.10	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.68
	25-Jul-16	< 0.001	< 0.001	0.06	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.55
	25-Oct-16	< 0.001	< 0.001	0.06	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.62
	25-Jan-17	< 0.001	< 0.001	0.05	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.29
	13-Apr-17	< 0.001	< 0.001	0.04	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.34
	26-Jul-17	< 0.001	< 0.001	0.04	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	1.05
	29-Mar-18	< 0.001	< 0.001	0.04	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.29
	29-May-18	Not Analyzed	Not Analyzed	0.03	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	0.1	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	0.33
	17-Oct-18	Not Analyzed	Not Analyzed	0.04	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	0.1	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	0.48
MW-11 (Downgradient)	21-Dec-15	< 0.001	< 0.001	0.07	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	2.21
	27-Jan-16	< 0.001	< 0.001	0.06	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.33
	21-Apr-16	< 0.001	< 0.001	0.06	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	3.18
	21-Jul-16	< 0.001	< 0.001	0.08	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.70
	20-Oct-16	< 0.001	< 0.001	0.06	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.93
	23-Jan-17	< 0.001	< 0.001	0.07	< 0.001	< 0.002	< 0.01	< 0.005	0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.48
	13-Apr-17	< 0.001	< 0.001	0.07	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	1.46
	26-Jul-17	< 0.001	< 0.001	0.05	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.80
	29-Mar-18	< 0.001	< 0.001	0.08	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.78
	24-May-18	Not Analyzed	Not Analyzed	0.07	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	0.1	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	0.83
	18-Oct-18	Not Analyzed	Not Analyzed	0.07	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	0.1	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	1.20

= Value determined as a statistical outlier and excluded from background calculations.

= Result from July 17, 2018 re-sampling; prior result from May 23, 2018 sampling (103.6 pCi/L) was associated with use of incorrect analytical Method (gamma spec Method 901.1).

Notes:

1. Cells with "<" are represented as non-detects. Values shown correspond to the laboratory reporting limit.
2. Background values based on statistical evaluation of initial eight rounds (Dec. 2015 thru July 2017) of groundwater sampling data for Well MW-31.
3. As indicated, Groundwater Protection Standards are either published MCLs or risk-based Regional Screening Levels (RSLs). For constituents where calculated background exceeds either the MCL or RSL, the background value is used.

Figures

LEGEND:

MW-3 (1068.29) — CCR GROUNDWATER MONITORING WELL WITH GROUNDWATER ELEVATION MEASURED BETWEEN OCTOBER 18 AND 24, 2018.

GROUNDWATER FLOW DIRECTION

REFERENCE:

GOOGLE AERIAL PHOTOGRAPHY, DATED 10/2015.

SCALE

0 100 200 FEET

APTIM

500 Penn Center Boulevard,
Suite 1000
Pittsburgh, Pennsylvania 15235

GenOn

FIGURE 1
CCR COMPLIANCE GROUNDWATER MONITORING WELL LOCATION MAP
ASH FILTER PONDS
CONEMAUGH GENERATING STATION
INDIANA COUNTY, PENNSYLVANIA

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Pittsburgh, PA	12/11/18	--	E. Schlegel	--	--	1009144003-B8

File: O:\PROJECT\1009144003_Conemaugh\1009144003-B8.dwg
Plot Date/Time: Dec 12, 2018 - 6:25am
Plotted By: Greg.Jones
Xref : Image

LEGEND:

MW-9 (1100.32) — CCR GROUNDWATER MONITORING WELL WITH GROUNDWATER ELEVATION MEASURED BETWEEN OCTOBER 17 AND 22, 2018.

GROUNDWATER FLOW DIRECTION

REFERENCE:

GOOGLE AERIAL PHOTOGRAPH, DATED 10/2015.

APTIM
500 Penn Center Boulevard, Suite 1000
Pittsburgh, Pennsylvania 15235

GenOn

FIGURE 2
CCR COMPLIANCE GROUNDWATER MONITORING WELL LOCATION MAP
ASH/REFUSE DISPOSAL SITE
CONEMAUGH GENERATING STATION
INDIANA COUNTY, PENNSYLVANIA

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Pittsburgh, PA	12/11/18	--	E. Schlegel	--	--	1009144003-B9

File: O:\PROJECT\1009144003_Conemaugh\1009144003-B9.dwg
Plot Date/Time: Dec 12, 2018 - 6:32am
Plotted By: Greg.Jones
Xref: Image

Appendix A

Ash Filter Ponds--Alternate Source Demonstration

CCR COMPLIANCE
ALTERNATE SOURCE DEMONSTRATION
APPENDIX III GROUNDWATER EVALUATION
OF A STATISTICALLY SIGNIFICANT INCREASE AT THE CONEMAUGH ASH FILTER PONDS

Prepared for:

GenOn Northeast Management Company
Conemaugh Generating Station
New Florence, Pennsylvania

Prepared by:

Aptim Environmental & Infrastructure, Inc.
St. Charles, Illinois

April 2018

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1.0 Introduction

Title 40 Code of Federal Regulations (CFR) §257.90 mandates that existing Coal Combustion Residuals (CCR) impoundments, also known as CCR units, be subject to groundwater monitoring and corrective action requirements as further detailed in §257.91 through §257.98. These requirements are part of the overall CCR Rule (or Rule) which was published in the Federal Register on April 17, 2015 and which became effective on October 19, 2015. Specific obligations for Owners and Operators of existing CCR units regarding the requirements for groundwater sampling as part of the CCR Detection Monitoring Program are outlined in §257.94.

The Conemaugh Generating Station (Conemaugh), operated by GenOn Northeast Management Company, is a coal-fired steam turbine-driven electric generation station located in New Florence, Pennsylvania. The Rule applies to this facility due to the management/disposal of CCR materials that are generated from the combustion of coal. CCR units associated with Conemaugh operations include four Ash Filter Ponds (Ponds "A," "B," "C," and "D") and the Ash/Refuse Disposal Site (not the subject of this current document). The Ash Filter Ponds have a dedicated groundwater monitoring system that was originally installed to comply with Commonwealth of Pennsylvania Residual Waste Regulations, and was subsequently evaluated and modified for use under the CCR program. Additionally, in accordance with the provisions of §257.91(d) of the Rule, the groundwater monitoring system for the Ash Filter Ponds has been designated to provide coverage in the context of a multiunit system encompassing all four ponds collectively.

In accordance with §257.94(b), groundwater sampling in support of the CCR Detection Monitoring Program was conducted during the 4th quarter of 2017 at the Conemaugh Ash Filter Ponds. Samples were collected on October 1-4, 2017, and subsequently analyzed for CCR Appendix III constituents only. The analytical data from this sampling event has served as the first point of comparison to determine if concentrations in any of the downgradient wells are at levels representing a statistically significant increase (SSI) over background concentrations established in the upgradient wells. Results from the October 2017 sampling event showed only one Appendix III constituent (sulfate) at levels above background in one of the downgradient monitoring wells (MW-4).

Following additional review of the data and preliminary consideration of the results as an SSI, a determination was made on January 15, 2018 to conduct an Alternate Source Demonstration per §257.94(e)(2), which includes provisions such that:

> "The owner or operator may demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from an error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality."

Accordingly, this Alternate Source Demonstration (ASD) has been prepared to satisfy the requirements of §257.94(e)(2), and which further stipulates that the ASD must be completed within 90 days of detecting a SSI(s) above background and be certified by a qualified professional engineer. If a successful ASD is completed, then sampling under the CCR Detection Monitoring program may continue for the unit. The ASD must also be included in the Annual Groundwater Monitoring and Corrective Action Report [per §257.90(e)] that must be prepared by January 31 of each year. If at the end of the 90-day period the ASD is proven unsuccessful, the owner or operator of the affected CCR unit must then initiate an Assessment Monitoring Program per §257.95.

2.0 Background

These ash ponds are located within the station proper, are situated immediately adjacent to one another, and are designated from north to south as Bottom Ash Filter Recycle Pond "A" and Bottom Ash Filter Ponds "B," "C," and "D" (see Figure 1). Each pond is approximately 405 feet long by 90 feet wide as measured at the crest and has an average depth of approximately 11 feet as measured from the crest to the top of the protective bottom ash layer. In addition, each of the ponds is constructed with a liner system compliant with the requirements of §257.71, reflecting the certified/documented presence of a two-feet thick clay liner meeting the hydraulic conductivity criteria per §257.71(a)(1)(i).

The groundwater monitoring system for the Ash Filter Ponds is comprised of five wells, including two upgradient wells (MW-1B and MW-2), and three downgradient wells (MW-3, MW-4, and MW-23). All five wells communicate with the alluvium, which is the uppermost aquifer in this portion of the property. The locations of the monitoring wells are also shown on Figure 1, along with a depiction of the generalized groundwater flow direction in the area of the ponds.

Per the requirements of §257.94, background sampling over the course of eight quarterly events was performed (4th QTR 2015 through 3rd QTR 2017) at all five groundwater monitoring wells. Data from upgradient wells MW-1B and MW-2 was then utilized to calculate background levels for each of the Appendix III constituents. The procedures used to calculate the background concentrations are presented in the document entitled "Statistical Method for Groundwater Data Evaluation – Ash Filter Ponds and Ash/Refuse Disposal Site – Conemaugh Generating Station, October 2017." In summary, specialized software that utilizes a statistical predictive algorithm was used to calculate the background concentrations. The quarterly background data for the upgradient wells and the resultant calculated background concentrations derived from the specialized software are presented in Appendix A.

An SSI is realized at a downgradient well if either the concentration at that well is greater than the background concentration, or the pH at that well is outside of the background pH range. As shown in Table 1, the results from the October 2017 Detection Monitoring event showed sulfate concentrations in well MW-4 (1,050 mg/L) to be above the calculated background value (788 mg/L). Based on this observation, a decision was made on January 15, 2018 to evaluate the possible existence of an alternate source for the observed sulfate concentration in well MW-4.

3.0 Geochemical Comparison

Utilizing the data from the October 2017 groundwater sampling event, a geochemical comparison was performed to assist in determining if the SSI for sulfate at well MW-4 originated from the Ash Filter Ponds or from an alternate source. In this regard, a Piper diagram was created to help compare analytical data from the monitoring wells to the liquid in the Ash Filter Ponds. A Piper diagram employs a methodology that is used to compare a known/suspected source to sampling locations, based on the classification and visualization of hydrochemical data. This methodology builds on the recognition that almost 90 percent of dissolved solids in groundwater are attributed to eight ions: Ca^{2+}, Cl^{-}, CO_3^{2-}, HCO_3^{-}, K^{+}, Mg^{2+}, Na^{+}, and SO_4^{2-}.

A Piper diagram normalizes the eight ions into cations and anions. The normalized data are then plotted in three areas, including a center diamond which shows the composition of the sample with respect to both cations and anions, and two triangles that represent either cations or anions in the data. A Piper diagram also combines the concentrations of the anions CO_3^{2-} and HCO_3^{-} and cations Na^{+} and K^{+}, which allows all the major ions to be plotted on one diagram. The illustration below shows the hydrochemical classification system used to construct a Piper diagram. Samples that have been impacted by a source would shift away from upgradient background composition and toward the source composition.

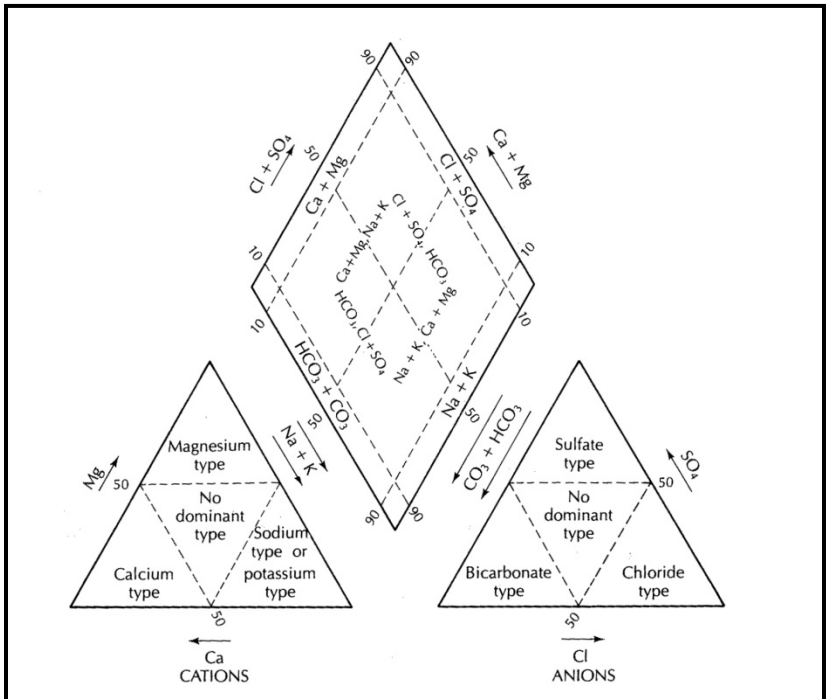

FIGURE 10.9 Hydrogeochemical classification system for natural waters using the trilinear diagram.

Fetter, C.W., Applied Hydrogeology, 1994.

The Piper diagram created for the current evaluation is presented in Figure 2 and makes use of supplemental data collected during the April 2017 CCR background sampling event (see Table 2) from the following locations:

- Upgradient wells MW-1B and MW-2
- Downgradient wells MW-3, MW-4, and MW-23
- Ash Filter Ponds "A" and "B"

It should be noted that the April 2017 analytical data strongly correlate with the October 2017 analytical results, including a possible SSI for sulfate (996 mg/L) at well MW-4, had background values been established at that time.

The Piper diagram further indicates that the geochemical composition of well MW-4 has not been altered by the source composition (Ponds "A" or "B"), as an altered composition would have plotted closer to the source composition. Moreover, the composition of the groundwater within well MW-4 is the least similar of all of the downgradient monitoring wells to the source composition. These observations suggest that the elevated sulfate levels well MW-4 are from a source other than the Ash Filter Ponds.

A final point to note is the presence/absence of boron, which is a recognized component of coal ash and considered to be a very mobile indicator parameter as such. Groundwater impacted by coal ash generally contains appreciable levels of boron. From review of Tables 1 and 2, significant levels of boron are present in the liquid contained within the Ash Filter Pond "A" and "B." Conversely, boron levels are generally non-detect in downgradient wells MW-3 and MW-23, and nearly non-detect in well MW-4 at concentrations seen to be a full order of magnitude less than the concentrations measured in the ponds. If well MW-4 was impacted by the regulated unit, one would expect to see elevated boron levels. These results offer additional evidence to support the differing compositions of well MW-4 versus the ponds, and further bolster the existence of an alternate source for the SSI for sulfate.

4.0 Alternate Source Identification and Conclusions

Based on discussions with Station personnel and understanding of operations in the area of the Ash Filter Ponds, focus was given to possible impacts associated with the gypsum handling operations which originate in the nearby Gypsum Storage Dome. Gypsum is generated as a product of the wet flue gas desulfurization (wet FGD) emissions control system that is designed to remove sulfur dioxide and other pollutants from the coal-fired boiler's flue gas stream. Gypsum is essentially comprised of calcium and sulfate, two of the CCR Appendix III indicator parameters. As shown on Figure 1, the Dome lies east of the Ash Filter Ponds and serves as the starting point for loading and truck-based transportation of gypsum to the Station's Ash/Refuse Disposal Site. The route from the Dome to the Ash/Refuse Disposal Site begins on a paved roadway that runs just south of the Ash Filter Ponds, with downgradient wells MW-3 and MW-4 being located immediately adjacent to this roadway. This roadway is regularly wetted via water trucks as a dust control measure, and any runoff from this section of the roadway will sheetflow in the direction of MW-3 and MW-4. Figure 3 shows a truck loaded with gypsum traveling along the haul road past the monitoring wells and en route to the Ash/Refuse Disposal Site. The photograph used in this figure was captured during APTIM's visit to Conemaugh on March 23, 2018.

Historical sulfate data for the three downgradient monitoring wells, including graphical representations (provided in Appendix B), indicate elevated and rising sulfate levels in all three wells until approximately 2014, when sulfate levels at wells MW-3 and MW-23 began to decline. At the same time, sulfate levels at well MW-4 continued to rise. Inquiries to Conemaugh personnel revealed that a concrete Gypsum Area Sump was newly installed and put on-line in and around this similar 2014 timeframe. As shown on Figure 4, the Gypsum Area Sump included a surface water runoff collection channel and culvert system located just east of well MW-3 and just south of well MW-23. Once functional, the Gypsum Area Sump and associated piping/grading began capturing the surface water runoff (containing gypsum) from the paved roadway near wells MW-3 and MW-23, and sulfate levels in these two wells subsequently decreased.

Well MW-4, however, is not topographically connected to the Gypsum Area Sump and was therefore unaffected by its implementation (refer to Figure 4). Well MW-3 is higher in surface elevation than well MW-4, and therefore, surface water runoff west of well MW-3 flows toward well MW-4 and not into the collection features tied to the Gypsum Area Sump. During APTIM's March 23, 2018 site visit, gypsum residue was present in the immediate area around MW-4 on the ground surface and completely covering the concrete wellpad. These observations were not found at either of the other downgradient monitoring wells. The analytical results from the October 2017 and April 2017 sampling events do bear out the "fingerprint" of gypsum in the form of elevated calcium and sulfate levels in well MW-4. Comparatively lesser concentrations of these

constituents are seen in wells MW-3 and MW-23, most likely due to the noted improvements in surface water drainage in these areas associated with the Gypsum Area Sump installation.

Several notable pieces of evidence have emerged during the course of this demonstration study, each of which points to an alternate source for the SSI for sulfate reported at well MW-4 during the October 2017 Detection Monitoring event. This evidence includes recognized differences in the geochemical composition of the groundwater at well MW-4 versus the liquid contents of the Ash Filter Ponds (refer to Figure 2). Further, the absence of elevated boron levels in all downgradient wells, including well MW-4, indicates a groundwater regime that is not impacted by ash or ash-derived leachate. The competent clay liner system within the ponds also bolsters the confirmation of different characteristics for groundwater outside the ponds when compared to the contents of the ponds themselves. And most notably, the examination of the gypsum handling operations and first-hand observations of gypsum accumulation in the immediate area of well MW-4 due to surface water runoff from the adjacent haul road. Subsequent surface water infiltration through these gypsum residuals and into the underlying groundwater table near well MW-4 is the most plausible explanation for the localized sulfate impacts. Commensurate with this conclusion, the SSI from the October 2017 Detection Monitoring event is deemed not to be in association with the Conemaugh Ash Filter Ponds. Accordingly, and per §257.94(e)(2), Detection Monitoring for the regulated unit will continue on the minimum semiannual frequency as outlined in §257.94(b).

5.0 Professional Engineer's Certification

In accordance with §257.94(e)(2) of the Rule, I hereby certify based on a review of the information contained herein, that the technical and investigatory methods utilized in this Alternate Source Demonstration Report are accurate and appropriate. These methods' application have provided the necessary evidence to conclude that the Conemaugh Ash Filter Ponds are not the source of the SSI observed during the October 2017 Detection Monitoring event.

Certified by: _____

Richard Southorn, P.E., P.G., CPSWQ

Professional Engineer Registration No. PE 085411

Aptim Environmental & Infrastructure, Inc.

Date: April 13, 2018

Tables

Table 1
Conemaugh Generating Station--Ash Filter Ponds
CCR Appendix III Constituents

Monitoring Well	Date Sampled	Total Boron (mg/L)	Total Calcium (mg/L)	Total Chloride (mg/L)	Total Fluoride (mg/L)	Total Dissolved Solids (mg/L)	Sulfate (mg/L)	pH (S.U.)
		Calculated Background						
		0.58	**376**	**1560**	**0.2**	**6975**	**788**	**4.59-7.42**
MW-3 (Downgradient)	1-Oct-17	< 0.05	135	387	< 0.1	1140	255	6.30
MW-4 (Downgradient)	4-Oct-17	0.14	335	814	< 0.2	3200	1050	6.02
MW-23 (Downgradient)	1-Oct-17	< 0.05	172	313	< 0.1	1520	575	6.25

= Statistically Significant Increase (SSI) over Background.

Notes:

1. Cells with "<" are represented as non-detects. Values shown correspond to the laboratory reporting limit.
2. Background values based on statistical evaluation of initial eight rounds of groundwater sampling data from upgradient monitoring wells (see Appendix A).

Table 2
Ash Pond and Monitoring Well Analytical Results (April 2017)
Conemaugh Generating Station

Parameter	Units	MW-1B (Upgradient)	MW-2 (Upgradient)	MW-3 (Downgradient)	MW-4 (Downgradient)	MW-23 (Downgradient)	Pond A	Settling Pond (Pond B)
		4/24/2017	4/25/2017	4/25/2017	4/26/2017	4/24/2017	4/26/2017	4/26/2017
Field Readings:								
Groundwater Elevation	ft MSL	1072.69	1072.92	1067.09	1070.93	1069.68	N/A	N/A
Specific Conductance	µmhos/cm	3890	1106	2470	4750	2280	N/A	N/A
Oxidation-Reduction Potential	mV	331	302	295	325	190	176	197
Dissolved Oxygen	mg/L	2.79	4.03	2.01	3.00	2.74	N/A	N/A
Temperature	^{o}C	16.0	15.5	14.0	14.5	15.5	21.2	27.1
Turbidity	NTU	0.03	3.34	0.35	1.06	5.21	N/A	N/A
pH	S.U.	5.27	6.28	5.57	6.68	5.21	8.37	7.22
CCR Appendix III:								
Total Boron	mg/L	0.37	0.29	ND @ 0.05	0.14	ND @ 0.05	2.70	2.75
Total Calcium	mg/L	166	136	181	392	164	444	443
Total Chloride	mg/L	988	69	552	863	383	91	85
Total Fluoride	mg/L	ND @ 0.1	ND @ 0.1	ND @ 0.1	ND @ 0.1	ND @ 0.1	0.2	0.3
Total Dissolved Solids	mg/L	2470	792	1740	3310	1520	2020	2020
Sulfate	mg/L	548	373	314	996	558	1060	1020
pH	S.U.	5.27	6.28	5.57	6.68	5.21	8.37	7.22
Anions:								
Alkalinity to pH 4.5	mg/L $CaC0_3$	13	112	62	44	30	34	32
Bromide	mg/L	0.5	0.2	1.0	0.3	0.5	1.4	1.4
Chloride	mg/L	995	68	545	892	377	91	85
Fluoride	mg/L	ND @ 0.1	ND @ 0.1	ND @ 0.1	ND @ 0.1	ND @ 0.1	0.2	0.3
Sulfate	mg/L	546	368	312	1000	546	1060	1020
Cations:								
Aluminum	mg/L	ND @ 0.1	0.1	ND @ 0.1	ND @ 0.1	ND @ 0.1	0.5	0.9
Barium	mg/L	0.02	0.02	0.03	0.01	0.01	0.06	0.13
Boron	mg/L	0.39	0.29	ND @ 0.05	0.13	ND @ 0.05	2.70	2.75
Calcium	mg/L	170	142	182	379	172	444	443
Iron	mg/L	ND @ 0.05	0.09	0.23	0.05	18.7	1.74	0.71
Lithium	mg/L	0.01	ND @ 0.01	ND @ 0.01	ND @ 0.01	ND @ 0.01	0.75	0.73
Magnesium	mg/L	29.0	36.4	75.8	98.9	70.2	58.8	56.2
Manganese	mg/L	2.94	0.09	7.30	9.00	11.8	0.35	0.31
Potassium	mg/L	12.5	4.4	2.4	4.3	2.5	20.2	19.8
Sodium	mg/L	683	38.5	180	652	206	74.6	72.7
Strontium	mg/L	0.62	0.39	0.31	0.78	0.14	2.01	2.14
Silica	mg/L	19.3	9.64	15.7	14.5	15.8	4.7	6.1

N/A = Not Analyzed.
ND = Not detected at or above the indicated reporting limit.

Figures

LEGEND:

MW-3 (1064.89) CCR GROUNDWATER MONITORING WELL WITH GROUNDWATER ELEVATION MEASURED BETWEEN OCTOBER 1 AND 4, 2017

GROUNDWATER FLOW DIRECTION

REFERENCE:

GOOGLE AERIAL PHOTOGRAPH, DATED 10/2015.

SCALE

0 100 200 FEET

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FIGURE 1
CCR COMPLIANCE GROUNDWATER MONITORING WELL LOCATION MAP
ASH FILTER PONDS

DRAWN BY:	BWM	APPROVED BY:	DAM	PROJ. NO.:	1009194003	DATE:	APRIL 2018

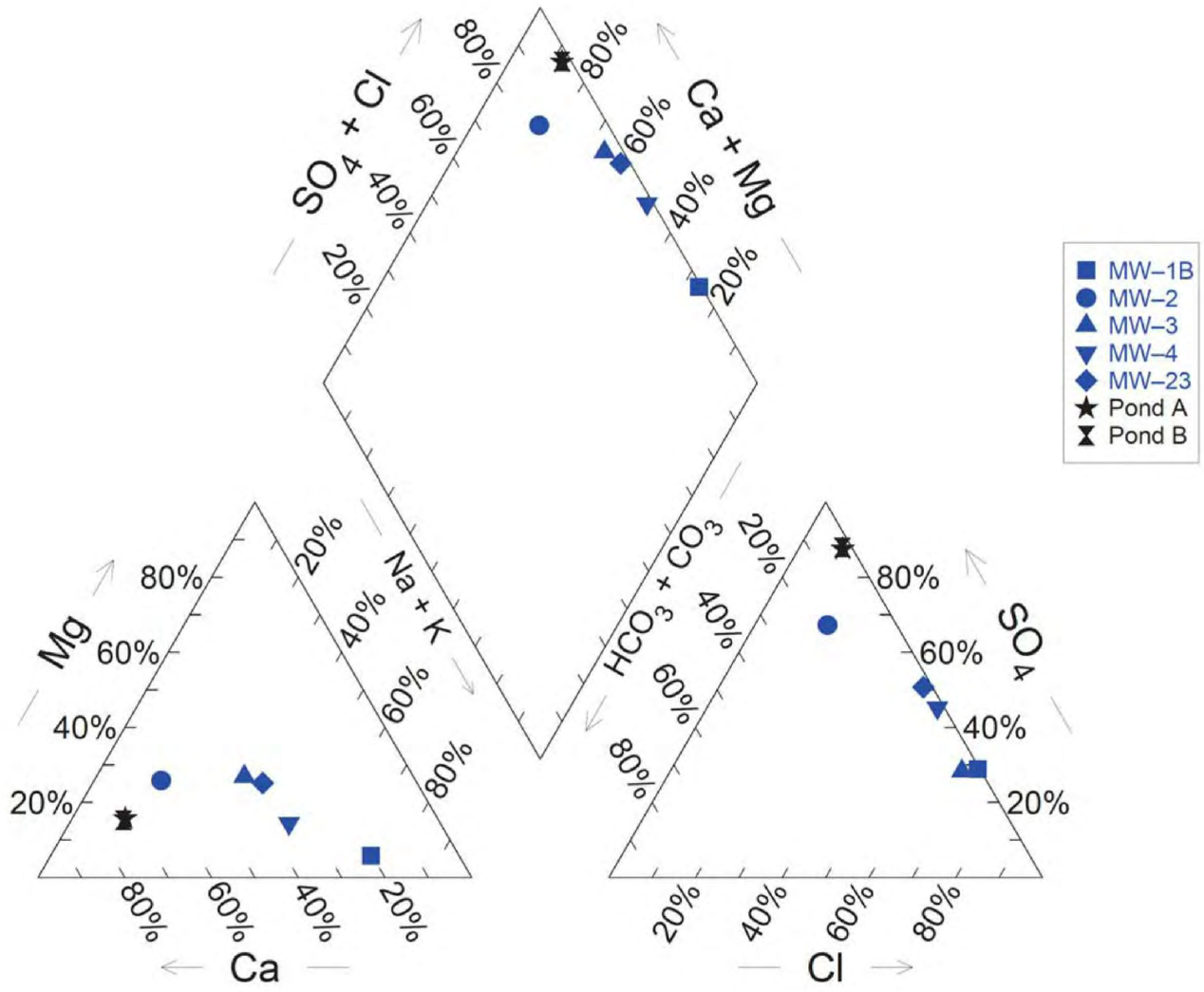

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FIGURE 2
PIPER DIAGRAM

DRAWN BY:	BWM	APPROVED BY:	DAM	PROJ. NO.:	1009194003	DATE:	APRIL 2018

C:\3DCivil\NRG\Conemaugh\Figures\Fig-02-PiperDiagram.dwg, 11x17, 4/9/2018 2:01:35 PM

REFERENCE: PHOTOGRAPH TAKEN MARCH 23, 2018.

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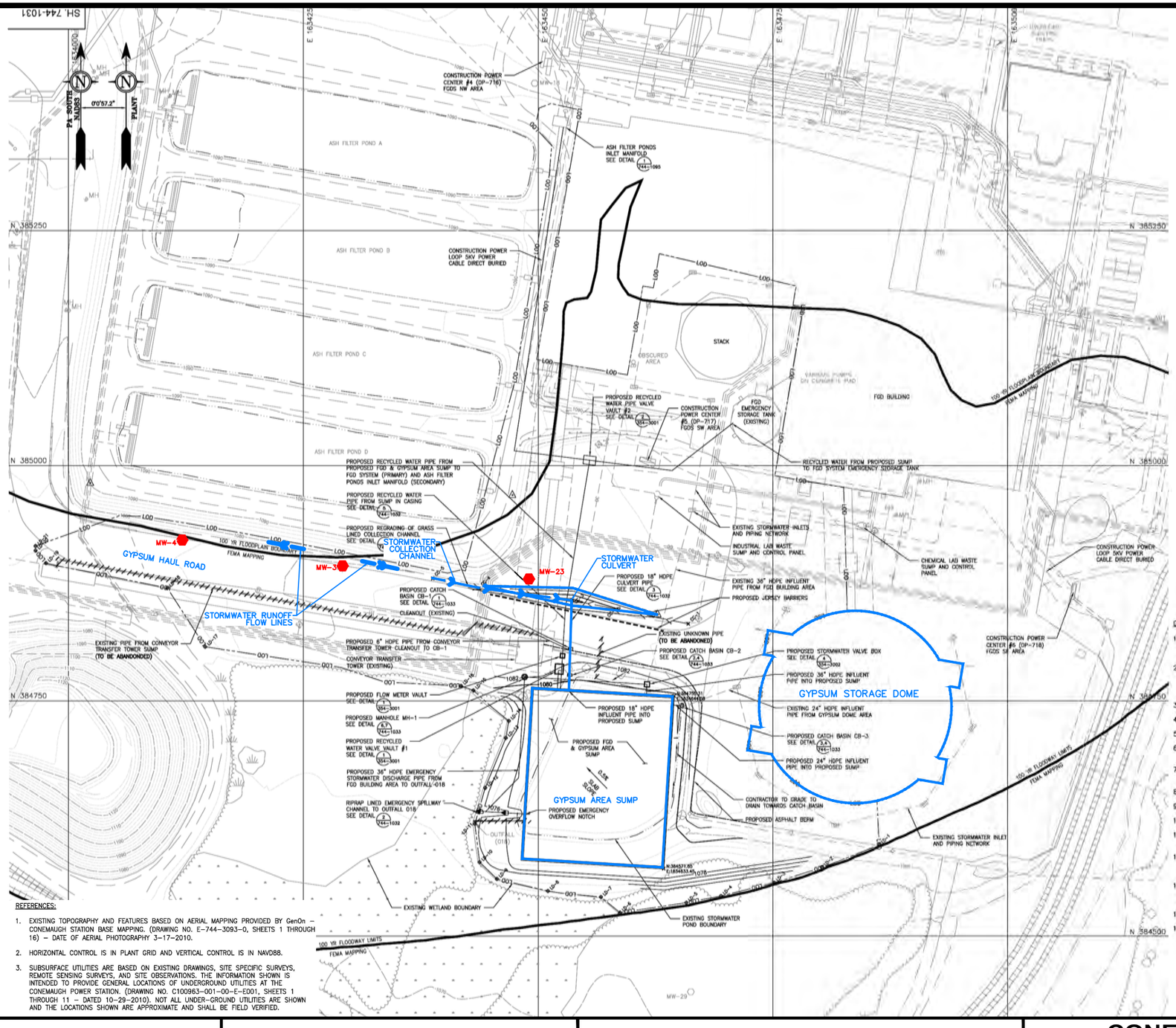
FIGURE 3
PHOTO OF GYPSUM HAUL TRUCK
NEXT TO MONITORING WELLS

DRAWN BY:	BWM	APPROVED BY:	DAM	PROJ. NO.:	1009194003	DATE:	APRIL 2018



GENERAL LEGEND

EXISTING FEATURES	PROPOSED FEATURES
	MONITORING WELL LOCATION
MH	MH MANHOLE
1200	1200 CONTOUR
	BURIED PIPE/CULVERT
	PIPE (TO BE ABANDONED)
	STORMWATER PIPE
	EXISTING POND WATER LEVEL
	CHAIN LINK FENCE/GATE
	TREE LINE
	WETLAND
	RAILROAD LINE
	TREE
	SHRUB
	SURVEY CONTROL POINT
	GUIDE RAIL / BARRIER
	PERIMETER LIGHTING
	FIRE HYDRANT
	STORMWATER PIPE
	STORMWATER INLET
	PROPOSED ASPHALT BERM
	LOD LIMIT OF DISTURBANCE
	POINT LOCATION
	JERSEY BARRIER

Collection Channel

Name	Northing	Easting	Elevation
CC-1	384831.87	1634059.62	1083.91
CC-2	384846.93	1634585.72	1080.01
CC-3	384857.00	1634636.11	1077.40
CC-4	384880.52	1634436.82	1081.33
CC-5	384880.59	1634387.70	1081.58

Limit of Disturbance (LOD)

Name	Northing	Easting
LD-1	384587.01	1634863.23
LD-2	384573.02	1634802.42
LD-3	384556.97	1634751.56
LD-4	384542.73	1634694.42
LD-5	384535.57	1634657.59
LD-6	384524.97	1634586.64
LD-7	384541.60	1634566.66
LD-8	384648.02	1634510.25
LD-9	384560.85	1634455.92
LD-10	384578.52	1634437.51
LD-11	384618.44	1634432.45
LD-12	384657.61	1634443.55
LD-13	384710.67	1634460.46
LD-14	384728.81	1634468.62
LD-15	384781.17	1634430.92
LD-16	384785.93	1634417.74
LD-17	384807.59	1634145.56
LD-18	384868.66	1634105.24
LD-19	384896.53	1633976.13
LD-20	384909.81	1633965.07
LD-21	384914.64	1633965.11

*NOTE: NOT ALL LIMIT OF DISTURBANCE BOUNDARY POINTS ARE SHOWN.

GENERAL NOTES:

1. EROSION AND SEDIMENTATION (E&S) CONTROL MEASURES ARE TO BE INSTALLED ACCORDING TO THE 01/18/2013 APPROVED E&S CONTROL PLAN PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
2. THE APPROXIMATE LOCATION OF THE 100 YEAR FLOODWAY LIMITS AND FLOODPLAIN BOUNDARIES ARE BASED ON FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) MAPPING, FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY-PANEL NUMBER 421724 0014B, EFFECTIVE DATE APRIL 2,1990.
3. FOR VALVE VAULTS AND PIPING SUPPORT DETAILS, SEE DRAWINGS 354-3001 AND 354-3002.
4. FOR ENLARGED PLAN OF SUMP, SEE DRAWING 436-1054.
5. FOR SUMP STRUCTURAL DETAILS AND SECTIONS, SEE DRAWING 436-1055.
6. PROPOSED INFLUENT PIPING SHALL BE HDPE PIPE WITH THE SAME INSIDE DIAMETER AS THE EXISTING STORMWATER PIPE WHICH IT WILL RECEIVE FLOW FROM.
7. PIPES TO BE ABANDONED SHALL BE CUT OFF AND GROUTED SHUT OR REMOVED. CONTRACTOR TO NOTIFY NRG/GenOn PRIOR TO WORK.
8. FOR CONSTRUCTION CONTROL POINTS, SEE DRAWINGS 744-1031, 744-1096, AND 436-1054.
9. FOR DISCHARGE PIPE PROFILES, SEE DRAWING 744-1096.
10. FOR TYPICAL PIPE TRENCH DETAILS, SEE DRAWING 744-1032.
11. STANDARD BOLLARDS TO BE INSTALLED AROUND PROPOSED RECYCLED WATER PIPE VALVE VAULTS. SEE DETAIL 7 ON DRAWING 744-1032 AND DRAWINGS 354-3001 AND 354-3002.
12. SHEET PILING/SHORING SHALL BE DESIGNED AND INSTALLED BY THE CONTRACTOR AS NEEDED TO PREVENT DAMAGE TO THE EXISTING ASPHALT ROAD AND CONVEYOR TRANSFER TOWER. SEE DRAWING 436-1058 FOR SITE SPECIFIC DESIGN CONSIDERATIONS.
13. ROCK ANCHORS SHALL BE INSTALLED PRIOR TO CONSTRUCTION OF THE SUMP BASE SLAB AS SPECIFIED ON DRAWINGS 436-1054, 436-1055, AND 436-1058. A MUD MAT MAY BE INSTALLED TO FACILITATE THE ROCK ANCHOR INSTALLATION.
14. FOR GENERAL NOTES, SEE DRAWING 744-1094.
15. EXISTING STORMWATER POND GRADES, EXISTING GROUND CONTOURS, EXISTING FEATURES, AND UTILITY LOCATIONS MUST BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO STARTING EARTHWORK AND LAYOUT WORK.

REFERENCES:

1. EXISTING TOPOGRAPHY AND FEATURES BASED ON AERIAL MAPPING PROVIDED BY GenOn – CONEMAUGH STATION BASE MAPPING. (DRAWING NO. E-744-3093-0, SHEETS 1 THROUGH 16) – DATE OF AERIAL PHOTOGRAPHY: 3-17-2010.
2. HORIZONTAL CONTROL IS IN PLANT GRID AND VERTICAL CONTROL IS IN NAVD88.
3. SUBSURFACE UTILITIES ARE BASED ON EXISTING DRAWINGS, SITE SPECIFIC SURVEYS, REMOTE SENSING SURVEYS, AND SITE OBSERVATIONS. THE INFORMATION SHOWN IS INTENDED TO PROVIDE GENERAL LOCATIONS OF UNDERGROUND UTILITIES AT THE CONEMAUGH POWER STATION. (DRAWING NO. C100963-001-00-E-E001, SHEETS 1 THROUGH 11 – DATED 10-29-2010). NOT ALL UNDER-GROUND UTILITIES ARE SHOWN AND THE LOCATIONS SHOWN ARE APPROXIMATE AND SHALL BE FIELD VERIFIED.

FIGURE ADAPTED FROM GAI CONSULTANTS "FGD & GYPSUM AREA SUMP GENERAL PLAN", DATED 12-14-12.

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FIGURE 4
FGD & GYPSUM AREA SUMP GENERAL PLAN

DRAWN BY:	BWM	APPROVED BY:	DAM	PROJ. NO.:	1009194003	DATE:	APRIL 2018

Appendix A

Quarterly Background Data for the Upgradient Wells and the Resultant Calculated Background Concentrations

Conemaugh Generating Station--Ash Filter Ponds
Data for Calculation of Background Values
CCR Appendix III Constituents

Monitoring Well	Date Sampled	Total Boron (mg/L)	Total Calcium (mg/L)	Total Chloride (mg/L)	Total Fluoride (mg/L)	Total Dissolved Solids (mg/L)	Sulfate (mg/L)	pH (S.U.)
MW-1B (Upgradient)	17-Dec-15	0.29	333	1540	< 0.1	3620	544	5.49
	27-Jan-16	0.31	288	1280	< 0.1	3180	583	5.87
	20-Apr-16	0.28	170	652	< 0.5	2410	729	6.09
	19-Jul-16	0.36	208	1310	0.1	2760	575	5.79
	11-Oct-16	0.46	192	1010	0.2	2640	438	6.56
	17-Jan-17	0.43	198	1030	< 0.1	2650	427	5.87
	24-Apr-17	0.37	166	988	< 0.1	2470	548	5.27
	20-Jul-17	0.39	345	1560	< 0.1	3740	388	5.00
MW-2 (Upgradient)	11-Oct-16	0.30	191	251	< 0.1	1200	348	6.28
	16-Nov-16	0.31	176	94	0.1	868	416	6.95
	21-Dec-16	0.41	176	101	0.2	1050	519	7.03
	25-Jan-17	0.21	137	68	0.2	726	316	6.93
	21-Mar-17	0.33	158	75	0.1	828	387	6.40
	25-Apr-17	0.29	136	69	< 0.1	792	373	6.28
	13-Jun-17	0.30	150	60	< 0.1	768	369	6.15
	27-Jul-17	0.28	133	67	< 0.1	684	310	6.45

Notes:

1. Cells with "<" are represented as non-detects. Values shown correspond to the laboratory reporting limit.
2. Background values based on statistical evaluation of initial eight rounds of groundwater sampling data; see attached output from Sanitas software application.

Prediction Limit

Conemaugh Generating Station Client: NRG Data: Conemaugh Ash Filter CCR ChemStat Printed 1/15/2018, 10:29 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Boron (mg/L)	n/a	0.5756	n/a	n/a	3 future	n/a	17	0	ln(x)	0.000...	Param Inter 1 of 2
Calcium (mg/L)	n/a	376.3	n/a	n/a	3 future	n/a	17	0	ln(x)	0.000...	Param Inter 1 of 2
Chloride (mg/L)	n/a	1560	n/a	n/a	3 future	n/a	17	0	n/a	0.00563	NP Inter (normality) ...
Fluoride (mg/L)	n/a	0.2	n/a	n/a	3 future	n/a	17	64.71	n/a	0.00563	NP Inter (NDs) 1 of 2
pH (S.U.)	n/a	7.42	4.586	n/a	3 future	n/a	16	0	x^2	0.000...	Param Inter 1 of 2
Sulfate (mg/L)	n/a	788.4	n/a	n/a	3 future	n/a	17	0	ln(x)	0.000...	Param Inter 1 of 2
Total dissolved solids (mg/L)	n/a	6975	n/a	n/a	3 future	n/a	17	0	ln(x)	0.000...	Param Inter 1 of 2

Appendix B

Historical Sulfate Data (Three Downgradient Monitoring Wells)

GEOCHEMICAL TESTING
Environmental and Energy Analysis

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Analyte
Trend
Trend Analysis
Workorders
WorkOrder Tests
Workorders By Site ID
Workorders by Date

Home | Workorders By Site ID | Trend Analysis | Trend Analysis

Analyte Trace

Please select a Date Range and Site:

Note: Date Format MM/DD/YYYY

From: 01/01/2004 To: 12/31/2017

NRG - CONEMAUGH STATION - GW - G1033.10 Search

Select Monitoring Point(s) Select Analyte(s)

MW-3 Sulfate

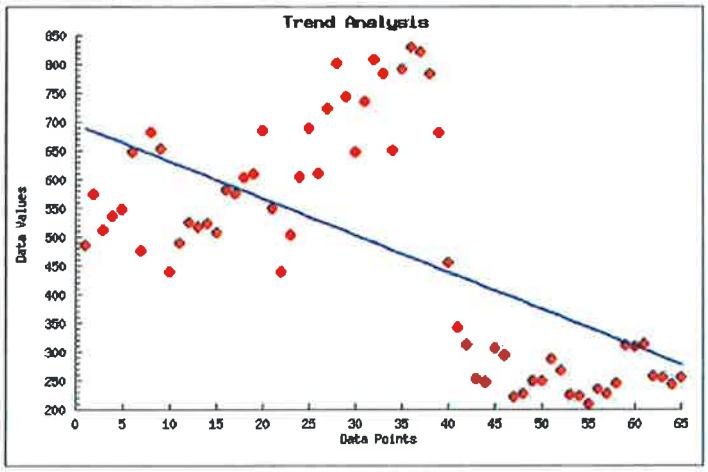
Export CSV

Sample No.	PDF	Attach	Sample ID	Date Sampled	Analyte	Result	QL	Qual	CL	Units	DF	Date/Time Analyzed	Test Method
G1710052			MW-3	10/01/2017	Sulfate	255	2			mg/L	1	10/03/2017 03:19	EPA 300.0
G1710051			MW-3	10/01/2017	Sulfate	243	10		738	mg/L	1	10/02/2017 22:35	EPA 300.0
G1707E08			MW-3	07/25/2017	Sulfate	256	2			mg/L	1	07/26/2017 08:47	EPA 300.0
G1707E07			MW-3	07/25/2017	Sulfate	258	10		738	mg/L	1	07/26/2017 07:18	EPA 300.0
G1704C52			MW-3	04/25/2017	Sulfate	314	2			mg/L	1	04/26/2017 06:28	EPA 300.0
G1704C51			MW-3	04/25/2017	Sulfate	309	10		738	mg/L	1	04/26/2017 05:47	EPA 300.0
G1704C50			MW-3	04/25/2017	Sulfate	312	2			mg/L	1	04/26/2017 01:51	EPA 300.0
G1701801			MW-3	01/17/2017	Sulfate	245	2			mg/L	1	01/17/2017 19:31	EPA 300.0
G1701800			MW-3	01/17/2017	Sulfate	228	10		738	mg/L	1	01/17/2017 18:36	EPA 300.0
G1610C34			MW-3	10/24/2016	Sulfate	237	10		738	mg/L	1	10/24/2016 21:23	EPA 300.0
G1610C33			MW-3	10/24/2016	Sulfate	211	2			mg/L	1	10/25/2016 00:04	EPA 300.0
G1607D13			MW-3	07/25/2016	Sulfate	225	2			mg/L	1	07/26/2016 23:38	EPA 300.0
G1607D12			MW-3	07/25/2016	Sulfate	227	10		738	mg/L	1	07/26/2016 22:34	EPA 300.0
G1604C65			MW-3	04/25/2016	Sulfate	267	10		738	mg/L	1	04/26/2016 00:06	EPA 300.0
G1604C64			MW-3	04/25/2016	Sulfate	288	2			mg/L	1	04/26/2016 01:22	EPA 300.0
G1601B13			MW-3	01/26/2016	Sulfate	250	2			mg/L	1	01/26/2016 19:36	EPA 300.0
G1601B12			MW-3	01/26/2016	Sulfate	249	10		738	mg/L	1	01/26/2016 19:26	EPA 300.0
G1512897			MW-3	12/16/2015	Sulfate	227	2			mg/L	1	12/16/2015 23:44	EPA 300.0
G1510B75			MW-3	10/22/2015	Sulfate	222	10		738	mg/L	1	10/23/2015 11:10	EPA 300.0
G1507A53			MW-3	07/21/2015	Sulfate	293	10		738	mg/L	1	07/21/2015 19:19	EPA 300.0
G1504C97			MW-3	04/27/2015	Sulfate	306	10		738	mg/L	1	04/27/2015 16:04	EPA 300.0
G1502038			MW-3	02/02/2015	Sulfate	248	10		738	mg/L	1	02/02/2015 17:49	EPA 300.0
G1410610			MW-3	10/13/2014	Sulfate	254	10		738	mg/L	1	10/13/2014 19:42	EPA 300.0
G1407578			MW-3	07/10/2014	Sulfate	312	10		738	mg/L	1	07/10/2014 17:57	EPA 300.0
G1404A78			MW-3	04/16/2014	Sulfate	344	10		738	mg/L	1	04/16/2014 18:54	EPA 300.0
G1402036			MW-3	02/03/2014	Sulfate	456	10		738	mg/L	1	02/04/2014 04:22	EPA 300.0
G1310157			MW-3	10/02/2013	Sulfate	681	10		738	mg/L	1	10/03/2013 09:23	EPA 300.0
G1307835			MW-3	07/17/2013	Sulfate	784	10	**	738	mg/L	1	07/19/2013 11:38	EPA 300.0
G1304933			MW-3	04/18/2013	Sulfate	821	10	**	738	mg/L	2	04/19/2013 09:00	EPA 300.0
G1301B90			MW-3	01/28/2013	Sulfate	830	10	**	738	mg/L	1	01/29/2013 09:45	EPA 300.0
G1211317			MW-3	11/07/2012	Sulfate	792	10	**	738	mg/L	1	11/08/2012 14:35	EPA 300.0
G1207908			MW-3	07/23/2012	Sulfate	649	10		738	mg/L	1	07/24/2012 09:07	EPA 300.0
G1204599			MW-3	04/12/2012	Sulfate	784	10	**	738	mg/L	1	04/13/2012 03:21	EPA 300.0
G1201362			MW-3	01/09/2012	Sulfate	807	10	**	738	mg/L	1	01/11/2012 09:16	EPA 300.0
G1110659			MW-3	10/17/2011	Sulfate	736	10		738	mg/L	5	10/26/2011 20:33	EPA 300.0
G1107365			MW-3	07/11/2011	Sulfate	648	10		738	mg/L	1	07/13/2011 03:03	EPA 300.0
G1104803			MW-3	04/21/2011	Sulfate	744	10	**	738	mg/L	1	04/22/2011 01:35	EPA 300.0
G1101588			MW-3	01/18/2011	Sulfate	803	10	**	738	mg/L	1	01/19/2011 11:00	EPA 300.0
G1010090			MW-3	10/04/2010	Sulfate	725	10		738	mg/L	1	10/06/2010 10:35	EPA 300.0
G1007286			MW-3	07/12/2010	Sulfate	611	10		738	mg/L	1	07/13/2010 23:44	EPA 300.0
G1004535			MW-3	04/20/2010	Sulfate	688	10		738	mg/L	1	04/21/2010 06:20	EPA 300.0
G1001485			MW-3	01/20/2010	Sulfate	605	10		738	mg/L	1	01/21/2010 10:05	EPA 300.0
G0910579			MW-3	10/21/2009	Sulfate	505	10		738	mg/L	1	10/21/2009 21:14	EPA 300.0
G0907378			MW-3	07/15/2009	Sulfate	441	10		738	mg/L	1	07/15/2009 22:45	EPA 300.0
G0904485			MW-3	04/20/2009	Sulfate	549	10		738	mg/L	1	04/22/2009 10:48	EPA 300.0
G0901497			MW-3	01/27/2009	Sulfate	684	10		738	mg/L	1	02/04/2009 00:00	EPA 300.0
G0810471			MW-3	10/20/2008	Sulfate	611	10		738	mg/L	1	10/21/2008 12:20	EPA 300.0
G0807419			MW-3	07/16/2008	Sulfate	604	10		738	mg/L	1	07/16/2008 23:15	EPA 300.0
G0804541			MW-3	04/21/2008	Sulfate	576	10		738	mg/L	1	04/22/2008 10:00	EPA 300.0
G0801435			MW-3	01/17/2008	Sulfate	583	10		738	mg/L	1	01/18/2008 19:18	EPA 300.0
G0710360			MW-3	10/15/2007	Sulfate	508	10		738	mg/L	1	10/16/2007 18:37	EPA 300.0
G0707064			MW-3	07/03/2007	Sulfate	523	10		738	mg/L	1	07/03/2007 00:00	EPA 300.0
G0704373			MW-3	04/16/2007	Sulfate	517	10		738	mg/L	1	04/17/2007 04:10	EPA 300.0
G0701360			MW-3	01/16/2007	Sulfate	526	10		738	mg/L	1	01/17/2007 10:37	EPA 300.0
G0610489			MW-3	10/24/2006	Sulfate	490	10		738	mg/L	1	10/24/2006 18:53	EPA 300.0
G0607332			MW-3	07/19/2006	Sulfate	441	10		738	mg/L	1	07/20/2006 13:02	EPA 300.0
G0604336			MW-3	04/18/2006	Sulfate	654	10		738	mg/L	1	04/19/2006 11:02	EPA 300.0
G0601272			MW-3	01/17/2006	Sulfate	682	10		738	mg/L	1	01/17/2006 19:48	EPA 300.0
G0510273			MW-3	10/13/2005	Sulfate	476	10		738	mg/L	1	10/13/2005 23:13	EPA 300.0
G0507278			MW-3	07/18/2005	Sulfate	649	10		0	mg/L	1	07/19/2005 16:26	EPA 300.0
G0504252			MW-3	04/14/2005	Sulfate	548	10		738	mg/L	1	04/14/2005 21:22	EPA 300.0
G0501322			MW-3	01/18/2005	Sulfate	536	10		738	mg/L	1	02/08/2005 07:22	EPA 300.0

Sample No.	PDF	Attach	Sample ID	Date Sampled	Analyte	Result	QL	Qual	CL	Units	DF	Date/Time Analyzed	Test Method
G0410194			MW-3	10/13/2004	Sulfate	512	10		738	mg/L	1	10/14/2004 15:36	EPA 300.0
G0407245			MW-3	07/15/2004	Sulfate	573	10		0	mg/L	1	07/15/2004 19:33	EPA 300.0
G0404284			MW-3	04/20/2004	Sulfate	485	10		0	mg/L	1	05/25/2004 00:00	EPA 300.0

Statistical Probability / Trend Analysis

Probability	95 %	99 %	99.5 %
Z: -3.7082	1.645	2.327	2.575
Trend	Yes	Yes	Yes



GEOCHEMICAL TESTING
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Analyte Trace

Please select a Date Range and Site:

Note: Date Format MM/DD/YYYY

From: 01/01/2004 To: 12/31/2017

NRG - CONEMAUGH STATION - GW - G1033.10

Search

Select Monitoring Point(s) Select Analyte(s)

MW-4 | Sulfate

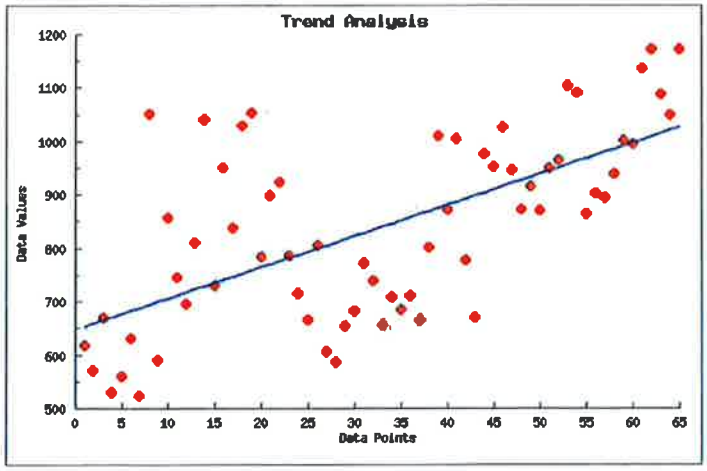
Export CSV

Sample No.	PDF	Attach	Sample ID	Date Sampled	Analyte	Result	QL	Qual	CL	Units	DF	Date/Time Analyzed	Test Method
G1710253			MW-4	10/04/2017	Sulfate	1170	10	**	738	mg/L	1	10/04/2017 17:41	EPA 300.0
G1710252			MW-4	10/04/2017	Sulfate	1050	2			mg/L	1	10/05/2017 08:52	EPA 300.0
G1707F83			MW-4	07/27/2017	Sulfate	1090	10	**	738	mg/L	1	07/27/2017 20:28	EPA 300.0
G1707F82			MW-4	07/27/2017	Sulfate	1170	2			mg/L	1	07/27/2017 19:04	EPA 300.0
G1704D71			MW-4	04/26/2017	Sulfate	1140	10	**	738	mg/L	1	04/27/2017 09:08	EPA 300.0
G1704D69			MW-4	04/26/2017	Sulfate	996	2			mg/L	1	04/28/2017 08:10	EPA 300.0
G1704D68			MW-4	04/26/2017	Sulfate	1000	2			mg/L	1	04/28/2017 07:52	EPA 300.0
G1701E56			MW-4	01/30/2017	Sulfate	940	10	**	738	mg/L	1	01/31/2017 19:42	EPA 300.0
G1701E55			MW-4	01/30/2017	Sulfate	895	2			mg/L	1	01/31/2017 19:20	EPA 300.0
G1610D95			MW-4	10/26/2016	Sulfate	903	10	**	738	mg/L	1	10/26/2016 20:16	EPA 300.0
G1610D94			MW-4	10/26/2016	Sulfate	865	2			mg/L	1	10/27/2016 06:30	EPA 300.0
G1607D13			MW-4	07/25/2016	Sulfate	1090	2			mg/L	1	07/27/2016 00:10	EPA 300.0
G1607D12			MW-4	07/26/2016	Sulfate	1100	10	**	738	mg/L	1	07/26/2016 23:22	EPA 300.0
G1604D34			MW-4	04/26/2016	Sulfate	965	2			mg/L	1	04/27/2016 07:47	EPA 300.0
G1604D33			MW-4	04/26/2016	Sulfate	951	10	**	738	mg/L	1	04/27/2016 07:36	EPA 300.0
G1602350			MW-4	02/04/2016	Sulfate	870	2			mg/L	1	02/05/2016 10:12	EPA 300.0
G1602348			MW-4	02/04/2016	Sulfate	915	10	**	738	mg/L	1	02/05/2016 10:01	EPA 300.0
G1512B14			MW-4	12/21/2015	Sulfate	874	2			mg/L	1	12/21/2015 17:27	EPA 300.0
G1510A90			MW-4	10/21/2015	Sulfate	946	10	**	738	mg/L	1	10/22/2015 19:42	EPA 300.0
G1507C23			MW-4	07/23/2015	Sulfate	1030	10	**	738	mg/L	1	07/23/2015 23:24	EPA 300.0
G1504E71			MW-4	04/29/2015	Sulfate	953	10	**	738	mg/L	1	04/29/2015 18:59	EPA 300.0
G1501985			MW-4	01/22/2015	Sulfate	977	10	**	738	mg/L	1	01/23/2015 09:41	EPA 300.0
G1410E15			MW-4	10/27/2014	Sulfate	670	10		738	mg/L	1	10/27/2014 20:39	EPA 300.0
G1409967			MW-4	09/18/2014	Sulfate	777	10	**	738	mg/L	1	09/18/2014 17:48	EPA 300.0
G1404D04			MW-4	04/21/2014	Sulfate	1000	10	**	738	mg/L	1	04/22/2014 15:28	EPA 300.0
G1401764			MW-4	01/16/2014	Sulfate	874	10	**	738	mg/L	1	01/16/2014 23:17	EPA 300.0
G1310157			MW-4	10/02/2013	Sulfate	1010	10	**	738	mg/L	1	10/04/2013 08:19	EPA 300.0
G1307578			MW-4	07/11/2013	Sulfate	802	10	**	738	mg/L	1	07/15/2013 09:48	EPA 300.0
G1304670			MW-4	04/15/2013	Sulfate	666	10		738	mg/L	1	04/15/2013 20:14	EPA 300.0
G1301669			MW-4	01/15/2013	Sulfate	710	10		738	mg/L	1	01/15/2013 21:02	EPA 300.0
G1210910			MW-4	10/18/2012	Sulfate	686	10		738	mg/L	1	10/19/2012 13:40	EPA 300.0
G1207653			MW-4	07/17/2012	Sulfate	708	10		738	mg/L	1	07/18/2012 01:47	EPA 300.0
G1204788			MW-4	04/18/2012	Sulfate	658	10		738	mg/L	1	04/19/2012 02:46	EPA 300.0
G1201758			MW-4	01/18/2012	Sulfate	738	10	**	738	mg/L	1	01/19/2012 13:57	EPA 300.0
G1110659			MW-4	10/17/2011	Sulfate	771	10	**	738	mg/L	1	10/18/2011 09:52	EPA 300.0
G1107484			MW-4	07/13/2011	Sulfate	684	10		738	mg/L	1	07/14/2011 16:31	EPA 300.0
G1104684			MW-4	04/19/2011	Sulfate	656	10		738	mg/L	10	04/25/2011 17:44	EPA 300.0
G1101588			MW-4	01/18/2011	Sulfate	589	10		738	mg/L	1	01/19/2011 10:43	EPA 300.0
G1010531			MW-4	10/19/2010	Sulfate	608	10		738	mg/L	1	10/20/2010 11:47	EPA 300.0
G1007500			MW-4	07/19/2010	Sulfate	806	10	**	738	mg/L	1	07/20/2010 14:17	EPA 300.0
G1004119			MW-4	04/06/2010	Sulfate	667	10		738	mg/L	1	04/07/2010 12:47	EPA 300.0
G1001446			MW-4	01/18/2010	Sulfate	715	10		738	mg/L	1	01/20/2010 05:51	EPA 300.0
G0910278			MW-4	10/12/2009	Sulfate	787	10	*	738	mg/L	1	10/13/2009 00:12	EPA 300.0
G0907330			MW-4	07/14/2009	Sulfate	924	10	*	738	mg/L	1	07/15/2009 09:33	EPA 300.0
G0904669			MW-4	04/29/2009	Sulfate	898	10	*	738	mg/L	1	04/30/2009 01:45	EPA 300.0
G0901427			MW-4	01/22/2009	Sulfate	784	10	*	738	mg/L	1	01/22/2009 22:21	EPA 300.0
G0810386			MW-4	10/15/2008	Sulfate	1050	10	*	738	mg/L	1	10/16/2008 08:50	EPA 300.0
G0807334			MW-4	07/14/2008	Sulfate	1030	10	*	738	mg/L	1	07/14/2008 22:25	EPA 300.0
G0804285			MW-4	04/10/2008	Sulfate	837	10	*	738	mg/L	1	04/10/2008 20:29	EPA 300.0
G0801379			MW-4	01/16/2008	Sulfate	950	10	*	738	mg/L	1	01/17/2008 10:04	EPA 300.0
G0710360			MW-4	10/16/2007	Sulfate	731	10		738	mg/L	1	10/16/2007 18:50	EPA 300.0
G0707064			MW-4	07/02/2007	Sulfate	1040	10	*	738	mg/L	1	07/04/2007 00:33	EPA 300.0
G0704412			MW-4	04/17/2007	Sulfate	811	10	*	738	mg/L	1	04/18/2007 08:45	EPA 300.0
G0701360			MW-4	01/15/2007	Sulfate	695	10		738	mg/L	1	01/17/2007 09:21	EPA 300.0
G0610426			MW-4	10/19/2006	Sulfate	745	10	*	738	mg/L	1	10/19/2006 22:04	EPA 300.0
G0607332			MW-4	07/19/2006	Sulfate	858	10	*	738	mg/L	1	07/20/2006 12:49	EPA 300.0
G0604336			MW-4	04/18/2006	Sulfate	591	10		738	mg/L	1	04/19/2006 10:50	EPA 300.0
G0601272			MW-4	01/17/2006	Sulfate	1050	10	*	738	mg/L	10	01/18/2006 19:47	EPA 300.0
G0510273			MW-4	10/13/2005	Sulfate	523	10		738	mg/L	1	10/13/2005 23:01	EPA 300.0
G0507302			MW-4	07/19/2005	Sulfate	631	10		738	mg/L	1	07/20/2005 12:17	EPA 300.0
G0504215			MW-4	04/12/2005	Sulfate	559	10		738	mg/L	1	04/14/2005 02:46	EPA 300.0
G0501348			MW-4	01/20/2005	Sulfate	530	10		738	mg/L	1	01/20/2005 21:18	EPA 300.0

Sample No.	PDF	Attach	Sample ID	Date Sampled	Analyte	Result	QL	Qual	CL	Units	DF	Date/Time Analyzed	Test Method
G0410194			MW-4	10/13/2004	Sulfate	671	10		738	mg/L	1	10/14/2004 16:01	EPA 300.0
G0407267			MW-4	07/19/2004	Sulfate	571	10		0	mg/L	1	07/20/2004 08:58	EPA 300.0
G0404313			MW-4	04/21/2004	Sulfate	619	10		0	mg/L	1	04/22/2004 15:17	EPA 300.0

Statistical Probability / Trend Analysis

Probability	95 %	99 %	99.5 %
Z: 5.1575	1.645	2.327	2.575
Trend	Yes	Yes	Yes



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Analyte
Trend
Trend Analysis
Workorders
WorkOrder Tests
Workorders By Site ID
Workorders by Date

Home : Workorders By Site ID | Trend Analysis | Trend Analysis

Analyte Trace

Please select a Date Range and Site:

Note: Date Format MM/DD/YYYY

From: 01/01/2004 To: 12/31/2017

NRG - CONEMAUGH STATION - GW - G1033.10 Search

Select Monitoring Point(s) Select Analyte(s)

MW-23 Sulfate

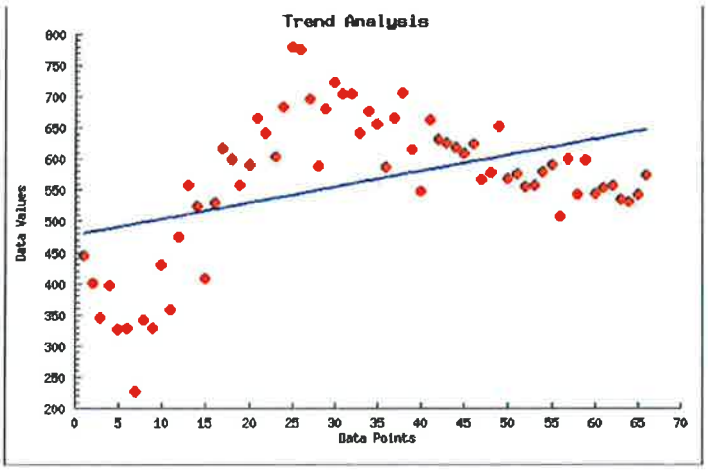
Export CSV

Sample No	PDF	Attach	Sample ID	Date Sampled	Analyte	Result	QL	Qual	CL	Units	DF	Date/Time Analyzed	Test Method
G1710052			MW-23	10/01/2017	Sulfate	575	2			mg/L	1	10/03/2017 02:43	EPA 300.0
G1710051			MW-23	10/01/2017	Sulfate	544	10		738	mg/L	1	10/02/2017 22:21	EPA 300.0
G1707E06			MW-23	07/24/2017	Sulfate	532	2			mg/L	1	07/26/2017 07:59	EPA 300.0
G1707E05			MW-23	07/24/2017	Sulfate	536	10		738	mg/L	1	07/25/2017 20:39	EPA 300.0
G1704C52			MW-23	04/24/2017	Sulfate	558	2			mg/L	1	04/26/2017 06:56	EPA 300.0
G1704C51			MW-23	04/24/2017	Sulfate	555	10		738	mg/L	1	04/26/2017 06:01	EPA 300.0
G1704C50			MW-23	04/24/2017	Sulfate	546	2			mg/L	1	04/26/2017 02:19	EPA 300.0
G1701907			MW-23	01/18/2017	Sulfate	598	10		738	mg/L	1	01/19/2017 08:54	EPA 300.0
G1701906			MW-23	01/18/2017	Sulfate	543	2			mg/L	1	01/19/2017 09:05	EPA 300.0
G1610C34			MW-23	10/24/2016	Sulfate	600	10		738	mg/L	1	10/24/2016 21:13	EPA 300.0
G1610C33			MW-23	10/24/2016	Sulfate	509	2			mg/L	1	10/24/2016 23:20	EPA 300.0
G1607B45			MW-23	07/21/2016	Sulfate	591	2			mg/L	1	07/22/2016 09:40	EPA 300.0
G1607B44			MW-23	07/21/2016	Sulfate	581	10		738	mg/L	1	07/22/2016 07:40	EPA 300.0
G1604C65			MW-23	04/25/2016	Sulfate	558	10		738	mg/L	1	04/25/2016 23:55	EPA 300.0
G1604C64			MW-23	04/25/2016	Sulfate	557	2			mg/L	1	04/26/2016 01:11	EPA 300.0
G1602122			MW-23	02/02/2016	Sulfate	576	2			mg/L	1	02/03/2016 04:14	EPA 300.0
G1602121			MW-23	02/02/2016	Sulfate	569	10		738	mg/L	1	02/03/2016 03:58	EPA 300.0
G1512A95			MW-23	12/20/2015	Sulfate	653	2			mg/L	1	12/21/2015 12:47	EPA 300.0
G1510869			MW-23	10/15/2015	Sulfate	578	10		738	mg/L	1	10/16/2015 02:34	EPA 300.0
G1507288			MW-23	07/07/2015	Sulfate	567	10		738	mg/L	1	07/07/2015 23:26	EPA 300.0
G1504D90			MW-23	04/28/2015	Sulfate	624	10		738	mg/L	1	04/29/2015 00:50	EPA 300.0
G1501837			MW-23	01/20/2015	Sulfate	609	10		738	mg/L	1	01/20/2015 16:38	EPA 300.0
G1410675			MW-23	10/14/2014	Sulfate	619	10		738	mg/L	1	10/14/2014 19:53	EPA 300.0
G1407764			MW-23	07/15/2014	Sulfate	626	10		738	mg/L	1	07/15/2014 23:06	EPA 300.0
G1404F75			MW-23	04/24/2014	Sulfate	632	10		738	mg/L	1	04/24/2014 20:29	EPA 300.0
G1403387			MW-23	03/10/2014	Sulfate	663	10		738	mg/L	1	03/11/2014 01:30	EPA 300.0
G1310239			MW-23	10/03/2013	Sulfate	549	10		738	mg/L	1	10/03/2013 18:51	EPA 300.0
G1307887			MW-23	07/18/2013	Sulfate	615	10		738	mg/L	1	07/19/2013 13:15	EPA 300.0
G1304933			MW-23	04/18/2013	Sulfate	706	10		738	mg/L	1	04/19/2013 02:45	EPA 300.0
G1301924			MW-23	01/21/2013	Sulfate	666	10		738	mg/L	1	01/21/2013 17:38	EPA 300.0
G1210541			MW-23	10/10/2012	Sulfate	588	10		738	mg/L	1	10/11/2012 04:42	EPA 300.0
G1207823			MW-23	07/19/2012	Sulfate	656	10		738	mg/L	1	07/20/2012 13:04	EPA 300.0
G1204122			MW-23	04/03/2012	Sulfate	676	10		738	mg/L	1	04/04/2012 14:24	EPA 300.0
G1201830			MW-23	01/19/2012	Sulfate	641	10		738	mg/L	1	01/19/2012 22:58	EPA 300.0
G1110714			MW-23	10/18/2011	Sulfate	705	10		738	mg/L	1	10/19/2011 08:50	EPA 300.0
G1107694			MW-23	07/18/2011	Sulfate	703	10		738	mg/L	1	07/20/2011 02:31	EPA 300.0
G1104282			MW-23	04/07/2011	Sulfate	722	10		738	mg/L	1	04/08/2011 16:57	EPA 300.0
G1101639			MW-23	01/19/2011	Sulfate	679	10		738	mg/L	1	01/20/2011 11:02	EPA 300.0
G1010173			MW-23	10/06/2010	Sulfate	589	10		738	mg/L	1	10/07/2010 15:13	EPA 300.0
G1007592			MW-23	07/21/2010	Sulfate	696	10		738	mg/L	1	07/22/2010 12:57	EPA 300.0
G1006237			MW-23	06/08/2010	Sulfate	775	10	**	738	mg/L	1	06/09/2010 16:19	EPA 300.0
G1004535			MW-23	04/19/2010	Sulfate	780	10	**	738	mg/L	1	04/21/2010 06:36	EPA 300.0
G1001485			MW-23	01/20/2010	Sulfate	684	10		738	mg/L	1	01/21/2010 09:28	EPA 300.0
G0910538			MW-23	10/20/2009	Sulfate	605	10		738	mg/L	1	10/21/2009 07:25	EPA 300.0
G0907428			MW-23	07/16/2009	Sulfate	641	10		738	mg/L	1	07/17/2009 12:56	EPA 300.0
G0904485			MW-23	04/20/2009	Sulfate	665	10		738	mg/L	1	04/22/2009 10:11	EPA 300.0
G0901427			MW-23	01/22/2009	Sulfate	591	10		738	mg/L	1	01/22/2009 22:09	EPA 300.0
G0810070			MW-23	10/02/2008	Sulfate	559	10		738	mg/L	1	10/02/2008 20:56	EPA 300.0
G0807134			MW-23	07/03/2008	Sulfate	601	10		738	mg/L	1	07/03/2008 20:20	EPA 300.0
G0804285			MW-23	04/10/2008	Sulfate	616	10		738	mg/L	1	04/10/2008 19:14	EPA 300.0
G0801435			MW-23	01/17/2008	Sulfate	530	10		738	mg/L	1	01/18/2008 19:06	EPA 300.0
G0710360			MW-23	10/15/2007	Sulfate	409	10		738	mg/L	1	10/16/2007 18:25	EPA 300.0
G0707064			MW-23	07/03/2007	Sulfate	524	10		738	mg/L	1	07/03/2007 00:00	EPA 300.0
G0704373			MW-23	04/16/2007	Sulfate	559	10		738	mg/L	1	04/17/2007 03:57	EPA 300.0
G0701360			MW-23	01/16/2007	Sulfate	475	10		738	mg/L	1	01/17/2007 10:50	EPA 300.0
G0610489			MW-23	10/24/2006	Sulfate	359	10		738	mg/L	1	10/24/2006 19:05	EPA 300.0
G0607269			MW-23	07/17/2006	Sulfate	431	10		738	mg/L	1	07/18/2006 19:55	EPA 300.0
G0604332			MW-23	04/17/2006	Sulfate	329	10		738	mg/L	1	04/19/2006 00:40	EPA 300.0
G0601248			MW-23	01/16/2006	Sulfate	342	10		738	mg/L	1	01/17/2006 17:43	EPA 300.0
G0510273			MW-23	10/13/2005	Sulfate	227	10		738	mg/L	1	10/13/2005 23:26	EPA 300.0
G0507222			MW-23	07/13/2005	Sulfate	329	10		738	mg/L	1	07/14/2005 20:49	EPA 300.0
G0504252			MW-23	04/14/2005	Sulfate	328	10		738	mg/L	1	04/14/2005 21:09	EPA 300.0

Sample No.	PDF	Attach	Sample ID	Date Sampled	Analyte	Result	QL	Qual	CL	Units	DF	Date/Time Analyzed	Test Method
G0501322			MW-23	01/18/2005	Sulfate	397	10		738	mg/L	1	02/08/2005 06:57	EPA 300.0
G0410194			MW-23	10/13/2004	Sulfate	346	10		738	mg/L	1	10/14/2004 15:49	EPA 300.0
G0407245			MW-23	07/15/2004	Sulfate	402	10		0	mg/L	1	07/15/2004 20:10	EPA 300.0
G0404284			MW-23	04/20/2004	Sulfate	446	10		0	mg/L	1	04/21/2004 02:43	EPA 300.0

Statistical Probability / Trend Analysis

Probability	95 %	99 %	99.5 %
Z: 1.2175	1.645	2.327	2.575
Trend	No	No	No



Appendix B

Ash Disposal Site—Assessment of Corrective Measures Report

ASSESSMENT OF CORRECTIVE MEASURES REPORT
CCR RELEASE INCIDENT
ASH VALLEY REFUSE/DISPOSAL AREA

Prepared for:

GenOn Northeast Management Company
Conemaugh Generating Station
New Florence, PA 15944

Prepared by:

Aptim Environmental & Infrastructure, Inc.
Pittsburgh, Pennsylvania

January 2019

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List of Acronyms & Abbreviations

APTIM	Aptim Environmental & Infrastructure, Inc.
CCR	coal combustion residuals
CCR Rule	Disposal of Coal Combustion Residuals from Electric Utilities Final Rule
cy	cubic yards
disposal site	Conemaugh Generating Station's Ash Valley Refuse/Disposal Site
ESP	Environmental Sampling Plan
GenOn	GenOn Northeast Management Company
GPS	global positioning system
MCL	Maximum Contaminant Level
PADEP	Pennsylvania Department of Environmental Protection
Report	Assessment of Corrective Measures Report
RRCSP	Run-On and Run-Off Control System Plan
RSL	Regional Screening Level
sf	square feet
SPLP	Synthetic Precipitation Leaching Procedure
TCLP	Toxicity Characteristic Leaching Procedure
USEPA	U.S. Environmental Protection Agency

1.0 Introduction

In 2015, the Disposal of Coal Combustion Residuals from Electric Utilities Final Rule (CCR Rule) was enacted within the Federal Register under Title 40 Code of Federal Regulations §257. The CCR Rule establishes technical requirements for coal combustion residuals (CCR) disposal sites and surface impoundments under Subtitle D of the Resource Conservation and Recovery Act, which is the primary law regulating solid waste. Conemaugh Generating Station's Ash Valley Refuse/Disposal Site (disposal site), operated by GenOn Northeast Management Company (GenOn), is subject to the CCR Rule.

On August 8, 2018, a surficial (non-groundwater) release of CCR was discovered during the performance of a routine inspection of the Conemaugh disposal site and established erosion and sedimentation control features. The release most likely occurred during an extremely intense precipitation event on July 30, 2018, which was localized and rare.

As described in §§257.84(b)(5) and 257.90(d) of the CCR Rule, in the event of a release from a CCR unit, the owner or operator of a disposal site must immediately undertake necessary measures to control the source(s) of the release so as to reduce or eliminate, to the maximum extent feasible, releases of contaminants into the environment. Additionally, the owner or operator must comply with all related applicable requirements in §§257.96-257.98. For surficial (non-groundwater) spills, these requirements generally include assessing and selecting corrective measures to prevent further releases, remediating the release as necessary, and restoring the affected area to original conditions. To document compliance with the CCR Rule, an Assessment of Corrective Measures Report (Report) must be prepared and placed into the facility's operating record per §257.96(d) and §257.105(h)(10). This Report must also be noticed to the State Director per §257.106(h)(8) and posted to the publicly accessible internet site per §257.107(h)(8).

Conemaugh Station's responses and subsequent activities to the subject CCR release were in accordance with the above-referenced regulations and guidance from the U.S. Environmental Protection Agency (USEPA) issued in response to a settlement of a portion of the lawsuit challenging the CCR Rule. In the settlement, USEPA agreed to a remand on the issue of defining which non-groundwater releases are subject to the full corrective action process under §§257.96-257.98. In the interim between the settlement and issuance of a revised regulation (which was not issued prior to this report), for no-groundwater CCR release, USEPA "would recommend that compliance determinations focus primarily on the rapid remediation of detected non-groundwater releases, consistent with §257.90(d) rather than adherence to the specific corrective action procedures in §§257.96-257.98."

2.0 Facility Overview

GenOn operates the Conemaugh Generating Station located in New Florence, Pennsylvania. The station began operating in 1970 and utilizes two coal-fired boilers each with a steam turbine-driven electric generator that provides electricity to the regional electric grid. CCR materials generated through the operation of these units are managed at the disposal site located directly north of the generating station. The CCR materials that are disposed consist primarily of bottom ash, fly ash, pyrites, and Flue Gas Desulfurization by-product (gypsum). The disposal site is permitted under Pennsylvania Department of Environmental Protection (PADEP) Solid Waste Permit No. 300876.

The disposal site is divided into three stages as shown on Figure 1. Stage I is approximately 160 acres and is located farthest to the north. Stage I started receiving CCR in 1970 and was closed in 1987. Stage II, which is currently active, covers approximately 120 acres and is located directly south of Stage I. Construction of the first phase (Phase IIIA) of Stage III, located directly south of Stage II, was ongoing at the time of the CCR release.

3.0 Summary of the Ash Release

On August 8, 2018, a surficial (non-groundwater) release of CCR materials (ash) was discovered during the performance of a routine inspection of the disposal site (as required by the CCR Rule) and other established erosion and sedimentation control features. As previously noted, the release most likely occurred during an extremely intense precipitation event on July 30, 2018, which was localized and rare.

Ash that was displaced from the active Stage II disposal area was initially observed outside of the disposal site boundary immediately south of Culvert 1C, which connects a Stage III intermediate non-contact stormwater channel to the locally-named "East Valley Stream" (see Figure 2). This stream is a mitigation feature that was relocated in support of the Stage III construction and is located east of the Phase III ultimate disposal site boundary. The non-contact stormwater channel is designed to convey stormwater that falls outside of the disposal site boundary so that it does not come into contact with CCR. Although the majority of deposited CCR materials were located immediately south of Culvert 1C, small pockets of ash were also identified up to 1,800 feet south of Culvert 1C adjacent to the East Valley Stream (see Figures 3 and 4). The deposits of ash in proximity to Culvert 1C and in areas farther south were observed to range in thickness between ¼ inch to 4 inches.

The channel and stream were inspected upon the discovery of CCR material. It was subsequently determined that a contact water diversion berm (see Figure 2) adjacent to a main haul road along the southern boundary of the Phase II disposal area had been overtopped by contact stormwater (water that had fallen on active areas of the disposal site) and flowed through the referenced channel to Culvert 1C. The subject berm had been temporarily lowered prior to the release in order to facilitate the transport of construction materials to the Phase III area.

4.0 Immediate Response Actions

Conemaugh Station responded to the ash release through a series of actions relative to PADEP notification, immediate cleanup activities, and implementation of CCR Rule corrective measures assessment requirements, including the retention of professional engineering services. The following sections provide detailed information regarding each of these elements.

4.1 Notification of Release

Upon discovery of the CCR release on August 8, 2018, Conemaugh Station immediately informed PADEP regarding the incident. On August 9, 2018, PADEP conducted an inspection of the area, whereupon verbal authorization was provided for Conemaugh Station to move forward with cleanup activities. A formal report of this incident was prepared and submitted to PADEP on August 13, 2018; a copy of that report is presented in Appendix A. Additionally, as required by §257.96(a) and (f) and §257.106(h)(7) of the CCR Rule, GenOn provided notification to PADEP (via email dated August 23, 2018) that the Conemaugh Station had initiated an Assessment of Corrective Measures, effective August 8, 2018. This notification was also placed into the Conemaugh Station facility's operating record per §257.105(h)(9) and posted to the publicly-accessible website per §257.107(h)(7).

4.2 CCR Removal

In order to minimize the potential for future releases, and as required under §257.90(d), Conemaugh Station and its contractor (R&L Development) began immediately removing the displaced CCR materials following receipt of the above-noted authorization from PADEP. This involved the use of a vacuum truck in the affected reaches of the East Valley Stream and the areas downstream of Culvert 1C. The vacuum truck was utilized in order to minimize disturbance to the established vegetation and ecosystem within and adjacent to the stream bed. These actions were continued until all practical quantities of CCR were removed to minimize potential impacts to human health and/or the environment. All impacted erosion and sedimentation controls were restored and/or improved.

4.3 Retention of Professional Engineering Services

In conjunction with initiation of the Assessment of Corrective Measures activities, GenOn retained professional engineering services from Aptim Environmental & Infrastructure, Inc. (APTIM) to assist with the associated CCR Rule obligations and to evaluate the adequacy and effectiveness of the CCR removal actions with respect to protectiveness of public health, welfare, and safety.

5.0 Corrective Measures Program

5.1 Initial On-Site Inspection of Immediate CCR Removal Activities

APTIM representatives visited the site on September 26 and 28, 2018 to assess the extent of the CCR release to the ground surface. APTIM walked the entire path of the CCR release starting at the diversion berm that was overtopped (located just south of the active portion of the Stage II disposal site), along the non-contact stormwater ditch to Culvert 1C, and along the East Valley Stream until approximately 300 feet downstream of Culvert 2 (approximately 2,300 feet downstream of Culvert 1C). The following observations were made:

- No CCR was observed between the access road located just south of the active portion of the Stage II disposal site downslope to Culvert 1C.
- The height of the overtopped diversion berm, which had been temporarily lowered prior to the storm to allow materials to be delivered to the Phase III construction area, had been restored.
- Erosion controls that had been damaged during the storm were observed to have been repaired and/or improved.
- A significant portion, but not all, of the displaced CCR materials downstream of Culvert 1C and along the stream had been removed.

During the noted September 2018 visits, APTIM identified discrete locations where some CCR materials were still visible and requested additional removal activities be conducted in these areas. The majority of the additional areas identified by APTIM were located on the east side of the stream just south of Culvert 1C. The southernmost location was situated just north of the Culvert 2 weir. The additional areas were addressed by Conemaugh Station and its contractor on October 1 and 2, 2018, again with utilization of a vacuum truck to remove the displaced CCR materials.

Each of the identified CCR-impacted areas between Culvert 1C and Culvert 2 were logged with a handheld global positioning system (GPS) unit, and the resultant coordinates were used to locate these areas on Figures 3 and 4. A total of 21 individual areas were identified with a cumulative area of approximately 5,400 square feet (sf). The largest single location (the "Upper Deposit") at the outlet of Culvert 1C covered an area of approximately 4,550 sf. The remaining areas (collectively referred to as the "Lower Deposits" and designated as areas L1 through L20), were much smaller in size, ranging from 1 to 100 sf, for a cumulative total of approximately 850 sf.

5.2 Environmental Sampling Plan Development

APTIM developed an Environmental Sampling Plan (ESP) for the release area to determine whether the CCR removal activities had appropriately mitigated potential environmental impacts

or whether additional action was warranted. This ESP was developed based on site-specific considerations and incorporated both soil and surface water sampling protocols for areas south of Culvert 1C.

5.2.1 Soil Sampling

5.2.1.1 Overview

Soil sampling included both "impacted areas" (areas where CCR had deposited) and "non-impacted areas" (soils along the stream that were east of Culvert 1C). Sample locations were selected using a random number generator technique to remove bias. Samples were evaluated against site-specific groundwater protection standards and compared to background values to determine whether immediate cleanup activities were appropriate to protect public health, welfare, and safety.

5.2.1.2 Number of Samples

In order to evaluate the effectiveness of cleanup activities, a total of 26 samples were proposed to be collected, including 16 in impacted areas and 10 in non-impacted areas. It is noted that no formal guidance is provided within the CCR Rule on how many samples are required to evaluate a CCR release. Therefore, engineering judgement was used that generally follows the sampling frequency identified in Pennsylvania's Land Recycling Program (Voluntary Cleanup Program), commonly referred to as "Act 2."

The "Upper Deposit" at the outlet of Culvert 1C has an approximate area of 4,550 sf, and conservatively assuming a maximum of 4 inches of CCR was removed, the total soil volume estimated is 57 cubic yards (cy). This volume has been conservatively estimated for the purpose of determining the number of samples to be taken. However, the majority of the CCR deposit thicknesses were less than 4 inches. A total of 8 soil samples were targeted for collection in the "Upper Deposit" area.

The remaining 20 "Lower Deposit" areas have an approximate cumulative total area of 850 sf, and again assuming a conservative maximum of 4 inches of CCR was removed, the total soil volume estimated is 11 cy. A total of 8 soil samples were targeted for collection from the Lower Deposits (L1 through L20).

5.2.1.3 Location of Samples

In order to determine the sampling locations, a 50-foot by 150-foot grid was overlain on the non-impacted area with a total of 75 blocks (each grid block measuring 10 feet by feet). The 10 soil sample locations were selected using a random number generator in Excel® to provide values ranging between 1 and 75. The random sample locations generated were 1, 8, 17, 24, 30, 36, 48, 55, 62, and 66. The 10 selected soil sample locations were translated to the field and documented

using GPS coordinates. Figure 3 shows the 10 selected soil sample locations within the non-impacted area.

In order to determine the sampling locations of the impacted "Upper Deposit" area, an 80-foot by 160-foot grid was established with a total of 128 blocks (each grid block measuring 10 feet by 10 feet). The 8 soil sample locations were selected using a random number generator in Excel® to provide values ranging between 1 and 128. If a random sampling location within the grid was selected that was not within the CCR deposit limits, a new random sampling location was generated until a total of 8 samples were within the CCR deposit limits. The random sample locations generated were 15, 31, 40, 44, 70, 76, 82, and 105. The 8 selected soil sample locations were translated to the field and documented using GPS coordinates. Figure 3 shows the 8 selected soil sample locations within the "Upper Deposit" area.

The 8 soil sample locations from the "Lower Deposit" areas were again selected using a random number generator in Excel® to provide values ranging between 1 and 20. The random sample locations generated were L1, L4, L8, L11, L12, L15, L18, and L20. The 8 soil samples collected within the randomly selected "Lower Deposit" areas were completed as biased sampling. Figures 3 and 4 show the 8 selected soil sample locations within the "Lower Deposit" areas.

5.2.1.4 Comparison Methodology

Background samples were collected from the non-impacted area for comparison purposes to determine if the total metals concentrations in the impacted area soil samples were greater than those collected in the non-impacted area. If the total metals concentrations were found to be similar for both potentially impacted and non-impacted soils, it would serve as indication that CCR materials had been adequately removed. If total metals concentrations were higher in potentially impacted soils, but further testing via leaching analysis (as discussed below) yielded acceptable results when compared to site-specific groundwater standards, it would offer evidence that trace CCR likely remains after cleanup, but does not threaten public health.

5.2.1.5 Testing Methods for Soil Samples

The most likely potential exposure pathway for the impacted soils was determined to be if chemical constituents from the soils that had been underneath the CCR deposit could leach and enter the groundwater. As the CCR material had been deposited on the ground surface, the leaching would most likely occur when rainwater or surface water came into contact with the residually impacted soils.

Based on this potential exposure pathway, a Synthetic Precipitation Leaching Procedure (SPLP) laboratory evaluation was selected. This test method passes a synthetic leaching agent (intended to mimic rainwater) through the soil sample and analyzes the resulting chemical constituents in the leachate. It is noted that leachate is defined as any liquid that, in passing through matter,

extracts solutes, suspended solids, or any other component of the material through which it has passed. The SPLP testing methodology is specified in USEPA SW-846 Method 1312. Although considered, the Toxicity Characteristic Leaching Procedure (TCLP) was deemed inappropriate for use, as TCLP uses a leaching agent that is intended to simulate the leachate that would result from a municipal solid waste landfill rather than rainwater.

5.2.1.6 Use of Groundwater Protection Standards

The CCR Rule outlines the establishment of groundwater protection standards for disposal sites using chemical constituents that are known to occur in CCR, which generally includes heavy metals. The actual list of chemical constituents for which groundwater protection standards must be established is contained in Appendix IV of the CCR Rule. Accordingly, the site-specific groundwater protection standards are either federally-published Maximum Contaminant Levels (MCLs) or risk-based Regional Screening Levels (RSLs). For constituents where calculated background exceeds either the MCL or RSL, the background value serves as the groundwater protection standard. Under this line of reasoning, the immediate cleanup measures would be deemed adequate if the concentrations in the leachate generated from SPLP analysis of the soil samples collected in the impacted areas were no greater than the site-specific CCR groundwater standards previously adopted/developed for the Conemaugh disposal site.

5.2.2 Surface Water (Stream) Sampling

Two surface water samples from the East Valley Stream were proposed for collection and laboratory analysis for the CCR Appendix IV constituents, including an upstream (Sample WS-1, non-impacted) and downstream (Sample WS-2, potentially impacted) sample. Sample WS-1was proposed to be collected upstream of the CCR release to establish baseline values for the constituents being analyzed. In the event that a constituent was observed to be leachable during soil testing and was measured at an elevated concentration in the downstream surface water sample location when compared to the upstream sample, this could suggest that trace CCR may be impacting surface water. The approximate surface water sampling locations are shown on Figures 3 and 4.

5.3 Review of Pertinent Disposal Site Design Documents

Pertinent engineering reports and plans were reviewed to determine whether modifications to design or operations would be appropriate to minimize the potential for a future release. Documents reviewed included the Phase III Residual Waste Permit Drawings, prepared by GAI Consultants, Inc., dated March 2014, and the Run-on and Run-off Control System Plan (RRCSP), also prepared by GAI Consultants, Inc., dated October 2016. Both documents were prepared under the direction of a licensed professional engineer. The disposal site design, including stormwater controls, has been confirmed to be the same in both documents and meets CCR Rule requirements.

The RRSCP was developed to control the flow of stormwater on and around the disposal site. Engineered controls are used to route and collect runoff from active portions of the disposal site so that the water may be treated prior to off-site discharge through a National Pollutant Discharge Elimination System outfall. As described in the RRCSP, all constructed runoff channels and slope drains around the active Stage II area are designed to manage the 24-hour, 100-year storm event, which exceeds the regulatory requirement and is more protective than the 24-hour, 25-year design storm event specified by the CCR Rule. Temporary channels and other diversion channels around the Phase III intermediate phase areas are designed to meet CCR Rule requirements and pass the 24-year, 25-year storm. When constructed, all permanent Stage III run-on/runoff controls will be sized to manage the 24-hour, 100-year storm event.

Based on a review of site conditions, it appears that the Phase II diversion berm that was overtopped on July 30, 2018 was designed appropriately, but had been temporarily lowered to allow materials to be delivered to the Phase III construction area. This berm had not been appropriately restored prior to the rain event on July 30, but has since been addressed. Based on review of these site documents and subsequent APTIM site visits, it is concluded that the disposal site has been restored to the intended design, which is appropriate and meets regulatory requirements.

5.4 Correctives Measures Assessment

Concurrent with development of the ESP, which was intended to be used to determine the effectiveness of the cleanup activities, additional corrective measures were evaluated. These measures would be implemented in the event immediate cleanup measures did not mitigate the risk to public health. The assessment of corrective measures was completed in accordance with §§257.96-257.98 of the CCR Rule, which require that corrective measures remediate releases and restore the affected area.

5.4.1 Time Period for Assessment

Per §257.96(a), the assessment of corrective measures must be completed within 90 days of the discovery of the release, unless additional time is needed. Because of the complexities related to removal of the displaced ash in the impacted areas and the need to develop a thorough sampling and analysis plan (i.e., the ESP), APTIM's professional engineer certified that a 60-day extension was appropriate for completing the assessment of corrective measures. Notification of this extension is provided in Appendix B.

5.4.2 Requirements for Corrective Measures

Per §257.97(b)(1)-(5), the selected corrective measure used to mitigate a CCR release must:

- Be protective of human health and the environment;
- Attain the groundwater protection standard as specified pursuant to §257.95(h);
- Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in Appendix IV to this part into the environment;
- Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems; and
- Comply with standards for management of wastes as specified in §257.98(d).

5.4.3 Considered Corrective Measures

Considering that the release was a non-groundwater surficial spill (resulting in deposition of CCR materials on the ground surface), direct removal of the CCR materials (as accomplished by the immediate cleanup activities) was the initially identified approach to meet the above objectives. The removal may encompass only the CCR materials or may also include the underlying soils, if laboratory testing of collected samples indicates that they have been impacted. Therefore, two corrective measures were considered, which would be implemented once laboratory test results were received.

Option 1: No Further Action

In the event that laboratory testing of the soil and surface water samples indicate that all groundwater protection standards are achieved, no further action would be the preferred approach. These results would indicate that completed cleanup activities have been sufficient to address the predominant exposure pathway (i.e., soil impacts to groundwater) and that any potential trace amounts of CCR that remain do not pose a threat to public health and comply with all requirements in §257.97. Removal of the underlying soils would not be necessary and would, in fact, cause undue harm by disturbing the East Valley Stream ecosystem environment.

Option 2: Remove Soils in Release Area

In the event that laboratory testing of the soil and surface water samples indicate that groundwater protection standards are not met due to the CCR release, the underlying soils would be recommended for removal and appropriately disposed. Under this option, additional sampling and removal would be iteratively conducted until sample results demonstrate that groundwater protection standards have been met and the objectives outlined in §257.97 are achieved. Stripping of the soil would destroy existing plant communities (and possibly disturb aquatic habitat) along the East Valley Stream, which would need to be replanted and stabilized following soil removal activities.

5.5 Public Meeting

On December 18, 2018, a public meeting was held in the New Florence Fire Hall to provide information regarding the CCR release and response actions taken to date. A discussion of corrective measures that were intended to be undertaken based on laboratory testing results was presented. Representatives from GenOn and APTIM were both available at the meeting, including the certifying engineer of this report. No representatives from the general public were in attendance. Notice of advertisement for the Public Meeting is provided in Appendix C. This meeting was held in accordance with §257.96(e).

6.0 Sampling Results

APTIM performed both soil and surface water sampling to determine whether the CCR deposits were adequately removed and whether potential environmental impacts were effectively mitigated. The sampling activities occurred on November 13 and 14, 2018.

In accordance with the ESP, a total of 26 soil samples were collected for confirmation purposes, including 10 background samples collected from the non-impacted area and 16 confirmation samples collected from the potentially impacted areas ("Upper" and "Lower Deposits"). In addition, two surface water samples were collected. The soil and surface water sample locations are shown on Figures 3 and 4. When compared to the background samples (see Table 1), the soils in the impacted areas did show slightly elevated metals concentrations at several locations (see Table 2). As discussed in Section 5.2.1.4, these findings suggest that potential trace amounts of CCR materials may still be present in the impacted areas. However, all values for SPLP testing of soil samples (see Table 3) indicate metals concentrations were either non-detect or below the site-specific CCR groundwater protection standards. Again, as mentioned in Section 5.2.1.4, these results offer evidence that although trace amounts of CCR materials may still be present in certain impacted areas, the quantities of these residuals (i) do not constitute an unacceptable risk for potential leaching to groundwater and maintain protectiveness of human health and the environment, and (ii) are generally consistent with concentrations in soil and other surficial materials located in southwestern Pennsylvania – see Appendix D.

The surface water sampling results (see Table 4) indicate that the downstream water is generally consistent with upstream source water, although radium was measured at a slightly higher concentration at the downstream location. The minimal difference in concentration is not believed to be attributed to the CCR release due to the leachability results from the SPLP testing.

The supporting analytical laboratory reports are presented in Appendix E.

7.0 Recommendation for No Further Action

The results of laboratory testing indicate that the immediate and subsequent CCR removal activities have mitigated the threat to public health, welfare, and safety. The disposal site stormwater management design has been reviewed and found to meet all CCR regulatory requirements. At the time of the CCR release, it is acknowledged that a runoff diversion berm had been temporarily lowered, which is where the CCR material was released from the disposal site. The diversion berm has been observed by APTIM personnel to have been restored to its original condition in accordance with its design.

It is the opinion of the engineer certifying this report that no further action is warranted based on the observed conditions of the facility and laboratory testing of the soils and surface water. In fact, removing additional soils in the release area would create undue harm to the East Valley Stream ecosystem and is in conflict with the stated objectives of §257.97(b)(4) (Selection of Remedy).

Moreover, groundwater in the area of the ash release ultimately flows southward and passes through the zone monitored by the disposal site's existing CCR groundwater well network (comprised of downgradient Wells MW-9, MW-10, and MW-11). Continued sampling of these wells (most recently in October 2018) under the CCR Assessment Monitoring Program has not yielded any remarkable changes in groundwater quality. Future analytical results would be anticipated as similar and providing further confirmation that the clean-up activities were adequate in mitigating potential impacts to human health and the environment. These well locations and referenced analytical results are contained in the CCR Annual Groundwater Monitoring and Corrective Action Report, dated January 2019, to which this report is appended.

8.0 Certification

I hereby certify, as a qualified professional engineer licensed in the Commonwealth of Pennsylvania, that the information described in this report is factually accurate to the best of my knowledge. I have made the recommendations contained within this report based on a review of available information, observations from my personal on-site visit and visits by colleagues under my direction, and laboratory testing results. I attest that the suggested remedy of no further action has been completed in compliance with the requirements of §257.98.

Certified by: RICHARD SOUTHORN, PE, PG

Date: JAN 9/2019

1/9/2019

LICENSE EXPIRES
9/30/2019

Richard Southorn, P.E., P.G., CPSWQ
Professional Engineer Registration No. PE 085411
Aptim Environmental & Infrastructure, Inc.

Tables

Table 1
Background Soil Sample Results
CCR Ash Release - Ash Valley Refuse/Disposal Area
Conemaugh Generating Station

Sample ID	Date Sampled	Sample Interval (inches)	Total Antimony (mg/Kg-dry)	Total Arsenic (mg/Kg-dry)	Total Barium (mg/Kg-dry)	Total Beryllium (mg/Kg-dry)	Total Cadmium (mg/Kg-dry)	Total Chromium (mg/Kg-dry)	Total Cobalt (mg/Kg-dry)	Total Lead (mg/Kg-dry)	Total Lithium (mg/Kg-dry)	Total Mercury (mg/Kg-dry)	Total Molybdenum (mg/Kg-dry)	Total Selenium (mg/Kg-dry)	Total Thallium (mg/Kg-dry)	Total Radium-226 and 228 (pCi/g)
			Maximum Detected Value													
			< 10.0	17.2	187	1.31	< 5.0	69.4	21.2	27.9	17.8	0.057	< 2.0	2.8	< 10.0	1.58
B-1 0-4	11/13/2018	0-4	< 10.0	15.5	127	1.11	< 5.0	41.5	17.6	23.2	15.9	0.038	< 2.0	2.3	< 10.0	1.58
B-2 0-4	11/13/2018	0-4	< 10.0	11.2	123	1.05	< 5.0	41.1	15.7	22.1	12.6	0.057	< 2.0	< 2.0	< 10.0	1.25
B-3 0-4	11/13/2018	0-4	< 10.0	14.5	87.8	0.74	< 5.0	69.4	9.2	18.5	12.8	0.054	< 2.0	< 2.0	< 10.0	1.29
B-4 0-4	11/13/2018	0-4	< 10.0	12.1	179	1.12	< 5.0	42.6	21.2	24.8	16.3	0.030	< 2.0	2.2	< 10.0	1.39
B-5 0-4	11/13/2018	0-4	< 10.0	14.6	166	1.23	< 5.0	43.6	20.4	26.4	14.7	0.039	< 2.0	2.7	< 10.0	1.30
B-6 0-4	11/13/2018	0-4	< 10.0	16.5	187	1.30	< 5.0	56.5	20.1	26.6	17.8	0.055	< 2.0	2.8	< 10.0	1.34
B-7 0-4	11/13/2018	0-4	< 10.0	17.2	161	1.23	< 5.0	42.6	16.1	27.3	16.4	0.037	< 2.0	2.6	< 10.0	1.41
B-8 0-4	11/13/2018	0-4	< 10.0	14.8	160	1.29	< 5.0	53.7	19.6	25.5	15.9	0.041	< 2.0	2.4	< 10.0	1.25
B-9 0-4	11/13/2018	0-4	< 10.0	16.0	186	1.31	< 5.0	54.6	20.3	27.9	13.2	0.037	< 2.0	2.7	< 10.0	1.41
B-10 0-4	11/13/2018	0-4	< 10.0	13.1	153	1.18	< 5.0	64.5	18.2	24.9	13.4	0.033	< 2.0	2.1	< 10.0	1.26

mg/Kg-dry - milligrams per Kilogram-dry

pCi/g - pico Curies per gram

Notes:

1. Cells with "<" are represented as non-detects. Values shown correspond to the laboratory quantitation limit.

Table 2
Confirmation Soil Sample Results
CCR Ash Release - Ash Valley Refuse/Disposal Area
Conemaugh Generating Station

Sample ID	Date Sampled	Sample Interval (inches)	Total Antimony (mg/Kg-dry)	Total Arsenic (mg/Kg-dry)	Total Barium (mg/Kg-dry)	Total Beryllium (mg/Kg-dry)	Total Cadmium (mg/Kg-dry)	Total Chromium (mg/Kg-dry)	Total Cobalt (mg/Kg-dry)	Total Lead (mg/Kg-dry)	Total Lithium (mg/Kg-dry)	Total Mercury (mg/Kg-dry)	Total Molybdenum (mg/Kg-dry)	Total Selenium (mg/Kg-dry)	Total Thallium (mg/Kg-dry)	Total Radium-226 and 228 (pCi/g)
			Site-Specific Standard Value													
			< 10.0	17.2	187	1.31	< 5.0	69.4	21.2	27.9	17.8	0.057	< 2.0	2.8	< 10.0	1.58
			Maximum Detected Value													
			< 10.0	27.2	161	1.39	< 5.0	43.5	22.0	29.1	19.5	0.260	2.1	2.6	< 10.0	2.61
UD-1 0-4	11/13/2018	0-4	< 10.0 S	25.2	113	1.01	< 5.0	24.8	17.7	20.4	11.5	0.20	< 2.0	2.3	< 10.0	1.41
UD-2 0-4	11/13/2018	0-4	< 10.0	14.5	123	1.07	< 5.0	33.1	16.7	22.1	16.6	0.072	< 2.0	2.3	< 10.0	1.63
UD-3 0-4	11/13/2018	0-4	< 10.0	11.3	107	0.94	< 5.0	24.5	12.7	18.9	11.8	0.037	< 2.0	< 2.0	< 10.0	2.33
UD-4 0-4	11/13/2018	0-4	< 10.0	16.5	136	1.02	< 5.0	30.5	15.4	19.5	19.3	0.099	2.1	2.2	< 10.0	1.65
UD-5 0-4	11/13/2018	0-4	< 10.0	5.8	50.7	0.31	< 5.0	9.2	6.4	9.7	3.5	0.045	< 2.0	< 2.0	< 10.0	0.60
UD-6 0-4	11/13/2018	0-4	< 10.0	15.9	118	1.10	< 5.0	27.0	22.0	20.8	13.2	0.054	< 2.0	< 2.0	< 10.0	1.17
UD-7 0-4	11/14/2018	0-4	< 10.0	27.2	149	1.24	< 5.0	31.5	14.8	22.1	17.2	0.26	1.2 J	2.2	< 10.0	1.61
UD-8 0-4	11/14/2018	0-4	< 10.0	14.6	135	1.12	< 5.0	31.8	17.5	23.0	17.7	0.040	< 2.0	2.4	< 10.0	1.60
LD-1 0-4	11/14/2018	0-4	< 10.0	24.5	161	1.20	< 5.0	31.7	16.9	28.9	16.2	0.042	1.2 J	2.5	< 10.0	2.50
LD-2 0-4	11/14/2018	0-4	< 10.0	11.9	143	1.14	< 5.0	31.4	17.2	23.8	15.8	0.032	< 2.0	2.2	< 10.0	1.47
LD-3 0-4	11/14/2018	0-4	< 10.0	17.8	147	1.19	< 5.0	32.6	17.8	24.1	17.4	0.040	1.0 J	2.0	< 10.0	2.27
LD-4 0-4	11/14/2018	0-4	< 10.0	17.6	148	1.39	< 5.0	43.5	21.6	29.1	19.5	0.038	1.2 J	2.5	< 10.0	1.60
LD-5 0-4	11/14/2018	0-4	< 10.0	20.8	141	1.17	< 5.0	27.7	17.9	27.8	16.0	0.057	1.8 J	2.5	< 10.0	1.55
LD-6 0-4	11/14/2018	0-4	< 10.0	18.5	149	1.25	< 5.0	29.2	18.6	26.8	15.6	0.052	1.4 J	2.2	< 10.0	2.56
LD-7 0-4	11/14/2018	0-4	< 10.0	12.8	99.0	0.94	< 5.0	30.1	13.0	20.2	12.6	0.046	< 2.0	2.6	< 10.0	1.38
LD-8 0-4	11/14/2018	0-4	< 10.0	18.8	137	1.32	< 5.0	30.7	21.5	23.2	11.7	0.095	< 2.0	2.6	< 10.0	2.61

J - Indicates an estimated value.
mg/Kg-dry - milligrams per Kilogram-dry
pCi/g - pico Curies per gram
S - Spike recovery indicates a possible matrix effect. The method is in control as indicated by the LCS.
Notes:
1. Cells with "<" are represented as non-detects. Values shown correspond to the laboratory quantitation limit.
2. The Site-Specific Standard values were determined to be the Maximum Background Soil Sample values, which were sampled on November 13, 2018.

Table 3
Confirmation Leachate Sample Results - SPLP Analysis
CCR Ash Release - Ash Valley Refuse/Disposal Area
Conemaugh Generating Station

Sample ID	Date Sampled	Sample Interval (inches)	Total Antimony (mg/L)	Total Arsenic (mg/L)	Total Barium (mg/L)	Total Beryllium (mg/L)	Total Cadmium (mg/L)	Total Chromium (mg/L)	Total Cobalt (mg/L)	Total Fluoride (mg/L)	Total Lead (mg/L)	Total Lithium (mg/L)	Total Mercury (mg/L)	Total Molybdenum (mg/L)	Total Selenium (mg/L)	Total Thallium (mg/L)	Total Radium-226 and 228 (pCi/L)
			Groundwater Protection Standard														
			MCL	MCL	MCL	MCL	MCL	MCL	RSL	MCL	RSL	RSL	MCL	RSL	MCL	MCL	MCL
			0.006	0.01	2	0.004	0.005	0.1	0.006	4.0	0.15	0.04	0.002	0.1	0.05	0.002	5
			Maximum Detected Value														
			0.05 U	0.010 U	0.093	0.0005 U	0.0010 U	0.0050 U	0.0020 U	0.51	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	1.219
UD-1 0-4	11/13/2018	0-4	0.05 U	0.010 U	0.093	0.0005 U	0.0010 U	0.005 U	0.0020 U	0.47	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	0.217
UD-2 0-4	11/13/2018	0-4	0.05 U	0.010 U	0.074	0.0005 U	0.0010 U	0.005 U	0.0020 U	0.20	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	0.747
UD-3 0-4	11/13/2018	0-4	0.05 U	0.010 U	0.059	0.0005 U	0.0010 U	0.005 U	0.0020 U	0.26	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	0.674
UD-4 0-4	11/13/2018	0-4	0.05 U	0.010 U	0.060	0.0005 U	0.0010 U	0.005 U	0.0020 U	0.16	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	0.0904
UD-5 0-4	11/13/2018	0-4	0.05 U	0.010 U	0.080	0.0005 U	0.0010 U	0.005 U	0.0020 U	0.44	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	1.066
UD-6 0-4	11/13/2018	0-4	0.05 U	0.010 U	0.073	0.0005 U	0.0010 U	0.005 U	0.0020 U	0.18	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	1.057
UD-7 0-4	11/14/2018	0-4	0.05 U	0.010 U	0.070	0.0005 U	0.0010 U	0.0050 U	0.0020 U	0.51	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	0.976
UD-8 0-4	11/14/2018	0-4	0.05 U	0.010 U	0.080	0.0005 U	0.0010 U	0.0050 U	0.0020 U	0.18	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	-0.1349
LD-1 0-4	11/14/2018	0-4	0.05 U	0.010 U	0.066	0.0005 U	0.0010 U	0.0050 U	0.0020 U	0.08 J	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	0.836
LD-2 0-4	11/14/2018	0-4	0.05 U	0.010 U	0.069	0.0005 U	0.0010 U	0.0050 U	0.0020 U	0.39	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	0.778
LD-3 0-4	11/14/2018	0-4	0.05 U	0.010 U	0.062	0.0005 U	0.0010 U	0.0050 U	0.0020 U	0.09 J	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	0.515
LD-4 0-4	11/14/2018	0-4	0.05 U	0.010 U	0.074	0.0005 U	0.0010 U	0.0050 U	0.0020 U	0.14	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	-0.301
LD-5 0-4	11/14/2018	0-4	0.05 U	0.010 U	0.086	0.0005 U	0.0010 U	0.0050 U	0.0020 U	0.05 U	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	0.907
LD-6 0-4	11/14/2018	0-4	0.05 U	0.010 U	0.086	0.0005 U	0.0010 U	0.0050 U	0.0020 U	0.09 J	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	0.468
LD-7 0-4	11/14/2018	0-4	0.050 U	0.010 U	0.047	0.0005 U	0.0010 U	0.005 U	0.0020 U	0.0917 J	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	-0.032
LD-8 0-4	11/14/2018	0-4	0.05 U	0.010 U	0.062	0.0005 U	0.0010 U	0.005 U	0.0020 U	0.27	0.010 U	0.005 U	< 0.0001 J	0.010 U	0.010 U	0.010 U	1.219

J - Indicates an estimated value.
MCL - Maximum Contaminant Level
mg/L - 1 milligrams per Liter
pCi/L - pico Curies per Liter
RSL - Regional Screening Level
SPLP - Synthetic Precipitation Leaching Procedure
U - The analyte was not detected at or above the listed concentration, which is below the laboratory quantitation limit.
Notes:
1. Cells with "<" are represented as non-detects. Values shown correspond to the laboratory quantitation limit.
2. As indicated, Groundwater Protection Standards are either published MCLs or risk-based RSLs.

Table 4
Surface Water Sample Results
CCR Ash Release - Ash Valley Refuse/Disposal Area
Conemaugh Generating Station

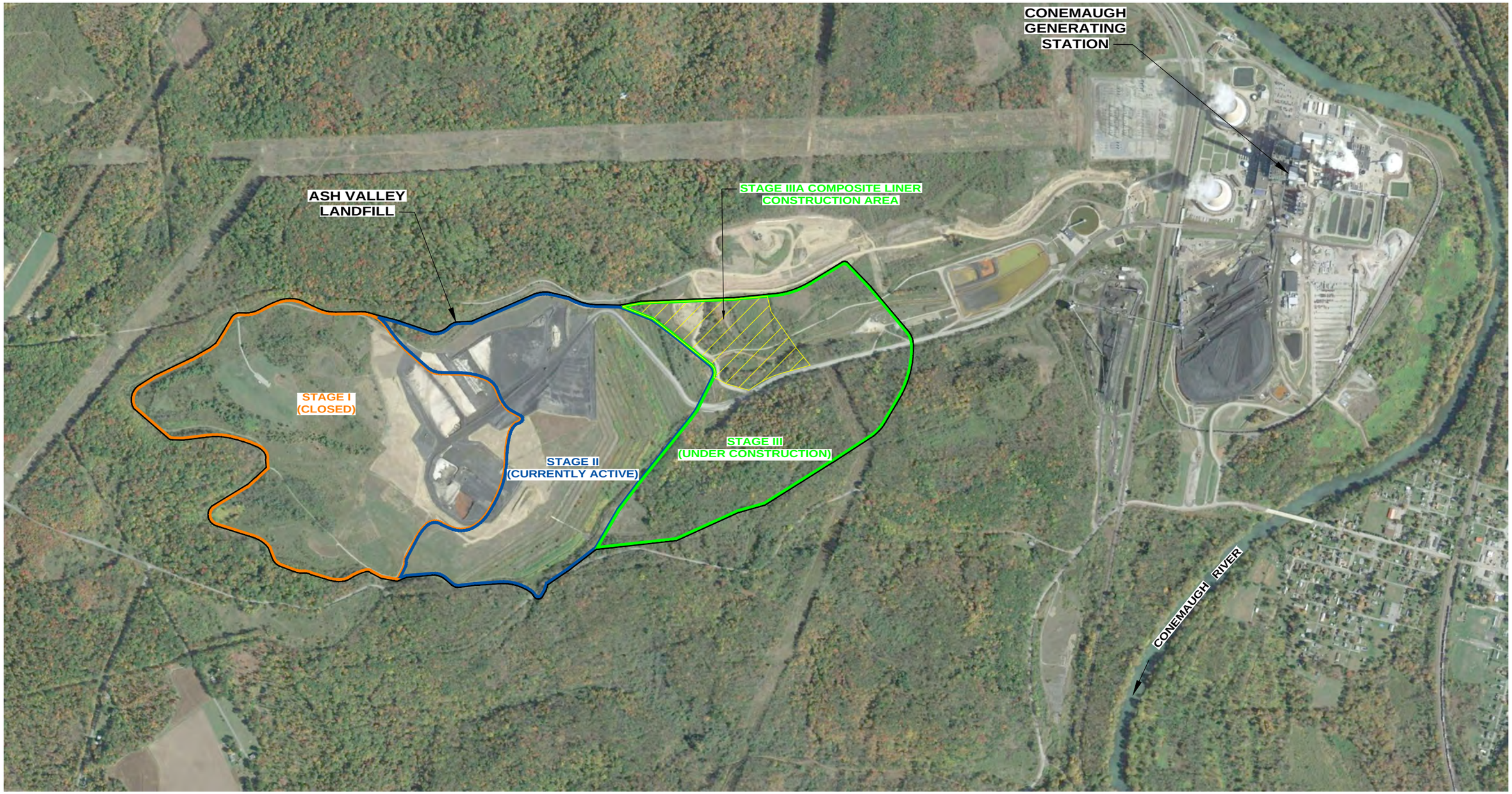
Sample ID	Date Sampled	Total Antimony (mg/L)	Total Arsenic (mg/L)	Total Barium (mg/L)	Total Beryllium (mg/L)	Total Cadmium (mg/L)	Total Chromium (mg/L)	Total Cobalt (mg/L)	Total Fluoride (mg/L)	Total Lead (mg/L)	Total Lithium (mg/L)	Total Mercury (mg/L)	Total Molybdenum (mg/L)	Total Selenium (mg/L)	Total Thallium (mg/L)	Total Radium-226 and 228 (pCi/L)
WS-1	11/14/2018	< 0.001	< 0.001	0.03	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.3834
WS-2	11/14/2018	< 0.001	< 0.001	0.03	< 0.001	< 0.002	< 0.01	< 0.005	< 0.1	< 0.001	< 0.01	< 0.0002	< 0.02	< 0.001	< 0.0002	0.796

mg/L - milligrams per Liter
pCi/L - pico Curies per Liter
Notes:
1. Cells with "<" are represented as non-detects. Values shown correspond to the laboratory quantitation limit.

Figures

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
--	E. Schlegel	P. Andrison	R. Southorn	003138-B1

OFFICE	DATE
Pittsburgh, PA	1/7/19



N

REFERENCE:

GOOGLE EARTH AERIAL PHOTOGRAPHY, DATED 10/11/2015.

SCALE

0 1,000 2,000 FEET

APTIM
500 Penn Center Boulevard,
Suite 900
Pittsburgh, Pennsylvania 15235

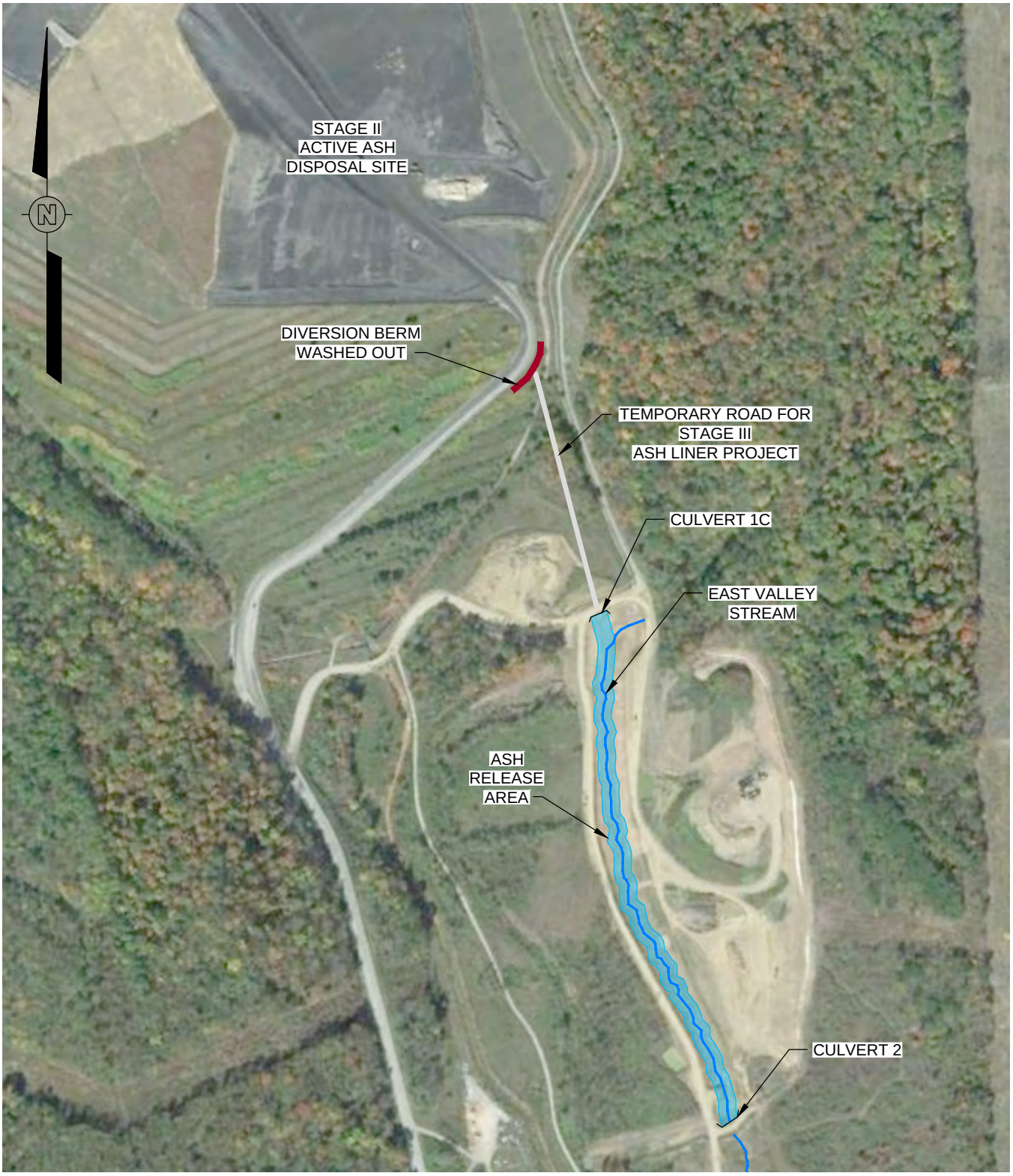
GenOn™

FIGURE 1

SITE LOCATION MAP

CONEMAUGH GENERATING STATION
ASH/REFUSE DISPOSAL SITE
INDIANA COUNTY, PENNSYLVANIA

File: O:\PROJECT\1009144003_Conemaugh\003138\003138-B1.dwg
Plot Date/Time: Jan 07, 2019 - 4:11pm
Plotted By: Evan.Schlegel
Xref: Image



OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Pittsburgh, PA	1/7/19	--	E. Schlegel	P. Andrison	R. Southorn	003138-A1

SCALE

0 500 1,000 FEET

REFERENCE:

GOOGLE EARTH AERIAL PHOTOGRAPHY, DATED 10/11/2015.

APTIM

500 Penn Center Boulevard,
Suite 900
Pittsburgh, Pennsylvania 15235

GenOn™

FIGURE 2

OVERVIEW OF ASH RELEASE AREA

CONEMAUGH GENERATING STATION
ASH/REFUSE DISPOSAL SITE
INDIANA COUNTY, PENNSYLVANIA

File: O:\PROJECT\1009144003_Conemaugh\003138\003138-A1.dwg
Plot Date/Time: Jan 07, 2019 - 4:17pm
Plotted By: Evan.Schlegel
Xref : Image

OFFICE Pittsburgh, PA

DRAWING NUMBER 003138-D1

START OF CCR RELEASE CULVERT 1C

CULVERT 1B

MATCH LINE 1

MATCH LINE 2

CULVERT 11

PERMANENT SEDIMENT TRAP 4

RIPRAP SLOPE PROTECTION (TYP.)

NON-IMPACTED AREA (SEE SOIL SAMPLING LOCATION NOTE 1)	
RANDOM LOCATION	SAMPLE ID
1	B-1
8	B-2
17	B-3
24	B-4
30	B-5
36	B-6
48	B-7
55	B-8
62	B-9
66	B-10

UPPER CCR DEPOSIT AREA (SEE SOIL SAMPLING LOCATION NOTE 2)	
RANDOM LOCATION	SAMPLE ID
15	UD-1
31	UD-2
40	UD-3
44	UD-4
70	UD-5
76	UD-6
82	UD-7
105	UD-8

LOWER CCR DEPOSIT AREA (SEE SOIL SAMPLING LOCATION NOTE 3)	
RANDOM LOCATION	SAMPLE ID
L1	LD-1
L4	LD-2
L8	LD-3
L11	LD-4
L12	LD-5
L15	LD-6
L18	LD-7
L20	LD-8

LEGEND:

- —1180— GROUND SURFACE CONTOUR (FT AMSL)
- TREE LINE
- STREAM
- WETLAND
- UPPER CCR DEPOSITS (TOTAL AREA ≈ 4,550 SQ. FT.)
- L9 LOWER CCR DEPOSITS (CUMULATIVE AREA = 850 SQ. FT.)
- WS-1 LOCATION OF SURFACE WATER SAMPLE
- NON-IMPACTED AREA DESIGNATED FOR SOIL SAMPLING
- 30 / L12 RANDOMLY SELECTED SAMPLE LOCATION (SEE SOIL SAMPLING LOCATION NOTES 1, 2, and 3)

GENERAL NOTES:

1. COAL COMBUSTIBLE RESIDUALS (CCR) AREAS ARE APPROXIMATE BASED ON VISUAL INSPECTIONS AND GLOBAL POSITIONING SYSTEM (GPS) COORDINATES COLLECTED BY APTIM ON SEPTEMBER 26 AND 28, 2018.

2. CCR DEPOSIT THICKNESS VARIED BETWEEN 1/4 INCH AND 4 INCHES. THE CCR DEPOSITS DECREASED IN THICKNESS AS LOCATIONS PROGRESSED DOWNSTREAM TOWARDS CULVERT 2.

SOIL SAMPLING LOCATION NOTES:

1. FOR THE NON-IMPACTED AREA, A TOTAL OF 10 SOIL SAMPLE LOCATIONS WERE RANDOMLY (DETERMINED USING A RANDOM NUMBER GENERATOR IN EXCEL®) SELECTED WITHIN THE GRID. THE SELECTED SAMPLE LOCATIONS WERE TRANSLATED TO THE FIELD USING GPS COORDINATES.

2. FOR THE UPPER DEPOSIT, A TOTAL OF 8 SOIL SAMPLE LOCATIONS WERE RANDOMLY SELECTED WITHIN THE CCR DEPOSIT LIMITS. THE SELECTED SAMPLE LOCATIONS WERE TRANSLATED TO THE FIELD USING GPS COORDINATES.

3. FOR THE LOWER DEPOSITS (L1 THROUGH L20), A TOTAL OF 8 SOIL SAMPLE LOCATIONS WERE RANDOMLY SELECTED. THE 8 SOIL SAMPLES TAKEN WITHIN THE RANDOMLY SELECTED LOWER DEPOSIT AREAS WERE BIASED SAMPLES (TAKEN WHERE TRACE CCR WAS VISIBLE, IF ANY).

4. SEE FIGURE 4 FOR LOWER DEPOSIT AREAS L18 THROUGH L20.

SCALE 0 25 50 75 FEET

REV	DESCRIPTION / ISSUE	DATE	APPROVED

APTIM

500 Penn Center Boulevard, Suite 900 Pittsburgh, Pennsylvania 15235

DESIGNED BY:	P. Andrison
DRAWN BY:	E. Schlegel
CHECKED BY:	P. Andrison
APPROVED BY:	R. Southorn
DATE:	12/18/18
SCALE:	AS SHOWN
DRAWING NO.	003138-D1-1
FIGURE NO.	3

GenOn

SOIL AND SURFACE WATER SAMPLING LOCATIONS (1 of 2)

CONEMAUGH GENERATING STATION ASH/REFUSE DISPOSAL SITE INDIANA COUNTY, PENNSYLVANIA

VERIFY SCALE 0 1"

Xref :

Image :

File: O:\PROJECT\1009144003_Conemaugh\003138\003138-D1.dwg
Plot Date/Time: Jan 07, 2019 - 4:22pm
Plotted By: Evan.Schlegel

OFFICE Pittsburgh, PA

DRAWING NUMBER 003138-D1

MATCH LINE 2

MATCH LINE 3

L18

L19

L20

WS-2

EXISTING TRANSMISSION LINE CORRIDORS

SEEP PROTECTION

ACCESS PATH

FLOW MEASURING WEIR

SILL (TYP)

CULVERT 2

LIVE CRIB WALL

LOWER CCR DEPOSIT AREA (SEE SOIL SAMPLING LOCATION NOTE 2)	
RANDOM LOCATION	SAMPLE ID
L1	LD-1
L4	LD-2
L8	LD-3
L11	LD-4
L12	LD-5
L15	LD-6
L18	LD-7
L20	LD-8

LEGEND:

- —1180— GROUND SURFACE CONTOUR (FT AMSL)
- TREE LINE
- STREAM
- WETLAND
- L19 LOWER CCR DEPOSITS (CUMULATIVE AREA = 850 SQ. FT.)
- WS-2 LOCATION OF SURFACE WATER SAMPLE
- L20 RANDOMLY SELECTED SAMPLE LOCATION (SEE SOIL SAMPLING LOCATION NOTE 2)

GENERAL NOTES:

1. COAL COMBUSTIBLE RESIDUALS (CCR) AREAS ARE APPROXIMATE BASED ON VISUAL INSPECTIONS AND GLOBAL POSITIONING SYSTEM (GPS) COORDINATES COLLECTED BY APTIM ON SEPTEMBER 26 AND 28, 2018.

2. CCR DEPOSIT THICKNESS VARIED BETWEEN 1/4 INCH AND 4 INCHES. THE CCR DEPOSITS DECREASED IN THICKNESS AS LOCATIONS PROGRESSED DOWNSTREAM TOWARDS CULVERT 2.

SOIL SAMPLING LOCATION NOTES:

1. SEE FIGURE 3 FOR LOWER DEPOSIT AREAS L1 THROUGH L17.

2. FOR THE LOWER DEPOSITS (L1 THROUGH L20), A TOTAL OF 8 SOIL SAMPLE LOCATIONS WERE RANDOMLY SELECTED. THE 8 SOIL SAMPLES TAKEN WITHIN THE RANDOMLY SELECTED LOWER DEPOSIT AREAS WERE BIASED SAMPLES (TAKEN WHERE TRACE CCR WAS VISIBLE, IF ANY).

SCALE 0 25 50 75 FEET

REV	DESCRIPTION / ISSUE	DATE	APPROVED

APTIM
500 Penn Center Boulevard, Suite 900
Pittsburgh, Pennsylvania 15235

GenOn

DESIGNED BY: P. Andrison
DRAWN BY: E. Schlegel
CHECKED BY: P. Andrison
APPROVED BY: R. Southorn

SOIL AND SURFACE WATER SAMPLING LOCATIONS (2 of 2)

CONEMAUGH GENERATING STATION
ASH/REFUSE DISPOSAL SITE
INDIANA COUNTY, PENNSYLVANIA

DATE: 12/18/18 | SCALE: AS SHOWN | DRAWING NO. 003138-D1-2 | FIGURE NO. 4

VERIFY SCALE 0 1"

Xref :
Image :

File: O:\PROJECT\100911440003_Conemaugh\003138\003138-D1.dwg
Plot Date/Time: Jan 07, 2019 - 4:21pm
Plotted By: Evan.Schlegel

Appendix A

CCR Release Notification to PADEP

GenOn Northeast Management Company*
Conemaugh Generating Station
1442 Plant Road
New Florence, PA 15944

August 13, 2018

Overnight Delivery
Ms. Kristin Gearhart
Pennsylvania Department of Environmental Protection
Cambria District Office
286 Industrial Park Road
Ebensburg, PA 15931

RE: Discharge of Contact Storm Water
5 Day Written Report
NPDES Permit No. PA0005011
Conemaugh Generating Station - New Florence, PA

Dear Ms. Gearhart:

As requested on August 9, 2018, GenOn Northeast Management Company (GenOn) is providing this five-day written report of the incident that was discovered at the Conemaugh Generating Station (Station). The incident was discovered on August 8, 2018 during inspections and repair of the landfill erosion and sedimentation controls. Ash was observed adjacent to and west of the East Valley Stream, an unnamed tributary to the Conemaugh River.

Description of the Noncompliance, Cause, and Duration

Based on data gathered from the Station rain gauge located at the Ash Valley landfill, the incident occurred on July 30th between noon and 1:35 pm. Approximately, 0.6 inches of rain fell between noon and 12:30 pm saturating the landfill drainage area. Another 1 inch of rain fell within a 15-minute period between 1:20 pm and 1:35 pm. The runoff from the large drainage area caused contact storm water from the landfill to exceed the capacity of the drainage channel adjacent to the landfill haul road near the entrance to the active Stage II disposal area. The overflow of the drainage channel subsided shortly after the storm.

At this location, a portion of this contact storm water flowed out of the channel over and through the Stage III construction area (~800 linear feet) where the flow joined noncontact storm water runoff and entered a storm water sedimentation trap adjacent to Culvert 1C. Contact storm water intermixed with non-contact storm water exceeded the capacity of the sedimentation trap, flowed through Culvert 1C on the south east side of the landfill, flowed south approximately 150 feet within a vegetated storm water swale where the flow combined with East Valley Stream flow. At this time, the East Valley Stream, a stream mitigation project for the landfill expansion, was well above the normal water levels and within the heavily vegetated constructed floodplain. Based on our inspections of the East Valley stream channel and adjacent areas on August 8, 9 and 10, one to three inches of ash was observed within the Culvert 1C storm water runoff swale and area on the west side of East Valley Stream. Several smaller areas of ash were observed

*: GenOn Northeast Management Company is a subsidiary of GenOn Energy, Inc.

downstream within low areas adjacent to the stream. No ash was observed within the East Valley Stream channel.

Steps Taken or Planned to Reduce, Eliminate, and Prevent Reoccurrence

All erosion and sedimentation controls within this area of the landfill were restored and/or improved to minimize re-occurrence. Additional activities to improve the grade of the haul road are expected to be completed within the next two months. Ash has been removed from sedimentation traps as of August 10.

Plans and permits, if necessary, to remove the ash within the in areas adjacent to the stream channel are being developed. We will review our plans with the Department prior to proceeding with the removal work adjacent to and within the stream. Ash removal may include the placement of erosion and sedimentation controls and removal by mechanical means (e.g., excavator) or by utilizing vacuum trucks and laborers to loosen and remove the ash.

Lastly, Conemaugh Station also believes that the very rainy conditions experienced in the area and throughout the Commonwealth in July 2018 resulted in diminished capacity for the soil / land to absorb the unusually high rainfall and thus avoid the consequences from the July 30th event. The table below summarizes the precipitation data for July 2018 for the Commonwealth. As presented below, rainfall experienced in July 2018 was the second highest amount recorded that month during the last 124 years. Conemaugh Station believes that the July 30th event was an isolated and rare occurrence.

.....

Please do not hesitate to contact Stephen Frank (Stephen.frank@genon.com) at 724-249-3610 or John Shimshock (John.Shimshock@genon.com) at 724-235-4596 with any questions or comments concerning this report.

Very truly yours,

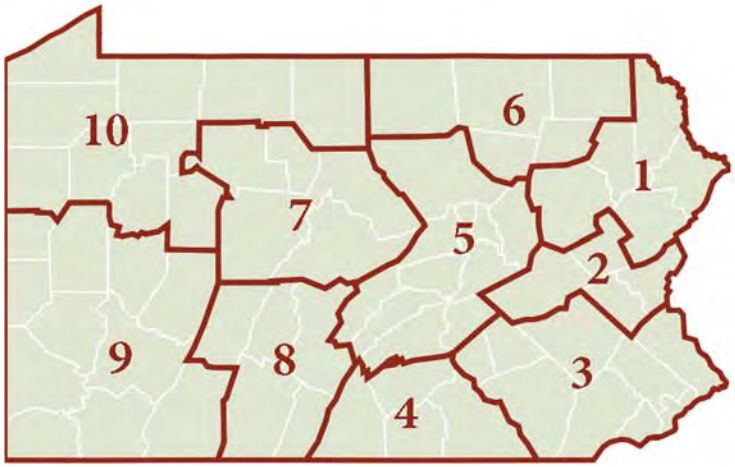
John P. Shimshock

John P. Shimshock
Environmental Specialist
Conemaugh Generating Station

July 2018 Precipitation Averages (inches)

State	Average	Departure	Pct Normal	Rank	Driest	Wettest
Pennsylvania	7.37	3.10	173%	124	1.90 in 1909	7.37 in 2018
1-Pocono Mountains	7.88	3.66	187%	121	1.19 in 1936	10.95 in 1947
2-East Central Mtns	8.75	4.17	191%	120	1.01 in 1999	10.17 in 1945
3-Southeastern Piedmont	8.35	3.75	182%	120	0.85 in 1955	8.93 in 1945
4-Lower Susquehanna	9.83	5.96	254%	124	0.97 in 1983	9.83 in 2018
5-Middle Susquehanna	10.74	6.69	265%	124	1.35 in 1909	10.74 in 2018
6-Upper Susquehanna	8.44	4.42	210%	123	1.32 in 1936	8.81 in 2004
7-Central Mountains	8.21	4.00	195%	122	1.83 in 1909	9.19 in 1992
8-South Central Mtns	7.47	3.66	196%	123	0.95 in 1983	7.97 in 1989
9-Southwest Plateau	4.48	0.16	104%	76	1.75 in 1930	9.70 in 1896
10-Northwest Plateau	5.31	0.71	115%	96	1.99 in 2011	10.00 in 1992

Rankings are for the 124 years between 1895 and 2018. 1=driest; 124=wettest.
Departures and percent normal are calculated using the 1981-2010 normals.



Reference: http://www.nrcc.cornell.edu/regional/tables/tables.html

Appendix B

Notice of Time Period Extension for Assessment of Corrective Measures

APTIM
1607 East Main Street
St Charles, Illinois 60174
Tel: +1 630 762 1400
Fax: +1 30 762 1402

November 1, 2018 **VIA EMAIL**

Mr. Steve Frank, GenOn
Mr. John Shimshock, Conemaugh Generating Station

Subject: Assessment of Corrective Measures—Acknowledgement of 60-day Extension
CCR Release Incident – Ash Valley Refuse/Disposal Area
Conemaugh Generating Station
West Wheatfield Township, Indiana County, Pennsylvania

Dear Messrs. Frank and Shimshock:

As you are aware, Title 40 Code of Federal Regulations (CFR) Part 257 Subpart D addresses the management of coal combustion residuals (CCR) in landfills and surface impoundments. Conemaugh Generating Station's Ash Valley Refuse/Disposal Site (operated by GenOn Northeast Management Company [GenOn]) is subject to the CCR Rule. On August 8, 2018, a surficial (non-groundwater) release of CCR was discovered during the performance of a routine inspection of the landfill and established erosion and sedimentation control features. The release most likely occurred during an extremely intense precipitation event on July 30, 2018, which was localized and rare.

As required under §257.90(d), in order to minimize the potential for future releases, Conemaugh Station and its contractor (R&L Development) immediately removed CCR from the onsite erosion and sedimentation control features and repaired them. Conemaugh Station and its contractor have additionally continued with implementation of additional interim measures to further stabilize the situation and minimize potential impacts to human health and/or the environment (e.g., removed nearly all of the displaced CCR). In this regard, a vacuum truck was used shortly after the release and during subsequent interim actions to remove as much of the released CCR as feasible in order to protect human health and the environment. This method of removal was selected in order to minimize disturbance to the vegetation and ecosystem.

Representatives from Aptim Environmental & Infrastructure, Inc. (APTIM) visited the site on September 26th and 28th, 2018 and October 23, 2018 to assess the extent of the CCR release to the ground surface. I, as a qualified professional engineer in the Commonwealth of Pennsylvania, reviewed the above-described interim/corrective actions during the noted site visit on October 23, 2018 and found them to be appropriate to minimize the potential for future release.

APTIM

APTIM is currently developing a soil and surface water sampling plan to assess whether the remedial activities undertaken immediately and shortly after the release have appropriately mitigated potential impacts to the health and/or the environment. Soil and surface water sampling will be undertaken once this plan is complete. If a potential impact to human health and/or the environment is found to be present due to the release, further corrective measures will be assessed in accordance with §257.96. The selection of any additional remedy, if required, will be conducted in accordance with §257.97 and implemented in accordance with §257.98. Because of the complexities related to removal of the displaced ash in the impacted areas, and the need to develop an adequate confirmatory sampling and analysis plan, Aptim certifies that a 60-day extension beyond the CCR Rule-specified 90 days is appropriate for completing the assessment of corrective measures. U.S. EPA acknowledged the need for such extensions in the preamble to the final CCR Rule, please see below:

> *Based on the comments received, as well as the Agency's own experience, EPA recognizes that there may be complex situations that require more time to develop a careful and well-thought out corrective measures assessment. Therefore, the final rule has been modified to allow up to an additional 60 days to complete the assessment of corrective measures, provided that a qualified professional engineer certifies that the additional time is necessary. The initial 90 days plus the additional 60 days, which is within the range of time suggested by the commenters, would provide the owner or operator up to 150 days to complete the corrective measures assessment, which EPA expects will be sufficient.* FR 80 (74) April 17, 2015, page 21406

The corrective measures assessment will be completed within 150 days of the observation of the release, representing the inclusion of a 60-day extension per the provisions of §257.96(a), and to provide sufficient time for completion of the upcoming confirmation sampling activities. Thus, the assessment and associated summary report will be completed on or before January 9, 2019.

Please contact me with any questions, either via email at Richard.Southorn@aptim.com or directly at 630-762-3327.

Sincerely,

Richard Southorn, PE, PG

Project Manager
Aptim Environmental & Infrastructure, Inc.

Appendix C

Newspaper Advertisement of Public Meeting

Proof of Publication

State of Pennsylvania
County of Indiana] SS

On this 28th day of November 2018 A.D.

before me, the subscriber, a Notary Public in and for said County and State, personally appeared:

Shirley McCombs

who being duly sworn according to laws, deposes and says, that (s)he is the Solicitor of the Indiana Gazette, that the said Indiana Gazette is a daily newspaper of general circulation, published in the borough of Indiana, in the County of Indiana, State of Pennsylvania, by the Indiana Printing & Publishing Company, and was established in said Borough on the second day of July 1890, since which date, said daily newspaper has been regularly issued in said Borough and County, that annexed hereto is a true copy of a notice in the above matter exactly as the same was printed in the regular editions and issues of the said daily newspaper on the following dates, viz:

11/23, 11/24, 11/25

Affiant further deposes and says that (s)he is an employee of the publisher of the said daily newspaper and has been authorized to verify the foregoing statement and the (s)he is not interested in the subject matter of the aforesaid notice or publication and that all allegations in the foregoing statement as to time, place, and character of publication are true.

Indiana Printing & Publishing Company

By: Shirley McCombs

Sworn to and subscribed before me the day and year aforesaid.

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
BARBARA J SULLINGER
Notary Public
INDIANA BORO, INDIANA COUNTY
My Commission Expires Dec 3, 2020

Barbara J Sullinger
Signature of notarial officer

	$179.40
Proof of Publication	$5.00
Proof of Intent	
Total	$184.40

Indiana Printing & Publishing Company, publishers of the Indiana Gazette, a daily newspaper, hereby acknowledges receipt of the aforesaid publication costs, and certifies the same have been fully paid.

Indiana Printing and Publishing Co.
P.O. Box 10, 899 Water Street, Indiana, PA 15701

By _____

NOTICE
Public Meeting Notice

GenOn Northeast Management Company, the operator of the Conemaugh Generating Station located in West Wheatfield Township, Indiana County, PA, will hold a public meeting with interested and affected parties to discuss the incident and the assessment of corrective measures in response to a non-groundwater coal combustion residuals (CCR) release that occurred at the station's residual waste landfill on July 30, 2018. Meeting info is presented at the end of this notice. Landfill operations are subject to the requirements of U.S. EPA's CCR Rule, 40CFR257 Subpart D. The public meeting is required by the Rule, §257.96(e). Individuals will have an opportunity to provide written or oral comments relevant to this incident, not to exceed the time allotted for the meeting. The meeting will be documented as required by the Rule, §257.015 (h)(11).

WHAT: Public meeting to review Conemaugh Station's actions and corrective measures in response to a non-groundwater CCR release that occurred at the station's residual waste landfill on July 30, 2018.

WHEN: Tuesday, December 18, 2018, 6:00 PM to 8:00 PM EST

WHERE: New Florence Fire Hall, 177 13th Street, New Florence, PA 15944

11/23, 11/24, 11/25

Appendix D

Supporting Soil and Surficial Materials Report

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

CHEMICAL ANALYSES OF SOILS AND OTHER SURFICIAL MATERIALS OF THE CONTERMINOUS UNITED STATES

By

Josephine G. Boerngen and Hansford T. Shacklette

Open-File Report 81-197

1981

Contents

Table Page

Introduction

A sampling program was begun in 1961 that was designed to give estimates of the abundance of elements in soils and other surficial materials and in associated plants from sites selected along routes of travel, and in study areas, of U.S. Geological Survey scientists. The sampling plan was kept simple. The proposed sampling intensity consisted of one sample of soil and one of plants collected at sites about 50 mi. (81 km) along routes of travel to areas of other types of field study. Sampling sites were selected, insofar as possible, that represented soil in its natural condition. This program resulted in the sampling of 863 sites. The results of the soil analyses were published for 35 elements by plotting their concentrations, in two to five frequency classes, on maps (Shacklette, Hamilton, Boerngen, and Bowles, 1971).

Soon after this publication, interest in environmental geochemistry, particularly the application to problems of industrial and vehicular pollution, increased greatly. At the same time, advances in analytical techniques made the analysis of additional elements practical. Therefore, the samples from the first study, with some additional samples, were analyzed and reported as follows: mercury by Shacklette, Boerngen, and Turner (1971); lithium and cadmium by Shacklette, Boerngen, Cahill, and Rahill (1973); and selenium, fluorine, and arsenic by Shacklette, Boerngen, and Keith (1974).

Sampling according to this plan continued, as opportunities arose, until autumn, 1975, resulting in the sampling of 355 additional sites that were selected to give a more uniform geographical coverage of the conterminous United States. These samples were analyzed and the data were merged with those of the original samples to produce the results given in this report.

The elemental composition of only the surficial materials were given in all reports; the data on analysis of the plant samples are held in files of the U.S. Geological Survey.

This study was made possible by the cooperation of many persons in the U.S. Geological Survey. We express our appreciation to those who collected samples, as follows: Jessie M. Bowles, F. A. Branson, R. A. Cadigan, F. C. Canney, H. L. Cannon, F. W. Cater, Jr., M. A. Chaffey, Todd Church, J. J. Connor, Dwight Crowder, R. J. Ebens, R. N. Eicher, J. A. Erdman, R. F. Gantner, G. B. Gott, W. R. Griffitts, T. P. Hill, E. K. Jenne, M. I. Kaufman, J. R. Keith, Frank Kleinhampl, A. T. Miesch, R. F. Miller, R. C. Pearson, E. V. Post, Douglas Richman, James Scott, D. E. Seeland, R. C. Severson, M. H. Staatz, T. A. Steven, M. H. Strobell, V. E. Swanson, R. R. Tidball, H. A. Tourtelot, J. D. Vine, and R. W. White.

We thank the following members of the U.S. Department of Agriculture, Soil Conservation Service for providing soil samples from areas in Minnesota: Donald D. Barron, Carroll R. Carlson, Donald E. DeMartelaire, Royce R. Lewis, Charles Sutton, and Paul Nyberg.

We acknowledge the analytical support provided by the following U.S. Geological Survey chemists: Lowell Artis, Philip Aruscavage, A. J. Bartel, S. D. Botts, L. A. Bradley, J. W. Budinsky, Alice Caemmerer, J. P. Cahill, E. Y. Campbell, G. W. Chloe, Don Cole, E. F. Cooley, N. M. Conklin, W. B. Crandell, Maurice Devalliere, P. L. D. Elmore, E. J. Finlay, Johnnie Gardner, J. L. Glenn, T. F. Harms, R. C. Haven, R. H. Heidel, M. B. Hinkle, Claude Huffman, Jr., L. B. Jenkins, R. J. Knight, B. W. Lanthorn, L. M. Lee, K. W. Leong, J. B. McHugh, J. D. Mensik, V. M. Merrit, H. T. Millard, Jr., Wayne Mountjoy, H. M. Nakagawa, H. G. Neiman, Uteana Oda, C. S. E. Papp, R. L. Rahill, V. E. Shaw, G. D. Shipley, Hezekiah Smith, A. J. Sutton, Jr., J. A. Thomas, Barbara Tobin, J. E. Troxel, J. H. Turner, and G. H. VanSickle.

We were assisted in computer programming for the data by J. B. Fife and George VanTrump, Jr.

Sample collection, preparation, and analysis

The sampling sites were selected, if possible, to represent surficial materials that were altered very little from their natural condition and that supported native or cultivated plants suitable for sampling. In practice, this site selection necessitated sampling away from roadcuts and fills, but in some areas only cultivated fields were available for sampling. The materials sampled included soil as defined by soil scientists, beach and dune sands, very stony lithosols, and organic deposits generally considered to be peat instead of soil. Most samples were collected at a depth of about 8 in. (20 cm), which reduced or avoided the effects of surface contamination. In zonal soils, this depth commonly is within the range of the B soil horizon (zone of element accumulation). Some lithosols over near-surface bedrock did not extend downward to 8 in. (20 cm); they were sampled at the bottom of soil development in the profile.

Areas of field studies commonly were sampled more intensively than at intervals of 50 miles (81 km). Samples used from these studies were selected to represent about the same geographical coverage as did those along roads.

The soil samples were dried in the laboratory, pulverized and sieved, and the minus-2mm fractions were used for analysis. The methods of analysis used for some elements were changed during the course of the study as new techniques and instruments became available. The results published in the first report (Shacklette, Hamilton, Boerngen, and Bowles, 1971) were obtained for most elements by use of a semiquantitative six-step emission spectrographic method (Neiman, 1976). Other methods were used for the following elements: atomic absorption, with flame (Huffman and Dinnin, 1976) for mercury, lithium, magnesium, sodium, rubidium, and zinc; atomic absorption, flameless (Vaughn, 1967) for mercury; X-ray fluorescence spectrometry (Wahlberg, 1976) for calcium, germanium, iron, potassium, selenium, silver, sulfur, and titanium; combustion (Huffman and Dinnin, 1976), total carbon; and neutron activation (Millard, 1975, 1976) for thorium and uranium.

Location, description, and concentration of elements for samples of surficial materials

Table 1 provides one page of descriptive material for 50 samples, arranged alphabetically by Postal Service abbreviations for state names and by county names, followed by four pages of analytical data for these samples, then proceeds to the descriptive page for the next 50 samples, and so on through the table. The state names in the descriptive material of site locations are abbreviated according to the system used by the Government Printing Office (GPO). The following table gives these abbreviations.

State	GPO	Postal Service	State	GPO	Postal Service
Alabama	Ala.	AL	Nebraska	Nebr.	NE
Arizona	Ariz.	AZ	Nevada	Nev.	NV
Arkansas	Ark.	AR	New Hampshire	N.H.	NH
California	Calif.	CA	New Jersey	N.J.	NJ
Colorado	Colo.	CO	New Mexico	N. Mex.	NM
Connecticut	Conn.	CT	New York	N.Y.	NY
Delaware	Del.	DE	North Carolina	N.C.	NC
Florida	Fla.	FL	North Dakota	N. Dak.	ND
Georgia	Ga.	GA	Ohio	Ohio	OH
Idaho	Idaho	ID	Oklahoma	Okla.	OK
Illinois	Ill.	IL	Oregon	Oreg.	OR
Indiana	Ind.	IN	Pennsylvania	Pa.	PA
Iowa	Iowa	IA	Rhode Island	R.I.	RI
Kansas	Kans.	KS	South Carolina	S.C.	SC
Kentucky	Ky.	KY	South Dakota	S. Dak.	SD
Louisiana	La.	LA	Tennessee	Tenn.	TN
Maine	Maine	ME	Texas	Tex.	TX
Maryland	Md.	MD	Utah	Utah	UT
Massachusetts	Mass.	MA	Vermont	Vt.	VT
Michigan	Mich.	MI	Virginia	Va.	VA
Minnesota	Minn.	MN	Washington	Wash.	WA
Mississippi	Miss.	MS	West Virginia	W. Va.	WV
Missouri	Mo.	MO	Wisconsin	Wis.	WI
Montana	Mont.	MT	Wyoming	Wyo.	WY

The location of the sampling sites is given by north latitude and west longitude in degrees and minutes, and the collection date is given by year and month. The format used for table 1 allows only 70 spaces for site and soil descriptions, therefore, this column is written in telegraphic style, employing numerous abbreviations, minimum punctuation, and the elimination of unnecessary connectives in the statements in order to give as much information as possible in the limited space. The sampling sites are located more precisely by a descriptive reference to landmarks, such as highways, towns, rivers, or other geographic features. The distances of

the sites from these landmarks are approximate, generally rounded to whole numbers. The descriptions of the surficial materials closely follow those made at the sites by the collectors, and are usually expressed in nontechnical terms. A list of the abbreviations that were used follows.

Abbreviation	Word or term	Abbreviation	Word or term
ALLUV	Alluvium	NAT	National
ALT	Alternate	NAT FOR	National forest
BLM	Bureau of Land Management	N.P.	National Park
BR	Branch	NR	Near
BRWN	Brown	PK	Park
C.H.	Courthouse	QUAD	Quadrangle
CO	County	QUAT	Quaternary
CR	Creek	R.	River
DECID.	Deciduous	RD	Road
FT	Fort	RES	Reservation
HATC	Hatchery	RR	Railroad
HOR	Horizon	RT	State Route
HTS	Heights	RX	Rocks
I	Interstate Highway	SED	Sedimentary
IN.	Inch or inches	SERV	Service
IRR	Irrigation	SH	Shale
JCT	Junction	SPGS	Springs
LGHT	Light	SS	Sandstone
LS	Limestone	TERT	Tertiary
MED	Medium	TPK	Turnpike
MI	Mile	US	U.S. Highway
MT	Mount or mountain	YDS	Yards
MX	Mixed		

Bismuth, cadmium, praseodymium, and silver were found infrequently in measurable concentrations in the samples. Data for these elements are given in the following table.

SAMPLE NO.	STATE	COUNTY	LATI-TUDE	LONGI-TUDE	DATE COLLECTED	LOCATION, DESCRIPTION, AND CONCENTRATION (PPM) OF ELEMENTS	
						BISMUTH	
GC171650	AZ	PINAL	33 18	111 5	64 5	US 60-70 W EDGE OF SUPERIOR; STONY ROUGH SOIL	15
250450	CA	INYO	36 28	117 52	66 6	RT 190 OWENS LAKE 5 MI S KEELER; SAND NEAR PLAYA	15
						CADMIUM	
060250	CA	KERN	35 30	119 38	70 7	JCT RT 33 AND UNNUMBERED RD 10 MI NW BUTTONWILLOW; SOIL NOT DESCRIBED	1.0
242750	CA	NEVADA	39 14	121 2	66 7	I-40 AT CISCO; SOIL NOT DESCRIBED	1.0
243150	CA	SANTA CLARA	36 58	121 33	66 7	US 101 AT RT 152 EXIT GILROY; SOIL NOT DESCRIBED	10.0
270650	CA	SHASTA	40 31	121 30	68 9	IN LASSEN VOLCANIC N.P. 3 MI SE MANZANITA LAKE; B HORIZON SOIL	1.0
185450	CO	MOFFAT	40 15	108 40	65 6	US 40 5 MI E MASSADONA; BROWN CLAYEY SILT 8 IN. DEPTH	1.0
066950	CO	SUMMIT	39 33	106 9	72 9	US 6 .5 MI E OFFICERS GULCH CAMPGROUND; BROWN GRAVELLY SOIL ON TILL	11.0
155850	KS	BOURBON	37 45	94 55	63 10	US 54 10 MI W FT. SCOTT; DARK PRAIRIE SOIL OVER LIMESTONE	1.5
024850	KS	LOGAN	39 7	101 44	71 10	US 40 AT OAKLEY; BLACK PRAIRIE SOIL	2.0
023550	MT	CASCADE	47 32	111 10	71 5	1 MI NORTH MALSTROM AIR BASE; CULTIVATED, PLOW ZONE	2.0
191350	NM	CHAVES	33 22	104 50	65 6	US 70 18 MI SW ROSWELL; VERY DRY, TAN, MANY CHERT FRAGMENTS	1.5
042250	OH	AUGLAIZE	40 30	83 55	66 10	US 33 1 MI NW LAKEVIEW; BROWN SILTY LOAM CULTIVATED	1.0
267450	SD	BROWN	45 25	98 7	68 8	RT 37 1 MI S GROTON; GRAY MOTTLED B HORIZON LACUSTRINE CLAY, GRASSLAND	1.0
152150	TX	HARRIS	29 47	95 38	63 7	US 90 2 MI E ADDICKS; DARK ALLUVIAL CLAY	1.0
022750	VA	WYTHE	36 58	80 57	72 9	RT 121 AT MAX MEADOWS; MUCK	4.0
056050	WI	POLK	45 31	92 35	70 5	RT 35 2 MI S LUCK; YELLOW SANDY LOAM	1.0
						PRASEODYMIUM	
070350	AL	MONTGOMERY	32 17	86 12	73 1	US 231 5 MI S MONTGOMERY; SANDY LOAM	100
						SILVER	
171450	AZ	COCONINO	34 33	111 18	64 5	RT 87 AT CLINTS WELL; DARK FOREST SOIL	3.0
033150	CO	CLEAR CREEK	39 47	105 47	65 8	US 40 ON BERTHOUD PASS; BROWN, ON GRANITE AND GNEISS RUBBLE	2.0
186250	ID	BANNOCK	42 47	112 24	65 6	I-15 8 MI SE POCATELLO; BROWN SILT, 4 IN. DEPTH	3.0
023550	MT	CASCADE	47 32	111 10	71 5	1 MI NORTH MALSTROM AIR BASE; CULTIVATED, PLOW ZONE	.7
263150	UT	SUMMIT	40 52	111 15	68 7	I-80 2 MI S RT 133 EXIT NEAR STREAM BED; BLACK ORGANIC ALLUVIUM	5.0
022750	VA	WYTHE	36 58	80 57	72 9	RT 121 AT MAX MEADOWS; MUCK	3.0

Some elements were looked for in all samples but were not found. These elements, analyzed by the semiquantative spectrographic method, and their approximate lower detection limits, in parts per million, are as follows: gold, 20; hafnium, 100; indium, 10; platinum, 30; palladium, 1; rhenium, 30; tantalum, 200; tellurium, 2,000; and thallium, 50. If lanthanum or cerium was found in a sample, the following elements, with their stated lower detection limits, were looked for in the same sample but were not found: dysprosium, 50; erbium, 50; gadolinium, 50; holmium, 20; lutetium, 30; terbium, 300; and thulium, 20.

The following symbols used in table 1 are explained as follows: N, not detected in the sample; leaders (--), no data available; <, less than the stated value; and >, greater than the stated value.

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Table 1.--Location, description, and concentration of elements for samples of surficial materials

[Data are divided into five-page units. The first page of each unit gives the sample numbers for 50 samples, the state and county names listed alphabetically, the latitude and longitude in degrees and minutes, the date of sample collection, the location of the sampling site, and the description of the sample. The following 4 pages give analytical results for 46 elements for each of the 50 samples in this unit. The second unit follows alphabetically by state and county, and so on through the entire table]

Table 1.--Location, description, and concentration of elements for samples of surficial materials--continued

Sample No.	State	County	Lati-tude	Long-itude	Date Colln.	Site and Soil Descriptions
GC268950	OR	MALHEUR	44 0	117 0	68 9	US 20-26 10 MI E VALE; B HORIZON SOIL
GC269050	OR	MALHEUR	43 47	117 56	68 9	US 20 ABOUT 10 MI E JUNTURA; B HORIZON SOIL
GC026950	OR	MARION	45 1	122 59	71 9	I-5 2.6 MI N JCT I-5 & US 99E; SOIL ON SILT DEPOSIT
GC269550	OR	MARION	44 50	123 5	68 9	I-5 S OF TURNER; B HORIZON SOIL
GC035350	OR	MORROW	45 50	119 36	65 8	I-80-US30 3 MI E US 730 JCT; MED BROWN SAND
GC035650	OR	MULTNOMAH	45 32	122 17	65 8	AT CORBETT OFF I-80; BROWN SILT
GC060650	OR	SHERMAN	45 20	120 46	70 10	US 97 1 MI S GRASS VALLEY; DARK GRAY SILT OVER BASALT
GC076650	OR	TILLAMOOK	45 44	123 56	73 9	RT 101 1 MI N MANZANITA; REDDISH-YELLOW LOAM
GC076750	OR	TILLAMOOK	45 12	123 55	73 9	US 101 4 MI S CLOVERDALE; PEBBLY LOAM
GC035250	OR	UMATILLA	45 40	118 45	65 8	US 30 1 MI E PENDLETON; GRAY SILT ON BASALT
GC269450	OR	UMATILLA	45 3	118 59	68 9	US 395 ABOUT 8 MI N DALE; B HORIZON SOIL
GC035150	OR	UNION	45 20	118 6	65 8	US 30 N EDGE LA GRANDE; GRAY-BROWN CLAY LOAM
GC035550	OR	WASCO	45 42	121 21	65 8	I-80N 3 MI W ROWENA; BROWN SILT, RESIDUAL ON BASALT
GC041650	PA	BEDFORD	39 57	78 20	66 10	PA TPK 6 MI W EXIT 12; LIGHT ORANGE-BROWN SANDY LOAM
GC059550	PA	CENTRE	41 2	77 57	70 9	I-80 .5 MI S JCT RT 144 ON GRAVEL TRAIL; SOIL NOT DESCRIBED
GC041350	PA	CHESTER	40 7	75 50	66 10	PA TPK 5 MI E EXIT 22; BROWN CLAY LOAM
GC041550	PA	CUMBERLAND	40 10	77 30	66 10	PA TPK 10 MI E EXIT 15; YELLOWISH CLAY LOAM
GC041450	PA	DAUPHIN	40 10	76 37	66 10	PA TPK 8 MI W EXIT 20; RED SANDY CLAY LOAM
GC003050	PA	ERIE	41 56	80 29	62 5	I-90 AT US 6N INTERCHANGE; YELLOWISH-ORANGE SAND
GC030950	PA	ERIE	42 11	79 50	72 9	RT 89 3 MI S OF NORTH EAST; HEAVY CLAY FOREST SOIL
GC041750	PA	FAYETTE	40 5	79 20	66 10	PA TPK 2 MI E EXIT 9; YELLOWISH BROWN SILTY CLAY LOAM
GC061150	PA	JEFFERSON	41 9	78 54	70 9	US 322 2.5 MI E RT 28 JCT; SOIL NOT DESCRIBED
GC184550	PA	LEHIGH	40 44	75 37	67 11	NE EXIT PENN. TPK NEAR SLATINGTON; SOIL NOT DESCRIBED
GC061350	PA	LYCOMING	41 12	77 8	70 9	RT 645 3.9 MI W JCT US 15; SOIL NOT DESCRIBED
GC061050	PA	MERCER	41 12	80 17	70 9	4.5 MI W JCT US 62 AND US 19; SOIL NOT DESCRIBED
GC184050	PA	SULLIVAN	41 23	76 30	67 10	US 220 2 MI S LAPORTE; B HORIZON FROM SANDSTONE
GC184450	PA	SUSQUEHANNA	41 38	75 38	67 11	I-81 5 MI S LENOX; SOIL NOT DESCRIBED
GC061450	PA	TIOGA	41 40	77 5	70 9	US 15 2.7 MI S OF N TURNOFF TO ARNOT; SOIL NOT DESCRIBED
GC041850	PA	WASHINGTON	40 10	80 15	66 10	I-70 AT WASHINGTON; YELLOWISH-ORANGE SILTY LOAM
GC006050	RI	PROVIDENCE	41 49	71 43	62 10	US 6 AT JCT RT 102; SANDY B HORIZON
GC062950	SC	AIKEN	33 24	81 33	70 10	US 78 2 MI S WINDSOR; SANDY, AZONAL, YOUNG PINE STAND
GC196650	SC	CLARENDON	33 52	80 0	65 7	US 378 2 MI E TURBEVILLE; LIGHT YELLOW SAND
GC063050	SC	DARLINGTON	34 18	79 50	70 10	CO RD 1 MI E DOVESVILLE; SANDY, AZONAL, PINE PLANTATION
GC196750	SC	HORRY	33 50	79 14	65 7	US 378 11 MI W CONWAY; BLACK SAND AND MUCK
GC196850	SC	HORRY	33 50	78 40	65 7	US 17 AT LITTLE RIVER; YELLOW SAND
GC196350	SC	MC CORMICK	33 51	82 22	65 7	US 378 1 MI E GEORGIA STATE LINE; RED CLAY WITH QUARTZ FRAGMENTS
GC063150	SC	ORANGEBURG	33 20	80 57	70 10	CO RD 1 MI E COPE; SANDY, AZONAL, MATURE PINE FOREST
GC196550	SC	RICHLAND	33 56	80 56	65 7	US 378 10 MI E COLUMBIA; YELLOW SAND
GC196450	SC	SALUDA	34 0	81 39	65 7	US 378 10 MI E SALUDA; RED LITHOSOL WITH QUARTZ FRAGMENTS
GC211050	SC	SPARTANBURG	34 55	82 0	65 7	US 29 .4 MI W I-85 AT SPARTANBURG; SOIL NOT DESCRIBED
GC267550	SD	BEADLE	44 33	98 19	68 8	RT 37 7 MI S RT 28 JCT, N HURON; DARK BROWN GRAVELLY, CULTIVATED
GC028850	SD	BENNETT	43 13	101 27	72 9	US 18 11 MI E MARTIN; DARK SILT LOAM
GC029250	SD	BON HOMME	43 5	98 5	72 9	RT 46 12 MI E WAGNER; BLACK CLAY LOAM
GC055250	SD	BROOKINGS	44 0	96 45	70 5	US 14 2 MI W BROOKINGS; BLACK PRAIRIE
GC267450	SD	BROWN	45 25	98 7	68 8	RT 37 1 MI S GROTON; GRAY MOTTLED B HORIZON LACUSTRINE CLAY, GRASSLAND
GC054450	SD	BUTTE	44 35	103 24	70 5	US 212 JCT RT 79; DARK CLAYEY SOIL
GC055150	SD	CODINGTON	44 30	97 3	70 5	US 81 3 MI S WATERTOWN; BLACK PRAIRIE
GC084150	SD	CORSON	45 51	101 55	74 11	STANDING ROCK INDIAN RESERVATION; SOIL DERIVED FROM SANDSTONE
GC054750	SD	DEWEY	44 54	100 42	70 5	US 212 6 MI E RIDGEVIEW; PRAIRIE CLAY LOAM
GC267750	SD	DOUGLAS	43 17	98 20	68 8	US 281 1 MI S .5 MI E ARMOUR; DARK CLAY LOAM, PRAIRIE GROUP, CULT.

Table 1.--Location, description, and concentration of elements for samples of surficial materials--continued

Sample No.	Al %	As ppm	B ppm	Ba ppm	Be ppm	Br ppm	C %	Ca %	Ce ppm	Co ppm	Cr ppm	Cu ppm
GC268950	>10.00	4.3	20	1,000	1.0	--	--	2.60	N	15	70.0	30.0
GC269050	>10.00	3.8	<20	700	1.0	--	--	4.50	N	30	30.0	150.0
GC026950	>10.00	6.2	30	1,500	3.0	1.9	2.2	1.21	<150	20	70.0	30.0
GC269550	>10.00	6.0	N	300	N	--	--	.20	N	30	70.0	100.0
GC035350	>10.00	2.6	N	700	N	--	--	2.40	N	20	50.0	20.0
GC035650	>10.00	4.4	N	700	N	--	--	3.20	N	15	100.0	20.0
GC060650	>10.00	5.7	<20	700	1.5	--	--	2.32	<150	15	50.0	50.0
GC076650	>10.00	10.3	30	500	N	10.8	4.2	.54	N	10	70.0	70.0
GC076750	10.00	5.5	<20	300	N	7.4	10.4	.19	N	5	150.0	70.0
GC035250	>10.00	6.9	N	700	N	--	--	2.20	N	20	50.0	30.0
GC269450	7.00	1.7	N	500	N	--	--	4.60	N	30	100.0	150.0
GC035150	>10.00	4.2	N	700	N	--	--	1.80	N	30	100.0	30.0
GC035550	>10.00	1.9	N	700	N	--	--	3.40	N	30	50.0	30.0
GC041650	7.00	29.0	70	300	2.0	--	--	.05	150	30	70.0	50.0
GC059550	5.00	6.1	30	300	N	--	--	.06	N	3	30.0	10.0
GC041350	7.00	5.2	20	500	1.5	--	--	.30	150	20	50.0	70.0
GC041550	10.00	9.9	50	500	1.5	--	--	.20	150	15	100.0	50.0
GC041450	7.00	7.0	70	300	3.0	--	--	.20	150	20	70.0	50.0
GC003050	1.50	6.3	30	300	N	--	--	.53	N	7	15.0	15.0
GC030950	7.00	15.7	50	500	N	5.3	4.1	.43	<150	10	70.0	50.0
GC041750	7.00	10.0	50	500	2.0	--	--	.45	150	30	70.0	50.0
GC061150	3.00	3.8	30	200	N	--	--	.03	N	3	15.0	7.0
GC184550	5.00	16.0	70	300	1.5	--	--	.10	N	15	30.0	50.0
GC061350	10.00	17.0	50	500	2.0	--	--	.04	<150	15	100.0	50.0
GC061050	7.00	14.0	50	500	1.0	--	--	.15	150	10	50.0	20.0
GC184050	3.00	11.0	30	150	N	--	--	.05	N	7	15.0	15.0
GC184450	5.00	14.0	70	200	1.5	--	--	.25	N	10	30.0	15.0
GC061450	7.00	10.0	50	300	1.0	--	--	.06	<150	10	30.0	20.0
GC041850	10.00	31.0	50	500	3.0	--	--	.25	150	30	100.0	70.0
GC006050	>10.00	3.5	N	500	N	--	--	1.10	N	10	50.0	15.0
GC062950	--	4.9	--	--	--	--	--	--	--	--	--	--
GC196650	1.50	1.1	50	70	N	--	--	.10	N	N	15.0	5.0
GC063050	--	3.2	--	--	--	--	--	--	--	--	--	--
GC196750	.70	1.0	50	70	N	--	--	.10	N	N	5.0	3.0
GC196850	.70	--	50	50	N	--	--	.10	N	N	5.0	5.0
GC196350	>10.00	4.3	N	300	N	--	--	.40	N	7	50.0	50.0
GC063150	--	6.8	--	--	--	--	--	--	--	--	--	--
GC196550	1.50	7.4	50	70	7.0	--	--	--	N	N	15.0	5.0
GC196450	3.00	2.9	N	200	N	--	--	.20	N	N	10.0	15.0
GC211050	>10.00	3.4	N	300	N	--	--	.25	N	10	50.0	30.0
GC267550	7.00	15.0	20	700	1.0	--	--	.80	N	10	50.0	50.0
GC028850	5.00	1.7	<20	1,000	N	<.5	.9	.76	N	<3	15.0	7.0
GC029250	7.00	13.5	50	700	1.5	1.4	3.5	1.27	<150	10	70.0	50.0
GC055250	5.00	7.0	30	500	N	--	1.8	1.00	N	7	30.0	10.0
GC267450	7.00	3.9	30	500	1.0	--	--	7.00	N	7	50.0	30.0
GC054450	7.00	17.0	70	1,000	1.0	--	1.5	1.20	N	10	70.0	30.0
GC055150	7.00	10.0	30	700	1.0	--	4.9	1.00	N	7	70.0	15.0
GC084150	7.00	1.9	50	1,000	2.0	<.5	2.2	1.22	N	10	70.0	20.0
GC054750	10.00	12.0	70	1,000	1.0	--	1.6	1.10	N	7	70.0	20.0
GC267750	>10.00	15.0	50	700	1.0	--	--	.55	N	10	70.0	50.0

Table 1.--Location, description, and concentration of elements for samples of surficial materials--continued

Sample No.	F %	Fe %	Ga ppm	Ge ppm	Hg ppm	I ppm	K %	La ppm	Li ppm	Mg %	Mn ppm	Mo ppm
GC268950	.039	5.00	30	--	.03	--	2.20	50	23	1.500	700	N
GC269050	.043	7.00	30	--	.02	--	1.40	50	12	3.000	1,000	5
GC026950	.070	7.00	20	1.78	.06	1.0	1.78	50	18	.700	1,000	N
GC269550	.016	>10.00	70	--	.11	--	.45	N	18	.300	1,500	N
GC035350	.031	3.00	30	--	.05	--	2.00	30	16	1.500	700	N
GC035650	.019	3.00	30	--	.28	--	1.80	30	20	1.000	700	N
GC060650	.037	7.00	20	--	.02	--	1.30	50	25	1.000	500	N
GC076650	.050	7.00	20	1.37	.07	4.8	1.34	<30	25	.700	700	N
GC076750	--	5.00	20	1.21	.06	2.1	.62	N	28	.500	100	N
GC035250	.043	5.00	30	--	.02	--	1.80	50	27	1.500	700	N
GC269450	.015	7.00	30	--	.03	--	.90	N	14	1.500	1,500	--
GC035150	.037	5.00	30	--	.11	--	1.20	50	23	1.000	1,000	5
GC035550	.030	7.00	30	--	.38	--	1.10	N	16	1.500	1,000	N
GC041650	.033	3.00	30	--	.06	--	2.00	70	37	.500	500	N
GC059550	.009	1.50	5	--	.13	--	.78	30	18	.100	150	N
GC041350	.026	5.00	30	--	.07	--	1.90	100	28	.700	1,000	3
GC041550	.080	5.00	30	--	.12	--	2.00	70	55	1.000	200	N
GC041450	.053	5.00	30	--	.07	--	1.30	70	47	1.000	1,500	N
GC003050	.009	1.50	15	--	.04	--	1.08	N	14	.300	300	N
GC030950	--	3.00	15	1.82	.11	2.2	1.51	<30	39	.500	700	N
GC041750	.040	7.00	30	--	.06	--	1.90	70	64	.700	700	N
GC061150	.004	.70	N	--	.05	--	.36	30	12	.070	300	N
GC184550	.061	3.00	15	--	.08	--	2.30	30	27	.300	300	3
GC061350	.008	7.00	30	--	.08	--	3.26	50	78	.700	700	N
GC061050	.027	3.00	15	--	.06	--	1.25	70	35	.300	700	N
GC184050	.034	1.50	15	--	.10	--	.75	30	41	.300	200	N
GC184450	.026	1.50	15	--	.14	--	1.20	30	40	.300	700	N
GC061450	.029	3.00	15	--	.25	--	1.29	50	39	.300	1,500	N
GC041850	.060	7.00	50	--	.05	--	2.50	70	80	.500	300	N
GC006050	.061	3.00	20	--	.24	--	1.50	N	24	.700	500	N
GC062950	.061	--	--	--	.03	--	--	--	6	--	--	--
GC196650	.002	.30	N	--	.05	--	.02	30	7	.050	20	N
GC063050	.017	--	--	--	.03	--	--	--	<5	--	--	--
GC196750	<.001	.15	N	--	.09	--	.04	N	<5	.020	20	N
GC196850	.011	.30	N	--	.03	--	.03	N	6	.030	70	N
GC196350	.012	3.00	30	--	.13	--	.65	N	12	.200	100	N
GC063150	<.001	--	--	--	.06	--	--	--	<5	--	--	--
GC196550	<.001	.50	N	--	.07	--	.05	30	10	.050	50	N
GC196450	<.001	1.50	10	--	.07	--	.60	N	10	.070	200	N
GC211050	.003	3.00	15	--	.06	--	.36	N	17	.100	150	N
GC267550	.022	5.00	15	--	.08	--	2.00	30	23	1.500	5,000	3
GC028850	--	1.00	10	1.06	.02	.6	1.41	N	10	.200	200	N
GC029250	.050	2.00	15	1.52	.05	2.1	1.93	50	25	.500	1,000	N
GC055250	.017	1.50	15	--	.05	<.5	1.40	N	17	.500	500	N
GC267450	.030	2.00	15	--	.03	--	1.70	30	27	2.000	3,000	N
GC054450	.100	3.00	20	--	.08	.6	2.00	30	61	1.000	200	N
GC055150	.028	2.00	15	--	.53	<.5	1.60	N	21	.700	1,000	N
GC084150	.040	3.00	15	1.04	.07	1.4	1.98	<30	17	.700	1,500	N
GC054750	.062	3.00	20	--	.06	.6	1.60	30	41	.700	200	N
GC267750	.041	5.00	20	--	.11	--	2.10	50	34	1.500	700	3

Table 1.--Location, description, and concentration of elements for samples of surficial materials--continued

Sample No.	Na %	Nb ppm	Nd ppm	Ni ppm	P %	Pb ppm	Rb ppm	S %	Sb ppm	Sc ppm	Se ppm	Si %
GC268950	1.50	10	<70	30	.030	10	--	--	--	15	.3	--
GC269050	1.00	10	70	20	.090	10	--	--	--	30	<.1	--
GC026950	2.00	10	N	15	--	20	100	.13	<1	15	.2	29
GC269550	.30	20	--	30	.120	20	--	--	--	30	.8	--
GC035350	1.50	20	N	20	.030	15	--	--	--	20	<.1	--
GC035650	2.00	20	N	30	.060	20	--	--	--	15	.2	--
GC060650	2.00	10	70	20	--	15	--	--	--	20	<.1	--
GC076650	1.00	10	N	7	--	20	60	<.08	<1	20	.8	24
GC076750	.50	10	--	15	--	15	55	.10	2	10	.3	20
GC035250	1.50	20	N	30	.024	20	--	--	--	20	.4	--
GC269450	2.00	20	--	70	.060	N	--	--	--	30	<.1	--
GC035150	1.50	30	N	50	.016	30	--	--	--	20	.4	--
GC035550	2.00	15	N	20	.090	30	--	--	--	20	<.1	--
GC041650	.50	15	70	30	.040	30	--	--	--	15	.3	--
GC059550	.20	10	N	<5	--	15	--	--	--	5	.4	--
GC041350	.70	10	150	30	.080	30	--	--	--	15	1.3	--
GC041550	.70	15	70	30	.030	20	--	--	--	15	.4	--
GC041450	1.00	15	70	30	.030	30	--	--	--	15	.4	--
GC003050	.70	10	--	15	.052	15	--	--	--	7	.1	--
GC030950	.70	<10	<70	20	--	30	85	<.08	<1	10	.2	31
GC041750	.50	15	70	50	.040	30	--	--	--	15	.7	--
GC061150	<.05	10	N	N	--	<10	--	--	--	5	.3	--
GC184550	.15	10	70	30	.040	30	--	--	--	15	1.1	--
GC061350	.50	10	70	50	--	10	--	--	--	15	.4	--
GC061050	.50	10	100	15	--	20	--	--	--	10	.4	--
GC184050	.15	15	70	15	.024	15	--	--	--	7	.5	--
GC184450	.70	15	70	15	.050	30	--	--	--	7	.4	--
GC061450	.30	10	70	10	--	20	--	--	--	7	.6	--
GC041850	.50	15	70	30	.060	30	--	--	--	15	.3	--
GC006050	1.50	15	N	15	.040	15	--	--	--	10	.9	--
GC062950	--	--	--	--	--	--	--	--	--	--	<.1	--
GC196650	N	20	N	N	.004	N	--	--	--	N	.2	--
GC063050	--	--	--	--	--	--	--	--	--	--	.1	--
GC196750	N	N	N	N	.012	N	--	--	--	N	.1	--
GC196850	N	15	N	N	.002	N	--	--	--	N	.1	--
GC196350	.15	N	N	15	.004	N	--	--	--	15	1.3	--
GC063150	--	--	--	--	--	--	--	--	--	--	<.1	--
GC196550	N	20	N	7	.004	N	--	--	--	N	.2	--
GC196450	.30	N	N	5	.008	N	--	--	--	10	.5	--
GC211050	.07	10	--	20	.006	N	--	--	--	10	.5	--
GC267550	1.00	10	N	70	.030	15	--	--	--	10	.7	--
GC028850	1.00	N	--	5	--	15	70	<.08	<1	5	<.1	28
GC029250	1.00	<10	70	50	--	20	75	<.08	2	10	<.1	29
GC055250	--	N	--	15	.065	15	--	--	--	5	.4	36
GC267450	1.50	10	<70	30	.030	10	--	--	--	7	.4	--
GC054450	--	<10	N	30	.052	15	--	--	--	10	1.9	29
GC055150	--	<10	--	20	.161	70	--	--	--	7	.6	30
GC084150	1.00	10	N	30	--	15	80	<.08	<1	10	<.1	31
GC054750	--	<10	N	30	.052	15	--	--	--	15	.4	29
GC267750	1.00	10	<70	70	.024	15	--	--	--	10	.9	--

Table 1.--Location, description, and concentration of elements for samples of surficial materials--continued

Sample No.	Sn ppm	Sr ppm	Ti %	Th ppm	U ppm	V ppm	Y ppm	Yb ppm	Zn %	Zr ppm
GC268950	--	500	.500	--	--	150	50	3.0	50	200
GC269050	--	300	.700	--	--	500	70	7.0	70	150
GC026950	1.79	500	1.000	9.23	3.15	200	30	3.0	89	150
GC269550	--	70	.700	--	--	500	20	3.0	85	150
GC035350	--	500	.700	--	--	150	30	5.0	40	150
GC035650	--	700	.500	--	--	150	30	3.0	70	150
GC060650	--	500	.700	--	--	150	50	3.0	88	200
GC076650	1.44	150	1.000	7.76	3.58	150	20	3.0	77	200
GC076750	.22	70	.500	--	3.01	200	10	2.0	59	100
GC035250	--	500	.700	--	--	150	30	5.0	50	200
GC269450	--	300	.700	--	--	300	30	5.0	65	100
GC035150	--	300	.700	--	--	150	30	5.0	55	150
GC035550	--	700	1.000	--	--	200	30	5.0	75	150
GC041650	--	150	.700	--	--	100	50	7.0	60	200
GC059550	--	30	.300	--	--	20	15	2.0	24	200
GC041350	--	70	.700	--	--	150	100	10.0	130	150
GC041550	--	150	.700	--	--	150	30	3.0	60	150
GC041450	--	150	.700	--	--	150	30	3.0	80	150
GC003050	--	70	.150	--	--	30	15	3.0	42	200
GC030950	1.79	150	.300	12.79	3.10	100	20	3.0	155	200
GC041750	--	150	.700	--	--	100	30	5.0	110	200
GC061150	--	10	.500	--	--	15	20	3.0	31	500
GC184550	--	30	.300	--	--	70	30	3.0	115	200
GC061350	--	150	.700	--	--	100	20	3.0	67	150
GC061050	--	70	.500	--	--	70	30	3.0	113	300
GC184050	--	30	.200	--	--	30	20	3.0	55	200
GC184450	--	30	.300	--	--	50	30	3.0	90	300
GC061450	--	50	.500	--	--	50	30	3.0	80	200
GC041850	--	150	.500	--	--	100	30	5.0	80	150
GC006050	--	150	.300	--	--	70	20	2.0	30	150
GC062950	--	--	--	--	--	--	--	--	--	--
GC196650	--	N	.500	--	--	15	20	3.0	--	500
GC063050	--	--	--	--	--	--	--	--	--	--
GC196750	--	N	.100	--	--	N	N	N	--	150
GC196850	--	N	.200	--	--	N	N	1.0	--	700
GC196350	--	N	.200	--	--	150	N	1.0	25	50
GC063150	--	--	--	--	--	--	--	--	--	--
GC196550	--	N	.300	--	--	15	30	3.0	--	500
GC196450	--	50	.200	--	--	30	20	3.0	--	100
GC211050	--	20	.200	--	--	100	N	1.0	--	100
GC267550	--	200	.300	--	--	100	30	3.0	60	150
GC028850	.34	200	.150	--	1.99	30	10	1.5	31	150
GC029250	1.48	200	.200	8.59	3.13	150	20	3.0	107	200
GC055250	--	150	.200	--	--	50	15	1.5	54	150
GC267450	--	300	.200	--	--	100	20	2.0	60	150
GC054450	--	200	.300	--	--	200	30	3.0	134	100
GC055150	--	150	.300	--	--	70	20	3.0	150	200
GC084150	.62	200	.200	9.86	2.23	150	20	3.0	79	100
GC054750	--	300	.300	--	--	150	20	3.0	100	100
GC267750	--	200	.300	--	--	150	30	5.0	75	200

Appendix E

Analytical Laboratory Reports

Background Samples (B-1 through B-10)

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N. Center Ave.
Somerset, PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

Friday, December 28, 2018

John Shimshock
GENON - CONEMAUGH STATION CCR
CONEMAUGH STATION
PO BOX K
NEW FLORENCE, PA 15944

RE: Conemaugh CCR IV Background Order No.: G1811861

Dear John Shimshock:

Geochemical Testing received 10 sample(s) on 11/14/2018 for the analyses presented in the following report.

There were no problems with the analyses and all QC data met NELAC, EPA, and laboratory specifications except where noted in the Case Narrative or Laboratory Results.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Timothy W. Bergstresser
Director of Technical Services

Leslie A. Nemeth
Project Manager

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306PA DEP

CLIENT: GENON - CONEMAUGH STATION CCR
Project: Conemaugh CCR IV Background
Lab Order: G1811861

CASE NARRATIVE

No problems were encountered during analysis of this workorder, except if noted in this report.

SAMPLE RECEIPT CHECKLIST

	Response
COC is present	Yes
COC is filled out in ink and legible	Yes
COC relinquished, signature, date, and time	Yes
Samples arrived within hold time	Yes
Containers properly preserved for the requested testing	Yes
Sample containers have legible labels	Yes
Sample preservation verified	Yes
Appropriate sample containers are used	Yes
Sample container(s) received at proper temperature	Yes
Zero headspace where required	Yes
Sufficient volume for all requested analyses	Yes

Comments on the above checklist: None

Legend:
ND - Not Detected
J - Indicates an estimated value.
U - The analyte was not detected at or above the listed concentration, which is below the laboratory quantitation limit.
B - Analyte detected in the associated Method Blank
Q - Qualifier QL -Quantitation Limit DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
** - Value exceeds Action Limit
H - Method Hold Time Exceeded
MCL - Contaminant Limit

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *28-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	B-1 0-4
Lab Order:	G1811861		
Project:	Conemaugh CCR IV Background	**Sampled By:**	APTIM
Lab ID:	G1811861-001	**Collection Date:**	11/13/2018 11:20:00 A
Matrix:	SOLID	**Received Date:**	11/14/2018 8:54:37 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.71+/-0.0401	0.077		pCi/g	1		12/06/18 7:05 PM
Radium-228	0.87+/-0.0742	0.092		pCi/g	1		12/06/18 7:05 PM

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 6:42 PM
Arsenic	15.5	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:30 PM
Barium	127	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:30 PM
Beryllium	1.11	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:30 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:30 PM
Chromium	41.5	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:30 PM
Cobalt	17.6	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:30 PM
Lead	23.2	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:30 PM
Lithium	15.9	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:30 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:30 PM
Selenium	2.3	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:30 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:30 PM

TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.038	0.010		mg/Kg-dry	1		11/20/18 2:36 PM

Laboratory Results

Geochemical Testing

Date: *28-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	B-2 0-4
Lab Order:	G1811861		
Project:	Conemaugh CCR IV Background	**Sampled By:**	APTIM
Lab ID:	G1811861-002	**Collection Date:**	11/13/2018 11:25:00 A
Matrix:	SOLID	**Received Date:**	11/14/2018 8:54:37 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.55+/-0.0321	0.070		pCi/g	1		12/07/18 9:15 PM
Radium-228	0.70+/-0.0678	0.073		pCi/g	1		12/07/18 9:15 PM

NOTES:

QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 7:05 PM
Arsenic	11.2	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:34 PM
Barium	123	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:34 PM
Beryllium	1.05	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:34 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:34 PM
Chromium	41.1	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:34 PM
Cobalt	15.7	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:34 PM
Lead	22.1	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:34 PM
Lithium	12.6	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:34 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:34 PM
Selenium	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:34 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:34 PM

TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.057	0.010		mg/Kg-dry	1		11/20/18 2:36 PM

Laboratory Results

Geochemical Testing

Date: *28-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	B-3 0-4
Lab Order:	G1811861		
Project:	Conemaugh CCR IV Background	**Sampled By:**	APTIM
Lab ID:	G1811861-003	**Collection Date:**	11/13/2018 11:30:00 A
Matrix:	SOLID	**Received Date:**	11/14/2018 8:54:37 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.58+/-0.0342	0.072		pCi/g	1		12/08/18 11:15 PM
Radium-228	0.71+/-0.0637	0.086		pCi/g	1		12/08/18 11:15 PM

NOTES:

QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 7:09 PM
Arsenic	14.5	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:39 PM
Barium	87.8	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:39 PM
Beryllium	0.74	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:39 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:39 PM
Chromium	69.4	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:39 PM
Cobalt	9.2	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:39 PM
Lead	18.5	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:39 PM
Lithium	12.8	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:39 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:39 PM
Selenium	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:39 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:39 PM

TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.054	0.010		mg/Kg-dry	1		11/20/18 2:36 PM

Laboratory Results

Geochemical Testing

Date: *28-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	B-4 0-4
Lab Order:	G1811861		
Project:	Conemaugh CCR IV Background	**Sampled By:**	APTIM
Lab ID:	G1811861-004	**Collection Date:**	11/13/2018 11:35:00 A
Matrix:	SOLID	**Received Date:**	11/14/2018 8:54:37 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.58+/-0.0329	0.066		pCi/g	1		12/10/18 12:06 AM
Radium-228	0.81+/-0.0687	0.091		pCi/g	1		12/10/18 12:06 AM

NOTES:

QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 7:14 PM
Arsenic	12.1	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:44 PM
Barium	179	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:44 PM
Beryllium	1.12	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:44 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:44 PM
Chromium	42.6	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:44 PM
Cobalt	21.2	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:44 PM
Lead	24.8	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:44 PM
Lithium	16.3	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:44 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:44 PM
Selenium	2.2	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:44 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:44 PM

TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.030	0.010		mg/Kg-dry	1		11/20/18 2:36 PM

Laboratory Results

Geochemical Testing

Date: *28-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	B-5 0-4
Lab Order:	G1811861		
Project:	Conemaugh CCR IV Background	**Sampled By:**	APTIM
Lab ID:	G1811861-005	**Collection Date:**	11/13/2018 11:40:00 A
Matrix:	SOLID	**Received Date:**	11/14/2018 8:54:37 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.56+/-0.0319	0.065		pCi/g	1		12/10/18 7:11 PM
Radium-228	0.74+/-0.0614	0.071		pCi/g	1		12/10/18 7:11 PM

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:32 AM
Arsenic	14.6	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:32 AM
Barium	166	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:32 AM
Beryllium	1.23	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:32 AM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:32 AM
Chromium	43.6	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:32 AM
Cobalt	20.4	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:32 AM
Lead	26.4	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:32 AM
Lithium	14.7	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:32 AM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:32 AM
Selenium	2.7	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:32 AM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:32 AM

TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.039	0.010		mg/Kg-dry	1		11/20/18 2:36 PM

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I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *28-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	B-6 0-4
Lab Order:	G1811861		
Project:	Conemaugh CCR IV Background	**Sampled By:**	APTIM
Lab ID:	G1811861-006	**Collection Date:**	11/13/2018 11:45:00 A
Matrix:	SOLID	**Received Date:**	11/14/2018 8:54:37 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.6+/-0.0344	0.070		pCi/g	1		12/11/18 7:23 AM
Radium-228	0.74+/-0.0634	0.081		pCi/g	1		12/11/18 7:23 AM

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:51 AM
Arsenic	16.5	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:51 AM
Barium	187	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:51 AM
Beryllium	1.30	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:51 AM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:51 AM
Chromium	56.5	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:51 AM
Cobalt	20.1	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:51 AM
Lead	26.6	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:51 AM
Lithium	17.8	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:51 AM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:51 AM
Selenium	2.8	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:51 AM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:51 AM

TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.055	0.010		mg/Kg-dry	1		11/20/18 2:36 PM

Laboratory Results

Geochemical Testing

Date: *28-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	B-7 0-4
Lab Order:	G1811861		
Project:	Conemaugh CCR IV Background	**Sampled By:**	APTIM
Lab ID:	G1811861-007	**Collection Date:**	11/13/2018 11:50:00 A
Matrix:	SOLID	**Received Date:**	11/14/2018 8:54:37 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.62+/-0.0342	0.067		pCi/g	1		12/11/18 7:52 PM
Radium-228	0.79+/-0.0671	0.088		pCi/g	1		12/11/18 7:52 PM

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:55 AM
Arsenic	17.2	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:55 AM
Barium	161	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:55 AM
Beryllium	1.23	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:55 AM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:55 AM
Chromium	42.6	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:55 AM
Cobalt	16.1	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:55 AM
Lead	27.3	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:55 AM
Lithium	16.4	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:55 AM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:55 AM
Selenium	2.6	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:55 AM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 11:55 AM

TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.037	0.010		mg/Kg-dry	1		11/20/18 2:36 PM

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *28-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	B-8 0-4
Lab Order:	G1811861		
Project:	Conemaugh CCR IV Background	**Sampled By:**	APTIM
Lab ID:	G1811861-008	**Collection Date:**	11/13/2018 11:55:00 A
Matrix:	SOLID	**Received Date:**	11/14/2018 8:54:37 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.6+/-0.0341	0.068		pCi/g	1		12/12/18 7:58 AM
Radium-228	0.65+/-0.0669	0.079		pCi/g	1		12/12/18 7:58 AM

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 12:00 PM
Arsenic	14.8	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 12:00 PM
Barium	160	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 12:00 PM
Beryllium	1.29	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 12:00 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 12:00 PM
Chromium	53.7	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 12:00 PM
Cobalt	19.6	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 12:00 PM
Lead	25.5	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 12:00 PM
Lithium	15.9	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 12:00 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 12:00 PM
Selenium	2.4	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 12:00 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 12:00 PM

TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.041	0.010		mg/Kg-dry	1		11/20/18 2:36 PM

Laboratory Results

Geochemical Testing

Date: *28-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	B-9 0-4
Lab Order:	G1811861		
Project:	Conemaugh CCR IV Background	**Sampled By:**	APTIM
Lab ID:	G1811861-009	**Collection Date:**	11/13/2018 12:00:00 P
Matrix:	SOLID	**Received Date:**	11/14/2018 8:54:37 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.62+/-0.0345	0.071		pCi/g	1		12/12/18 8:31 PM
Radium-228	0.79+/-0.0672	0.086		pCi/g	1		12/12/18 8:31 PM

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:37 PM
Arsenic	16.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:37 PM
Barium	186	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:37 PM
Beryllium	1.31	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:37 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:37 PM
Chromium	54.6	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:37 PM
Cobalt	20.3	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:37 PM
Lead	27.9	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:37 PM
Lithium	13.2	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:37 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:37 PM
Selenium	2.7	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:37 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:37 PM

TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.037	0.010		mg/Kg-dry	1		11/20/18 2:36 PM

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I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *28-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	B-10 0-4
Lab Order:	G1811861		
Project:	Conemaugh CCR IV Background	**Sampled By:**	APTIM
Lab ID:	G1811861-010	**Collection Date:**	11/13/2018 12:05:00 P
Matrix:	SOLID	**Received Date:**	11/14/2018 8:54:37 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.57+/-0.0313	0.062		pCi/g	1		12/13/18 10:19 AM
Radium-228	0.69+/-0.0593	0.068		pCi/g	1		12/13/18 10:19 AM

NOTES:

QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:42 PM
Arsenic	13.1	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:42 PM
Barium	153	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:42 PM
Beryllium	1.18	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:42 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:42 PM
Chromium	64.5	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:42 PM
Cobalt	18.2	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:42 PM
Lead	24.9	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:42 PM
Lithium	13.4	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:42 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:42 PM
Selenium	2.1	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:42 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:42 PM

TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.033	0.010		mg/Kg-dry	1		11/20/18 2:36 PM

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

Shuttle/Cooler ID#:

CHAIN OF CUSTODY

Geochemical Testing

Form F-5002, 12.16

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: GENON	**Contact (Company):** APTIM	**Phone:** (412) 380-4272
Address: CONEMAUGH	e-mail: patricia.andrison@aptim.com	Fax: ( )
City: NEW FLORENCE **State:** PA **Zip:** 15944	**Sampled by:** PATTI ANDRISON AND	**State Sampled:** PA
WO#: 618 1186 1	Project: EVAN SCHLEGEL	PO/Quote#:

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other		

Sample Location/ Description	Lab Number	Sample Matrix	Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
***NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG*								
B-1 0-4	001	SO	11/13/18	1120	G	SEE BOTTLES	Field Filtered: Y / N	1
B-1 4-8	—	SO	11/13/18	1122	G		Field Filtered: Y / N	1
B-2 0-4	002	SO	11/13/18	1125	G		Field Filtered: Y / N	1
B-2 4-8	—	SO	11/13/18	1127	G		Field Filtered: Y / N	1
B-3 0-4	003	SO	11/13/18	1130	G		Field Filtered: Y / N	1
B-3 4-8	—	SO	11/13/18	1132	G		Field Filtered: Y / N	1
B-4 0-4	004	SO	11/13/18	1135	G		Field Filtered: Y / N	1
B-4 4-8	—	SO	11/13/18	1137	G		Field Filtered: Y / N	1

Note Deficiencies Here:

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
APTIM Patricia M Andrison	11/13/18	1615		11-14-18	2054

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: X Yes or ___ No | Cooler Temp (°C) on receipt: 5

Sample Receiving (1st Review): JS | Client Support (2nd Review): ___

Shuttle/Cooler ID#:	**CHAIN OF CUSTODY**	Geochemical Testing

Form F-5002, 12.16

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: GENON	**Contact (Company):** APTIM	**Phone:** (412 380-4272
Address: CONEMAUGH	e-mail:	Fax: ( )
City: NEW FLORENCE **State:** PA **Zip:** 15944	**Sampled by:** PATTI ANDERSON AND	**State Sampled:** PA
WO#: 6181186 1	Project: EVAN SCHLEGEL	PO/Quote#:

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other		

Sample Location/ Description	Lab Number	Sample Matrix	Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
***NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG**								
B-5 0-4	005	SO	11/13/18	1140	G	SEE BOTTLES	Field Filtered: Y / N	1
B-5 4-8	—	SO	11/13/18	1142	G		Field Filtered: Y / N	1
B-6 0-4	006	SO	11/13/18	1145	G		Field Filtered: Y / N	1
B-6 4-8	—	SO	11/13/18	1147	G		Field Filtered: Y / N	1
B-7 0-4	~~SDG~~ 007	SO	11/13/18	1150	G		Field Filtered: Y / N	1
B-7 4-8	—	SO	11/13/18	1152	G		Field Filtered: Y / N	1
B-8 0-4	008	SO	11/13/18	1155	G		Field Filtered: Y / N	1
B-8 4-8	—	SO	11/13/18	1157	G		Field Filtered: Y / N	1

Note Deficiencies Here:

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
APTIM Patricia M Anderson	11/13/18	1615		11-13-18	1654

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: X Yes or ___ No | Cooler Temp (°C) on receipt: 5

Sample Receiving (1st Review): JS | Client Support (2nd Review): ___

Shuttle/Cooler ID#:

CHAIN OF CUSTODY

Geochemical Testing

Form F-5002, 12.16

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: GENON	**Contact (Company):** APTIM	**Phone:** (412) 380-4272
Address: CONEMAUGH	e-mail:	Fax: ( )
City: NEW FLORENCE **State:** PA **Zip:** 15944	**Sampled by:** Patti Andrison and Evan Schlegel	**State Sampled:** PA
WO#: 6181186	Project:	PO/Quote#:

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other		

Sample Location/ Description	Lab Number	Sample Matrix	Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
**NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG								
B-9 0-4	009	SO	11/13/18	1200	G	SEE BOTTLES	Field Filtered: Y / N	1
B-9 4-8	—	SO	11/13/18	1202	G		Field Filtered: Y / N	1
B-10 0-4	010	SO	11/13/18	1205	G		Field Filtered: Y / N	1
B-10 4-8	—	SO	11/13/18	1207	G		Field Filtered: Y / N	1
UD-1 0-4	—	SO	11/13/18	1330	G		Field Filtered: Y / N	3
UD-1 4-8	—	SO	11/13/18	1335	G		Field Filtered: Y / N	3
UD-2 0-4	—	SO	11/13/18	1345	G		Field Filtered: Y / N	3
UD-2 4-8	—	SO	11/13/18	1350	G		Field Filtered: Y / N	3

Note Deficiencies Here:

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
APTIM Patricia M Andrison	11/13/18	1615		11-14-18	0954

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: X Yes or ___ No | Cooler Temp (°C) on receipt: 5

Sample Receiving (1st Review): JJ | Client Support (2nd Review): ___

Confirmation Soil and Leachate Samples
(UD-1 through UD-8 and LD-1 through LD-8)

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N. Center Ave.
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Friday, December 21, 2018

John Shimshock
GENON - CONEMAUGH STATION CCR
CONEMAUGH STATION
PO BOX K
NEW FLORENCE, PA 15944

RE: Conemaugh CCR IV SPLP Order No.: G1811860

Dear John Shimshock:

Geochemical Testing received 6 sample(s) on 11/14/2018 for the analyses presented in the following report.

There were no problems with the analyses and all QC data met NELAC, EPA, and laboratory specifications except where noted in the Case Narrative or Laboratory Results.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Timothy W. Bergstresser
Director of Technical Services

Leslie A. Nemeth
Project Manager

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306PA DEP

CLIENT: GENON - CONEMAUGH STATION CCR
Project: Conemaugh CCR IV SPLP
Lab Order: G1811860

CASE NARRATIVE

No problems were encountered during analysis of this workorder, except if noted in this report.

SAMPLE RECEIPT CHECKLIST

	Response
COC is present	Yes
COC is filled out in ink and legible	Yes
COC relinquished, signature, date, and time	Yes
Samples arrived within hold time	Yes
Containers properly preserved for the requested testing	Yes
Sample containers have legible labels	Yes
Sample preservation verified	Yes
Appropriate sample containers are used	Yes
Sample container(s) received at proper temperature	Yes
Zero headspace where required	Yes
Sufficient volume for all requested analyses	Yes

Comments on the above checklist: None

The radiological analysis (Radium 226 by EPA 903.1; Radium 228 by EPA 904.0) was subcontracted to Pace Analytical (PADEP 65-00282). A copy of the subcontractor's laboratory report is enclosed with this Analytical Report.

Laboratory Results

Geochemical Testing

Date: *21-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-1 0-4
Lab Order:	G1811860		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811860-001	**Collection Date:**	11/13/2018 1:30:00 PM
Matrix:	SOLID	**Received Date:**	11/14/2018 7:39:08 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.20	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.47	0.05		mg/L	1	11/16/18 11:45 AM	11/16/18 12:09 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0	S	mg/Kg-dry	1	11/20/18 1:30 PM	11/26/18 11:24 AM
Arsenic	25.2	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:39 PM
Barium	113	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:39 PM
Beryllium	1.01	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:39 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:39 PM
Chromium	24.8	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:39 PM
Cobalt	17.7	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:39 PM
Lead	20.4	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:39 PM
Lithium	11.5	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:39 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:39 PM
Selenium	2.3	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:39 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:39 PM

NOTES:
S - Spike recovery indicates a possible matrix effect. The method is in control as indicated by the LCS.

SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 9:20 AM	11/19/18 1:49 PM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:46 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:46 PM
Barium	0.093	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 1:46 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:46 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:46 PM
Chromium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:46 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:46 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:46 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:46 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:46 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:46 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:46 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.70+/-0.0756	0.073		pCi/g	1		11/15/18 6:45 PM
Radium-228	0.71+/-0.0647	0.097		pCi/g	1		11/15/18 6:45 PM

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *21-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-1 0-4
Lab Order:	G1811860		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811860-001	**Collection Date:**	11/13/2018 1:30:00 PM
Matrix:	SOLID	**Received Date:**	11/14/2018 7:39:08 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
NOTES: QL is equal to the MDA							
Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).							
The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.							
Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.							
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.366+-0.382	0.5		pCi/L	1		12/06/18 10:42 AM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	-0.149+-0.331	0.8		pCi/L	1		12/05/18 12:09 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	6.56			S.U.	1		11/15/18 8:00 PM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	8.01			S.U.	1		11/15/18 9:16 AM

Laboratory Results

Geochemical Testing

Date: *21-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-2 0-4
Lab Order:	G1811860		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811860-002	**Collection Date:**	11/13/2018 1:45:00 PM
Matrix:	SOLID	**Received Date:**	11/14/2018 7:39:08 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.072	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.20	0.05		mg/L	1	11/16/18 11:45 AM	11/16/18 1:03 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 6:19 PM
Arsenic	14.5	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:48 PM
Barium	123	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:48 PM
Beryllium	1.07	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:48 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:48 PM
Chromium	33.1	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:48 PM
Cobalt	16.7	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:48 PM
Lead	22.1	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:48 PM
Lithium	16.6	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:48 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:48 PM
Selenium	2.3	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:48 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:48 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 9:20 AM	11/19/18 1:51 PM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:51 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:51 PM
Barium	0.074	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 1:51 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:51 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:51 PM
Chromium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:51 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:51 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:51 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:51 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:51 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:51 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:51 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.71+/-0.0788	0.074		pCi/g	1		11/16/18 6:52 AM
Radium-228	0.92+/-0.0751	0.088		pCi/g	1		11/16/18 6:52 AM

Laboratory Results

Geochemical Testing

Date: *21-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-2 0-4
Lab Order:	G1811860		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811860-002	**Collection Date:**	11/13/2018 1:45:00 PM
Matrix:	SOLID	**Received Date:**	11/14/2018 7:39:08 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.503+-0.523	0.8		pCi/L	1		12/14/18 10:03 PM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	0.244+-0.301	0.6		pCi/L	1		12/14/18 2:12 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	4.87			S.U.	1		11/15/18 8:00 PM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	7.03			S.U.	1		11/15/18 9:16 AM

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *21-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-3 0-4
Lab Order:	G1811860		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811860-003	**Collection Date:**	11/13/2018 2:05:00 PM
Matrix:	SOLID	**Received Date:**	11/14/2018 7:39:08 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.037	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.26	0.05		mg/L	1	11/16/18 11:45 AM	11/16/18 1:21 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 6:24 PM
Arsenic	11.3	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:53 PM
Barium	107	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:53 PM
Beryllium	0.94	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:53 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:53 PM
Chromium	24.5	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:53 PM
Cobalt	12.7	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:53 PM
Lead	18.9	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:53 PM
Lithium	11.8	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:53 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:53 PM
Selenium	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:53 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 5:53 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 11:32 AM	11/20/18 9:55 AM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:55 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:55 PM
Barium	0.059	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 1:55 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:55 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:55 PM
Chromium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:55 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:55 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:55 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:55 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:55 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:55 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 1:55 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.99+/-0.0504	0.054		pCi/g	1		11/16/18 7:57 PM
Radium-228	1.34+/-0.0862	0.045		pCi/g	1		11/16/18 7:57 PM

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *21-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-3 0-4
Lab Order:	G1811860		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811860-003	**Collection Date:**	11/13/2018 2:05:00 PM
Matrix:	SOLID	**Received Date:**	11/14/2018 7:39:08 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.394+-0.410	0.6		pCi/L	1		12/06/18 10:42 AM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	0.280+-0.460	1.0		pCi/L	1		12/05/18 12:09 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	7.66			S.U.	1		11/15/18 8:00 PM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	8.42			S.U.	1		11/15/18 9:16 AM

Laboratory Results

Geochemical Testing

Date: *21-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-4 0-4
Lab Order:	G1811860		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811860-004	**Collection Date:**	11/13/2018 2:20:00 PM
Matrix:	SOLID	**Received Date:**	11/14/2018 7:39:08 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.099	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.16	0.05		mg/L	1	11/16/18 11:45 AM	11/16/18 1:39 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 6:28 PM
Arsenic	16.5	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:16 PM
Barium	136	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:16 PM
Beryllium	1.02	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:16 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:16 PM
Chromium	30.5	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:16 PM
Cobalt	15.4	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:16 PM
Lead	19.5	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:16 PM
Lithium	19.3	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:16 PM
Molybdenum	2.1	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:16 PM
Selenium	2.2	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:16 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:16 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 11:32 AM	11/20/18 10:01 AM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:18 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:18 PM
Barium	0.060	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 2:18 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:18 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:18 PM
Chromium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:18 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:18 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:18 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:18 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:18 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:18 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:18 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.82+/-0.0442	0.074		pCi/g	1		11/16/18 7:59 PM
Radium-228	0.83+/-0.0696	0.089		pCi/g	1		11/16/18 7:59 PM

Laboratory Results

Geochemical Testing

Date: *21-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-4 0-4
Lab Order:	G1811860		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811860-004	**Collection Date:**	11/13/2018 2:20:00 PM
Matrix:	SOLID	**Received Date:**	11/14/2018 7:39:08 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.148+-0.409	0.8		pCi/L	1		12/14/18 10:03 PM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	-0.0576+-0.299	0.7		pCi/L	1		12/14/18 2:12 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	3.97			S.U.	1		11/15/18 8:00 PM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	6.64			S.U.	1		11/15/18 9:16 AM

Laboratory Results

Geochemical Testing

Date: *21-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-5 0-4
Lab Order:	G1811860		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811860-005	**Collection Date:**	11/13/2018 3:00:00 PM
Matrix:	SOLID	**Received Date:**	11/14/2018 7:39:08 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.045	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.44	0.05		mg/L	1	11/16/18 11:45 AM	11/16/18 1:57 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 6:33 PM
Arsenic	5.8	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:20 PM
Barium	50.7	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:20 PM
Beryllium	0.31	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:20 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:20 PM
Chromium	9.2	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:20 PM
Cobalt	6.4	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:20 PM
Lead	9.7	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:20 PM
Lithium	3.5	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:20 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:20 PM
Selenium	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:20 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:20 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 11:32 AM	11/20/18 10:02 AM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:23 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:23 PM
Barium	0.080	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 2:23 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:23 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:23 PM
Chromium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:23 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:23 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:23 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:23 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:23 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:23 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:23 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.35+/-0.0283	0.065		pCi/g	1		11/19/18 6:56 PM
Radium-228	0.25+/-0.0473	0.078		pCi/g	1		11/19/18 6:56 PM

Laboratory Results

Geochemical Testing

Date: *21-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-5 0-4
Lab Order:	G1811860		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811860-005	**Collection Date:**	11/13/2018 3:00:00 PM
Matrix:	SOLID	**Received Date:**	11/14/2018 7:39:08 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
NOTES: QL is equal to the MDA							
Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).							
The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.							
Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.							
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.564+-0.527	0.7		pCi/L	1		12/06/18 10:42 AM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	0.502+-0.418	0.8		pCi/L	1		12/05/18 12:09 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	6.13			S.U.	1		11/15/18 8:00 PM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	8.75			S.U.	1		11/15/18 9:16 AM

Laboratory Results

Geochemical Testing

Date: *21-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-6 0-4
Lab Order:	G1811860		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811860-006	**Collection Date:**	11/13/2018 3:10:00 PM
Matrix:	SOLID	**Received Date:**	11/14/2018 7:39:08 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.054	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.18	0.05		mg/L	1	11/16/18 11:45 AM	11/16/18 2:15 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 6:37 PM
Arsenic	15.9	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:25 PM
Barium	118	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:25 PM
Beryllium	1.10	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:25 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:25 PM
Chromium	27.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:25 PM
Cobalt	22.0	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:25 PM
Lead	20.8	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:25 PM
Lithium	13.2	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:25 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:25 PM
Selenium	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:25 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/21/18 6:25 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 11:32 AM	11/20/18 10:04 AM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:28 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:28 PM
Barium	0.073	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 2:28 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:28 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:28 PM
Chromium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:28 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:28 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:28 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:28 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:28 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:28 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:28 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.58+/-0.0361	0.079		pCi/g	1		11/20/18 7:31 PM
Radium-228	0.59+/-0.0562	0.077		pCi/g	1		11/20/18 7:31 PM

I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *21-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-6 0-4
Lab Order:	G1811860		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811860-006	**Collection Date:**	11/13/2018 3:10:00 PM
Matrix:	SOLID	**Received Date:**	11/14/2018 7:39:08 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.737+-0.668	1.0		pCi/L	1		12/10/18 1:33 PM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	0.320+-0.300	0.6		pCi/L	1		12/10/18 1:12 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	4.11			S.U.	1		11/15/18 8:00 PM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	7.16			S.U.	1		11/15/18 9:16 AM

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N. Center Ave.
Somerset, PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

Wednesday, December 12, 2018

John Shimshock
GENON - CONEMAUGH STATION CCR
CONEMAUGH STATION
PO BOX K
NEW FLORENCE, PA 15944

RE: Conemaugh CCR IV SPLP Order No.: G1811867

Dear John Shimshock:

Geochemical Testing received 4 sample(s) on 11/15/2018 for the analyses presented in the following report.

There were no problems with the analyses and all QC data met NELAC, EPA, and laboratory specifications except where noted in the Case Narrative or Laboratory Results.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Timothy W. Bergstresser
Director of Technical Services

Leslie A. Nemeth
Project Manager

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306PA DEP

CLIENT: GENON - CONEMAUGH STATION CCR
Project: Conemaugh CCR IV SPLP
Lab Order: G1811867

CASE NARRATIVE

No problems were encountered during analysis of this workorder, except if noted in this report.

SAMPLE RECEIPT CHECKLIST

	Response
COC is present	Yes
COC is filled out in ink and legible	Yes
COC relinquished, signature, date, and time	Yes
Samples arrived within hold time	Yes
Containers properly preserved for the requested testing	Yes
Sample containers have legible labels	Yes
Sample preservation verified	Yes
Appropriate sample containers are used	Yes
Sample container(s) received at proper temperature	Yes
Zero headspace where required	Yes
Sufficient volume for all requested analyses	Yes

Comments on the above checklist: None

The radiological analysis (Radium 226 by EPA 903.1; Radium 228 by EPA 904.0) was subcontracted to Pace Analytical (PADEP 65-00282). A copy of the subcontractor's laboratory report is enclosed with this Analytical Report.

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-7 0-4
Lab Order:	G1811867		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811867-001	**Collection Date:**	11/14/2018 9:30:00 AM
Matrix:	SOLID	**Received Date:**	11/15/2018 6:32:36 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.26	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.51	0.05		mg/L	1	11/16/18 11:45 AM	11/16/18 2:33 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:46 PM
Arsenic	27.2	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:46 PM
Barium	149	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:46 PM
Beryllium	1.24	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:46 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:46 PM
Chromium	31.5	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:46 PM
Cobalt	14.8	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:46 PM
Lead	22.1	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:46 PM
Lithium	17.2	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:46 PM
Molybdenum	1.2	2.0	J	mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:46 PM
Selenium	2.2	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:46 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:46 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 11:32 AM	11/20/18 10:06 AM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:32 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:32 PM
Barium	0.070	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 2:32 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:32 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:32 PM
Chromium	0.0050	0.0050	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:32 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:32 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:32 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:32 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:32 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:32 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:32 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.71+/-0.0380	0.073		pCi/g	1		11/21/18 7:47 AM
Radium-228	0.90+/-0.0735	0.086		pCi/g	1		11/21/18 7:47 AM

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-7 0-4
Lab Order:	G1811867		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811867-001	**Collection Date:**	11/14/2018 9:30:00 AM
Matrix:	SOLID	**Received Date:**	11/15/2018 6:32:36 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.132+-0.301	0.2		pCi/L	1		12/06/18 9:43 PM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	0.844+-0.439	0.8		pCi/L	1		12/05/18 12:09 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	4.68			S.U.	1		11/15/18 8:00 PM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	8.29			S.U.	1		11/15/18 9:16 AM

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-8 0-4
Lab Order:	G1811867		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811867-003	**Collection Date:**	11/14/2018 9:50:00 AM
Matrix:	SOLID	**Received Date:**	11/15/2018 6:32:36 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.040	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.18	0.05		mg/L	1	11/16/18 11:45 AM	11/16/18 2:51 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:51 PM
Arsenic	14.6	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:51 PM
Barium	135	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:51 PM
Beryllium	1.12	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:51 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:51 PM
Chromium	31.8	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:51 PM
Cobalt	17.5	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:51 PM
Lead	23.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:51 PM
Lithium	17.7	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:51 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:51 PM
Selenium	2.4	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:51 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:51 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 11:32 AM	11/20/18 10:26 AM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:46 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:46 PM
Barium	0.080	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 2:46 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:46 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:46 PM
Chromium	0.0050	0.0050	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:46 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:46 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:46 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:46 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:46 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:46 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 2:46 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.71+/-0.0385	0.074		pCi/g	1		11/21/18 8:20 PM
Radium-228	0.89+/-0.0732	0.083		pCi/g	1		11/21/18 8:20 PM

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	UD-8 0-4
Lab Order:	G1811867		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811867-003	**Collection Date:**	11/14/2018 9:50:00 AM
Matrix:	SOLID	**Received Date:**	11/15/2018 6:32:36 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
NOTES: QL is equal to the MDA							
Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).							
The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.							
Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.							
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.0821+-0.581	1.2		pCi/L	1		12/07/18 12:08 PM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	-0.217+-0.347	0.9		pCi/L	1		12/05/18 3:36 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	6.05			S.U.	1		11/15/18 8:00 PM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	7.53			S.U.	1		11/15/18 9:16 AM

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-1 0-4
Lab Order:	G1811867		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811867-005	**Collection Date:**	11/14/2018 10:05:00 A
Matrix:	SOLID	**Received Date:**	11/15/2018 6:32:36 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.042	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.08	0.05	J	mg/L	1	11/16/18 11:45 AM	11/16/18 3:08 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:55 PM
Arsenic	24.5	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:55 PM
Barium	161	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:55 PM
Beryllium	1.20	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:55 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:55 PM
Chromium	31.7	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:55 PM
Cobalt	16.9	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:55 PM
Lead	28.9	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:55 PM
Lithium	16.2	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:55 PM
Molybdenum	1.2	2.0	J	mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:55 PM
Selenium	2.5	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:55 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 1:55 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 11:32 AM	11/20/18 10:49 AM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:10 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:10 PM
Barium	0.066	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 5:10 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:10 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:10 PM
Chromium	0.0050	0.0050	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:10 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:10 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:10 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:10 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:10 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:10 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:10 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	1.11+/-0.0567	0.052		pCi/g	1		11/21/18 8:20 PM
Radium-228	1.39+/-0.0877	0.038		pCi/g	1		11/21/18 8:20 PM

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-1 0-4
Lab Order:	G1811867		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811867-005	**Collection Date:**	11/14/2018 10:05:00 A
Matrix:	SOLID	**Received Date:**	11/15/2018 6:32:36 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
NOTES: QL is equal to the MDA							
Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).							
The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.							
Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.							
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.349+-0.364	0.5		pCi/L	1		12/06/18 10:00 PM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	0.487+-0.402	0.8		pCi/L	1		12/05/18 12:09 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	4.54			S.U.	1		11/17/18 1:00 PM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	7.52			S.U.	1		11/15/18 9:16 AM

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-2 0-4
Lab Order:	G1811867		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811867-007	**Collection Date:**	11/14/2018 10:55:00 A
Matrix:	SOLID	**Received Date:**	11/15/2018 6:32:36 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.032	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.39	0.05		mg/L	1	11/16/18 11:45 AM	11/16/18 3:26 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:00 PM
Arsenic	11.9	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:00 PM
Barium	143	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:00 PM
Beryllium	1.14	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:00 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:00 PM
Chromium	31.4	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:00 PM
Cobalt	17.2	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:00 PM
Lead	23.8	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:00 PM
Lithium	15.8	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:00 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:00 PM
Selenium	2.2	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:00 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:00 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 11:32 AM	11/20/18 11:17 AM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 11:25 AM	11/20/18 6:52 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 6:52 PM
Barium	0.069	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 6:52 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 6:52 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 6:52 PM
Chromium	0.0050	0.0050	U	mg/L	1	11/19/18 11:25 AM	11/20/18 6:52 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 6:52 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 6:52 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 6:52 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 6:52 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 6:52 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 6:52 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.64+/-0.0354	0.069		pCi/g	1		11/22/18 9:01 AM
Radium-228	0.83+/-0.0693	0.088		pCi/g	1		11/22/18 9:01 AM

I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-2 0-4
Lab Order:	G1811867		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811867-007	**Collection Date:**	11/14/2018 10:55:00 A
Matrix:	SOLID	**Received Date:**	11/15/2018 6:32:36 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
NOTES: QL is equal to the MDA							
Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).							
The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.							
Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.							
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.477+-0.498	0.7		pCi/L	1		12/07/18 12:08 PM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	0.301+-0.570	1.2		pCi/L	1		12/05/18 3:36 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	3.67			S.U.	1		11/18/18 11:00 AM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	10.7			S.U.	1		11/15/18 9:16 AM

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N. Center Ave.
Somerset, PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

Wednesday, December 12, 2018

John Shimshock
GENON - CONEMAUGH STATION CCR
CONEMAUGH STATION
PO BOX K
NEW FLORENCE, PA 15944

RE: Conemaugh CCR IV SPLP Order No.: G1811869

Dear John Shimshock:

Geochemical Testing received 4 sample(s) on 11/15/2018 for the analyses presented in the following report.

There were no problems with the analyses and all QC data met NELAC, EPA, and laboratory specifications except where noted in the Case Narrative or Laboratory Results.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Timothy W. Bergstresser
Director of Technical Services

Leslie A. Nemeth
Project Manager

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306PA DEP

CLIENT: GENON - CONEMAUGH STATION CCR
Project: Conemaugh CCR IV SPLP
Lab Order: G1811869

CASE NARRATIVE

No problems were encountered during analysis of this workorder, except if noted in this report.

SAMPLE RECEIPT CHECKLIST

	Response
COC is present	Yes
COC is filled out in ink and legible	Yes
COC relinquished, signature, date, and time	Yes
Samples arrived within hold time	Yes
Containers properly preserved for the requested testing	Yes
Sample containers have legible labels	Yes
Sample preservation verified	Yes
Appropriate sample containers are used	Yes
Sample container(s) received at proper temperature	Yes
Zero headspace where required	Yes
Sufficient volume for all requested analyses	Yes

Comments on the above checklist: None

The radiological analysis (Radium 226 by EPA 903.1; Radium 228 by EPA 904.0) was subcontracted to Pace Analytical (PADEP 65-00282). A copy of the subcontractor's laboratory report is enclosed with this Analytical Report.

Legend:
ND - Not Detected
J - Indicates an estimated value.
U - The analyte was not detected at or above the listed concentration, which is below the laboratory quantitation limit.
B - Analyte detected in the associated Method Blank
Q - Qualifier QL -Quantitation Limit DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
** - Value exceeds Action Limit
H - Method Hold Time Exceeded
MCL - Contaminant Limit

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-3 0-4
Lab Order:	G1811869		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811869-001	**Collection Date:**	11/14/2018 11:15:00 A
Matrix:	SOLID	**Received Date:**	11/15/2018 6:58:38 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.040	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.09	0.05	J	mg/L	1	11/16/18 11:45 AM	11/16/18 4:20 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:09 PM
Arsenic	17.8	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:09 PM
Barium	147	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:09 PM
Beryllium	1.19	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:09 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:09 PM
Chromium	32.6	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:09 PM
Cobalt	17.8	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:09 PM
Lead	24.1	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:09 PM
Lithium	17.4	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:09 PM
Molybdenum	1.0	2.0	J	mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:09 PM
Selenium	2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:09 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:09 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 11:32 AM	11/20/18 11:16 AM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:33 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:33 PM
Barium	0.062	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 5:33 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:33 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:33 PM
Chromium	0.0050	0.0050	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:33 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:33 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:33 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:33 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:33 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:33 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:33 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.97+/-0.0496	0.054		pCi/g	1		11/22/18 11:36 PM
Radium-228	1.3+/-0.0828	0.036		pCi/g	1		11/22/18 11:36 PM

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-3 0-4
Lab Order:	G1811869		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811869-001	**Collection Date:**	11/14/2018 11:15:00 A
Matrix:	SOLID	**Received Date:**	11/15/2018 6:58:38 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.155+-0.353	0.2		pCi/L	1		12/06/18 10:00 PM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	0.360+-0.353	0.7		pCi/L	1		12/05/18 12:09 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	3.71			S.U.	1		11/17/18 1:00 PM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	6.46			S.U.	1		11/15/18 9:16 AM

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-4 0-4
Lab Order:	G1811869		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811869-003	**Collection Date:**	11/14/2018 11:40:00 A
Matrix:	SOLID	**Received Date:**	11/15/2018 6:58:38 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.038	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.14	0.05		mg/L	1	11/16/18 11:45 AM	11/16/18 5:14 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:33 PM
Arsenic	17.6	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:33 PM
Barium	148	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:33 PM
Beryllium	1.39	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:33 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:33 PM
Chromium	43.5	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:33 PM
Cobalt	21.6	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:33 PM
Lead	29.1	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:33 PM
Lithium	19.5	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:33 PM
Molybdenum	1.2	2.0	J	mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:33 PM
Selenium	2.5	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:33 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 2:33 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 11:32 AM	11/20/18 11:25 AM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:37 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:37 PM
Barium	0.074	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 5:37 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:37 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:37 PM
Chromium	0.0050	0.0050	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:37 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:37 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:37 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:37 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:37 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:37 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:37 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.73+/-0.0407	0.070		pCi/g	1		11/22/18 11:37 PM
Radium-228	0.87+/-0.0732	0.094		pCi/g	1		11/22/18 11:37 PM

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-4 0-4
Lab Order:	G1811869		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811869-003	**Collection Date:**	11/14/2018 11:40:00 A
Matrix:	SOLID	**Received Date:**	11/15/2018 6:58:38 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	-0.227+-0.394	1.0		pCi/L	1		12/07/18 12:08 PM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	-0.074+-0.479	1.0		pCi/L	1		12/05/18 3:36 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	3.81			S.U.	1		11/17/18 1:00 PM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	6.61			S.U.	1		11/15/18 9:16 AM

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-5 0-4
Lab Order:	G1811869		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811869-005	**Collection Date:**	11/14/2018 11:55:00 A
Matrix:	SOLID	**Received Date:**	11/15/2018 6:58:38 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.057	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.05	0.05	U	mg/L	1	11/16/18 11:45 AM	11/16/18 5:32 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:10 PM
Arsenic	20.8	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:10 PM
Barium	141	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:10 PM
Beryllium	1.17	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:10 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:10 PM
Chromium	27.7	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:10 PM
Cobalt	17.9	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:10 PM
Lead	27.8	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:10 PM
Lithium	16.0	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:10 PM
Molybdenum	1.8	2.0	J	mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:10 PM
Selenium	2.5	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:10 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:10 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 11:32 AM	11/20/18 11:26 AM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:42 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:42 PM
Barium	0.086	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 5:42 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:42 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:42 PM
Chromium	0.0050	0.0050	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:42 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:42 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:42 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:42 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:42 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:42 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:42 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.74+/-0.0398	0.071		pCi/g	1		11/23/18 7:41 PM
Radium-228	0.81+/-0.0682	0.088		pCi/g	1		11/23/18 7:41 PM

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-5 0-4
Lab Order:	G1811869		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811869-005	**Collection Date:**	11/14/2018 11:55:00 A
Matrix:	SOLID	**Received Date:**	11/15/2018 6:58:38 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.379+-0.577	1.0		pCi/L	1		12/06/18 10:00 PM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	0.528+-0.438	0.9		pCi/L	1		12/05/18 12:10 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	3.83			S.U.	1		11/17/18 1:00 PM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	6.33			S.U.	1		11/15/18 9:16 AM

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-6 0-4
Lab Order:	G1811869		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811869-007	**Collection Date:**	11/14/2018 12:10:00 P
Matrix:	SOLID	**Received Date:**	11/15/2018 6:58:38 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.052	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.09	0.05	J	mg/L	1	11/16/18 11:45 AM	11/16/18 5:50 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:15 PM
Arsenic	18.5	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:15 PM
Barium	149	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:15 PM
Beryllium	1.25	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:15 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:15 PM
Chromium	29.2	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:15 PM
Cobalt	18.6	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:15 PM
Lead	26.8	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:15 PM
Lithium	15.6	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:15 PM
Molybdenum	1.4	2.0	J	mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:15 PM
Selenium	2.2	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:15 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:15 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 11:32 AM	11/20/18 11:28 AM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:46 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:46 PM
Barium	0.086	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 5:46 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:46 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:46 PM
Chromium	0.0050	0.0050	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:46 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:46 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:46 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:46 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:46 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:46 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:46 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	1.14+/-0.0570	0.054		pCi/g	1		11/23/18 7:43 PM
Radium-228	1.42+/-0.0895	0.035		pCi/g	1		11/23/18 7:43 PM

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-6 0-4
Lab Order:	G1811869		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811869-007	**Collection Date:**	11/14/2018 12:10:00 P
Matrix:	SOLID	**Received Date:**	11/15/2018 6:58:38 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.206+-0.386	0.8		pCi/L	1		12/07/18 12:08 PM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	0.262+-0.421	0.9		pCi/L	1		12/05/18 3:36 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	3.50			S.U.	1		11/18/18 11:00 AM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	7.20			S.U.	1		11/15/18 9:16 AM

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N. Center Ave.
Somerset, PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

Wednesday, December 12, 2018

John Shimshock
GENON - CONEMAUGH STATION CCR
CONEMAUGH STATION
PO BOX K
NEW FLORENCE, PA 15944

RE: Conemaugh CCR IV SPLP Order No.: G1811870

Dear John Shimshock:

Geochemical Testing received 2 sample(s) on 11/15/2018 for the analyses presented in the following report.

There were no problems with the analyses and all QC data met NELAC, EPA, and laboratory specifications except where noted in the Case Narrative or Laboratory Results.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Timothy W. Bergstresser
Director of Technical Services

Leslie A. Nemeth
Project Manager

ACCREDITED IN ACCORDANCE WITH nelac I.D. 56-00306PA DEP

CLIENT: GENON - CONEMAUGH STATION CCR
Project: Conemaugh CCR IV SPLP
Lab Order: G1811870

CASE NARRATIVE

No problems were encountered during analysis of this workorder, except if noted in this report.

SAMPLE RECEIPT CHECKLIST

	Response
COC is present	Yes
COC is filled out in ink and legible	Yes
COC relinquished, signature, date, and time	Yes
Samples arrived within hold time	Yes
Containers properly preserved for the requested testing	Yes
Sample containers have legible labels	Yes
Sample preservation verified	Yes
Appropriate sample containers are used	Yes
Sample container(s) received at proper temperature	Yes
Zero headspace where required	Yes
Sufficient volume for all requested analyses	Yes

Comments on the above checklist: None

The radiological analysis (Radium 226 by EPA 903.1; Radium 228 by EPA 904.0) was subcontracted to Pace Analytical (PADEP 65-00282). A copy of the subcontractor's laboratory report is enclosed with this Analytical Report.

Legend:

ND - Not Detected
J - Indicates an estimated value.
U - The analyte was not detected at or above the listed concentration, which is below the laboratory quantitation limit.
B - Analyte detected in the associated Method Blank
Q - Qualifier QL -Quantitation Limit DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
** - Value exceeds Action Limit
H - Method Hold Time Exceeded
MCL - Contaminant Limit

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-7 0-4
Lab Order:	G1811870		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811870-001	**Collection Date:**	11/14/2018 12:30:00 P
Matrix:	SOLID	**Received Date:**	11/15/2018 7:21:44 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.046	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.0917	0.0500	J	mg/L	1	11/16/18 11:45 AM	11/16/18 6:28 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:38 PM
Arsenic	12.8	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:38 PM
Barium	99.0	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:38 PM
Beryllium	0.94	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:38 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:38 PM
Chromium	30.1	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:38 PM
Cobalt	13.0	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:38 PM
Lead	20.2	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:38 PM
Lithium	12.6	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:38 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:38 PM
Selenium	2.6	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:38 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:38 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 11:32 AM	11/20/18 11:30 AM
SPLP METALS FLUID #1		Analyst: **MXS**				**EPA 200.2**	**EPA 200.7**
Antimony	0.050	0.050	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:51 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:51 PM
Barium	0.047	0.005		mg/L	1	11/19/18 11:25 AM	11/20/18 5:51 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:51 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:51 PM
Chromium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:51 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:51 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:51 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:51 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:51 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:51 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 11:25 AM	11/20/18 5:51 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	0.57+/-0.0333	0.069		pCi/g	1		11/24/18 11:54 PM
Radium-228	0.81+/-0.0699	0.093		pCi/g	1		11/24/18 11:54 PM

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-7 0-4
Lab Order:	G1811870		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811870-001	**Collection Date:**	11/14/2018 12:30:00 P
Matrix:	SOLID	**Received Date:**	11/15/2018 7:21:44 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**

NOTES:
QL is equal to the MDA

Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).

The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.

Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.

SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.205+-0.355	0.6		pCi/L	1		12/06/18 10:42 AM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	-0.237+-0.379	0.9		pCi/L	1		12/05/18 12:09 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	3.60			S.U.	1		11/17/18 1:00 PM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	8.63			S.U.	1		11/15/18 9:16 AM

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-8 0-4
Lab Order:	G1811870		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811870-003	**Collection Date:**	11/14/2018 12:55:00 P
Matrix:	SOLID	**Received Date:**	11/15/2018 7:21:44 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
TOTAL METALS		Analyst: **RLL**					**EPA 7473**
Mercury	0.095	0.010		mg/Kg-dry	1		11/20/18 2:36 PM
SPLP INORGANICS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	0.27	0.05		mg/L	1	11/16/18 11:45 AM	11/16/18 6:45 PM
TOTAL METALS		Analyst: **MXS**				**EPA 3050**	**EPA 6010**
Antimony	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:43 PM
Arsenic	18.8	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:43 PM
Barium	137	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:43 PM
Beryllium	1.32	0.10		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:43 PM
Cadmium	< 5.0	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:43 PM
Chromium	30.7	5.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:43 PM
Cobalt	21.5	0.5		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:43 PM
Lead	23.2	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:43 PM
Lithium	11.7	1.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:43 PM
Molybdenum	< 2.0	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:43 PM
Selenium	2.6	2.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:43 PM
Thallium	< 10.0	10.0		mg/Kg-dry	1	11/20/18 1:30 PM	11/23/18 3:43 PM
SPLP METALS FLUID #1		Analyst: **GXI**				**SM 3112 B**	**EPA 7470**
Mercury	< 0.0001	0.0001	J	mg/L	1	11/19/18 11:32 AM	11/20/18 11:32 AM
SPLP METALS FLUID #1		Analyst: **JEK**				**EPA 200.2**	**EPA 200.7**
Antimony	0.05	0.05	U	mg/L	1	11/19/18 12:05 PM	11/20/18 2:06 PM
Arsenic	0.010	0.010	U	mg/L	1	11/19/18 12:05 PM	11/20/18 2:06 PM
Barium	0.062	0.005		mg/L	1	11/19/18 12:05 PM	11/20/18 2:06 PM
Beryllium	0.0005	0.0005	U	mg/L	1	11/19/18 12:05 PM	11/20/18 2:06 PM
Cadmium	0.0010	0.0010	U	mg/L	1	11/19/18 12:05 PM	11/20/18 2:06 PM
Chromium	0.005	0.005	U	mg/L	1	11/19/18 12:05 PM	11/20/18 2:06 PM
Cobalt	0.0020	0.0020	U	mg/L	1	11/19/18 12:05 PM	11/20/18 2:06 PM
Lead	0.010	0.010	U	mg/L	1	11/19/18 12:05 PM	11/20/18 2:06 PM
Lithium	0.005	0.005	U	mg/L	1	11/19/18 12:05 PM	11/20/18 2:06 PM
Molybdenum	0.010	0.010	U	mg/L	1	11/19/18 12:05 PM	11/20/18 2:06 PM
Selenium	0.010	0.010	U	mg/L	1	11/19/18 12:05 PM	11/20/18 2:06 PM
Thallium	0.010	0.010	U	mg/L	1	11/19/18 12:05 PM	11/20/18 2:06 PM
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
Radium-226	1.08+/-0.0552	0.059		pCi/g	1		11/25/18 12:08 AM
Radium-228	1.53+/-0.0971	0.040		pCi/g	1		11/25/18 12:08 AM

Laboratory Results

Geochemical Testing

Date: *12-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	LD-8 0-4
Lab Order:	G1811870		
Project:	Conemaugh CCR IV SPLP	**Sampled By:**	APTIM
Lab ID:	G1811870-003	**Collection Date:**	11/14/2018 12:55:00 P
Matrix:	SOLID	**Received Date:**	11/15/2018 7:21:44 AM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
GAMMA SPECTROSCOPY		Analyst: **AM**					**EPA 901.1**
NOTES: QL is equal to the MDA							
Result includes the uncertainty which is calculated at the 95% confidence level (1.96-sigma).							
The reported value for Ra-226 is the average of its daughter's Pb-214 and Bi-214 activity due to the possibility of U-235 interference.							
Ra-228 and Ac-228 are assumed to be in secular equilibrium. The results for Ra-228 are inferred from Ac-228.							
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1 MOD**
Radium 226	0.792+-0.627	0.9		pCi/L	1		12/07/18 12:08 PM
SPLP RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0 MOD**
Radium 228	0.427+-0.397	0.8		pCi/L	1		12/05/18 3:36 PM
SPLP FLUID #1		Analyst: **ALD**					**EPA 1312**
Final pH Metals	5.14			S.U.	1		11/18/18 11:00 AM
SPLP FLUID #3		Analyst: **MAG**					**EPA 1312**
Final pH Non Metals	9.56			S.U.	1		11/15/18 9:16 AM

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

Shuttle/Cooler ID#:

CHAIN OF CUSTODY

Geochemical Testing

Form F-5002, 12.16

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: GENON	**Contact (Company):** APTIM	**Phone:** (412) 380-4272
Address: CONEMAUGH	e-mail:	Fax: ( )
City: NEW FLORENCE **State:** PA **Zip:** 15944	**Sampled by:** Faith Anderson and Evan Schlegel	**State Sampled:** PA
WO#: 6181869	Project:	PO/Quote#:

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other	**PCBs**

Sample Location/ Description	Lab Number	Sample Matrix	Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
**NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG								
B-9 0-4	—	SO	11/13/18	1200	G	SEE BOTTLES	Field Filtered: Y / N	1
B-9 4-8	—	SO	11/13/18	1202	G	↓	Field Filtered: Y / N	1
B-10 0-4	—	SO	11/13/18	1205	G		Field Filtered: Y / N	1
B-10 4-8	—	SO	11/13/18	1207	G		Field Filtered: Y / N	1
UD-1 0-4	001	SO	11/13/18	1330	G		Field Filtered: Y / N	3
UD-1 4-8	—	SO	11/13/18	1335	G		Field Filtered: Y / N	3
UD-2 0-4	002	SO	11/13/18	1345	G		Field Filtered: Y / N	3
UD-2 4-8	—	SO	11/13/18	1350	G	↓	Field Filtered: Y / N	3

Note Deficiencies Here:

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
Faith Anderson/APTIM	11/13/18	1615		11-14-18	1939

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: Yes or No

Cooler Temp (°C) on receipt: 4

Sample Receiving (1st Review): JS

Client Support (2nd Review):

Shuttle/Cooler ID#:

CHAIN OF CUSTODY

Geochemical Testing

Form F-5002, 12.16

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: GENON	**Contact (Company):** APTIM	**Phone:** (412) 380-4272
Address: CONEMAUGH	e-mail: patricia.andrison@aptim.com	Fax: ( )
City: NEW FLORENCE **State:** PA **Zip:** 15944	**Sampled by:** Patti Andrison	**State Sampled:** PA
WO#: 618/1860	Project: Evan Schlegel	PO/Quote#:

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other		

Sample Location/ Description	Lab Number	Sample Matrix	Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
**NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG								
UD-3 0-4	003	SO	11/13/18	1405	G	SEE BOTTLES	Field Filtered: Y / N	3
UD-3 4-8	—	SO	11/13/18	1410	G		Field Filtered: Y / N	3
UD-4 0-4	004	SO	11/13/18	1420	G		Field Filtered: Y / N	3
UD-4 4-8	—	SO	11/13/18	1425	G		Field Filtered: Y / N	3
UD-5 0-4	005	SO	11/13/18	1500	G		Field Filtered: Y / N	3
UD-5 4-8	—	SO	11/13/18	1505	G		Field Filtered: Y / N	3
UD-6 0-4	006	SO	11/13/18	1510	G		Field Filtered: Y / N	3
UD-6 4-8	—	SO	11/13/18	1520	G		Field Filtered: Y / N	3

Note Deficiencies Here:

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
APTIM Patricia M Andrison	11/13/18	1615		11-14-18	1939

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: Yes or No | Cooler Temp (°C) on receipt: 4

Sample Receiving (1st Review): JS | Client Support (2nd Review):

Shuttle/Cooler ID#:

CHAIN OF CUSTODY

Geochemical Testing

Form F-5002, 12.16

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: GENON	**Contact (Company):** APTM	**Phone:** (412) 380-4272
Address: CONEMAUGH	e-mail:	Fax: ( )
City: NEW FLORENCE **State:** PA **Zip:**	**Sampled by:** PATTI ANDRISON AND	**State Sampled:** PA
WO#: 61811867	Project: EVAN SCHLEGEL	PO/Quote#:

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other		

Sample Location/ Description	Lab Number	Sample Matrix	Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
**NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG								
UD-7 0-4	001	SO	11/14/18	0930	G	SEE BOTTLES	Field Filtered: Y / N	3
UD-7 4-8	—002	|	|	0935	G	HOLD	Field Filtered: Y / N	3
UD-8 0-4	003	|	|	0950	G	SEE BOTTLES	Field Filtered: Y / N	3
UD-8 4-8	—004	|	|	0955	G	HOLD	Field Filtered: Y / N	3
LD-1 0-4	005	|	|	1005	G	SEE BOTTLES	Field Filtered: Y / N	3
LD-1 4-8	—006	|	|	1015	G	HOLD	Field Filtered: Y / N	3
LD-2 0-4	007	|	|	1055	G	SEE BOTTLES	Field Filtered: Y / N	3
LD-2 4-8	— 008	↓	↓	1100	G	HOLD	Field Filtered: Y / N	3

Note Deficiencies Here:

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
Patricia M Andrison APTM	11/14/18	1400	Don Paul	11-15-18	6.32

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: X Yes or ___ No | Cooler Temp (°C) on receipt: 4

Sample Receiving (1st Review): | Client Support (2nd Review):

Shuttle/Cooler ID#:

CHAIN OF CUSTODY

Geochemical Testing

Form F-5002, 12.16

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: GENON	**Contact (Company):** APTIM	**Phone:** (412) 380-4272
Address: CONEMAUGH	e-mail:	Fax: ( )
City: NEW FLORENCE **State:** PA **Zip:**	**Sampled by:** PATTI ANDRISON AND EVAN SCHLEGEL	**State Sampled:** PA
WO#: 618118669	Project:	PO/Quote#:

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other		

Sample Location/ Description	Lab Number	Sample Matrix	Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
***NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG*								
LD-3 0-4	001	SO	11/14/18	1115	G	SEE BOTTLES	Field Filtered: Y / N	3
LD-3 4-8	002			1120		HOLD	Field Filtered: Y / N	3
LD-4 0-4	003			1140		SEE BOTTLES	Field Filtered: Y / N	3
LD-4 4-8	004			1145		HOLD	Field Filtered: Y / N	3
LD-5 0-4	005			1155		SEE BOTTLES	Field Filtered: Y / N	3
LD-5 4-8	006			1200		HOLD	Field Filtered: Y / N	3
LD-6 0-4	007			1210		SEE BOTTLES	Field Filtered: Y / N	3
LD-6 4-8	008	↓	↓	1215	↓	HOLD	Field Filtered: Y / N	3

Note Deficiencies Here:

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
Patricia McGinnis APTIM	11/14/18	1400	Don Peel	11-15-18	6:58

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: X Yes or ___ No | Cooler Temp (°C) on receipt: 5

Sample Receiving (1st Review): MF | Client Support (2nd Review): ___

Shuttle/Cooler ID#:

CHAIN OF CUSTODY

Geochemical Testing

Form F-5002, 12.16

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: GENON	**Contact (Company):** APTIM	**Phone:** (412) 380-4272
Address: CONEMAUGH	e-mail:	Fax: ( )
City: NEW FLORENCE **State:** PA **Zip:**	**Sampled by:** PATTI ANDRISON AND EVAN SCHLEGEL	**State Sampled:**
WO#: 6181870	Project:	PO/Quote#:

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other		

Sample Location/ Description	Lab Number	Sample Matrix	Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
***NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG*								
LD-7 0-4	001	SO	11/14/18	1230	G	SEE BOTTLES	Field Filtered: Y / N	3
LD-7 4-8	002	SO	"	1240	"	HOLD	Field Filtered: Y / N	3
LD-8 0-4	003	SO	"	1255	"	SEE BOTTLES	Field Filtered: Y / N	3
LD-8 4-8	—	SO	"	—	"	PMA ~~HOLD~~ NO SAMPLES TAKEN	Field Filtered: Y / N	0
							Field Filtered: Y / N	
							Field Filtered: Y / N	
							Field Filtered: Y / N	
							Field Filtered: Y / N	

Note Deficiencies Here:

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
Patricia M Gamble APTIM	11/14/18	1400	[signature]	11-14-18	7:21

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: Y Yes or ___ No | Cooler Temp (°C) on receipt: 4

Sample Receiving (1st Review): MF | Client Support (2nd Review): ___

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

December 06, 2018

Ms. Leslie Nemeth
Geochemical Testing
2005 N. Center Avenue
Somerset, PA 15501

RE: Project: G1811860
Pace Project No.: 30272445

Dear Ms. Nemeth:
Enclosed are the analytical results for sample(s) received by the laboratory on November 21, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carin A. Ferris

Carin Ferris
carin.ferris@pacelabs.com
724-850-5615
Project Manager

Enclosures

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: G1811860
Pace Project No.: 30272445

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: G1811860
Pace Project No.: 30272445

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30272445001	**G1811860-001**	Water	11/15/18 09:16	11/21/18 09:30
30272445002	**G1811860-003**	Water	11/15/18 09:16	11/21/18 09:30
30272445003	**G1811860-005**	Water	11/15/18 09:16	11/21/18 09:30

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: G1811860
Pace Project No.: 30272445

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30272445001	**G1811860-001**	EPA 903.1	MK1	1
		EPA 904.0	JLW	1
30272445002	**G1811860-003**	EPA 903.1	MK1	1
		EPA 904.0	JLW	1
30272445003	**G1811860-005**	EPA 903.1	MK1	1
		EPA 904.0	JLW	1

Pace Analytical Services, LLC
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Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811860
Pace Project No.: 30272445

Method: **EPA 903.1**
Description: 903.1 Radium 226
Client: Geochemical Testing
Date: December 06, 2018

General Information:
3 samples were analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811860
Pace Project No.: 30272445

Method: **EPA 904.0**
Description: 904.0 Radium 228
Client: Geochemical Testing
Date: December 06, 2018

General Information:
3 samples were analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
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Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: G1811860
Pace Project No.: 30272445

Sample: G1811860-001 **Lab ID: 30272445001** Collected: 11/15/18 09:16 Received: 11/21/18 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample date on Chain of Custody is SPLP extraction date, no extraction time listed.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.366 ± 0.382 (0.539) C:NA T:91%**	pCi/L	12/06/18 10:42	13982-63-3	
Radium-228	EPA 904.0	**-0.149 ± 0.331 (0.802) C:74% T:90%**	pCi/L	12/05/18 12:09	15262-20-1	

Sample: G1811860-003 **Lab ID: 30272445002** Collected: 11/15/18 09:16 Received: 11/21/18 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample date on Chain of Custody is SPLP extraction date, no extraction time listed.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.394 ± 0.410 (0.611) C:NA T:95%**	pCi/L	12/06/18 10:42	13982-63-3	
Radium-228	EPA 904.0	**0.280 ± 0.460 (0.999) C:78% T:82%**	pCi/L	12/05/18 12:09	15262-20-1	

Sample: G1811860-005 **Lab ID: 30272445003** Collected: 11/15/18 09:16 Received: 11/21/18 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample date on Chain of Custody is SPLP extraction date, no extraction time listed.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.564 ± 0.527 (0.748) C:NA T:86%**	pCi/L	12/06/18 10:42	13982-63-3	
Radium-228	EPA 904.0	**0.502 ± 0.418 (0.836) C:74% T:85%**	pCi/L	12/05/18 12:09	15262-20-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811860
Pace Project No.: 30272445

QC Batch: 321860 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 30272445001, 30272445002, 30272445003

METHOD BLANK: 1569350 Matrix: Water
Associated Lab Samples: 30272445001, 30272445002, 30272445003

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.236 ± 0.358 (0.774) C:81% T:77%	pCi/L	12/05/18 12:08	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811860
Pace Project No.: 30272445

QC Batch: 321859 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 30272445001, 30272445002, 30272445003

METHOD BLANK: 1569347 Matrix: Water
Associated Lab Samples: 30272445001, 30272445002, 30272445003

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.234 ± 0.459 (0.839) C:NA T:91%	pCi/L	12/06/18 09:57	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: G1811860
Pace Project No.: 30272445

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty: For Safe Drinking Water Act (SDWA) analyses, the reported Unc. Is the calculated Count Uncertainty (95% confidence interval) using a coverage factor of 1.96. For all other matrices (non-SDWA), the reported Unc. is the calculated Expanded Uncertainty (aka Combined Standard Uncertainty, CSU), reported at the 95% confidence interval using a coverage factor of 1.96.

Gamma Spec: The Unc. reported for all gamma-spectroscopy analyses (EPA 901.1), is the calculated Expanded Uncertainty (CSU) at the 95.4% confidence interval, using a coverage factor of 2.0.

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

Shuttle/Cooler ID#:

CHAIN OF CUSTODY

Geochemical Testing

Form F-5002, 04.13

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: Geochemical Testing	**Contact (Company):** Leslie Nemeth	**Phone:** (814) 443-1671
Address: 2005 North Center Avenue	e-mail: lnemeth@geo-ces.com	Fax: (814) 445-6729
City: Somerset **State:** PA **Zip:** 15501	**Sampled by:** Client	**Preservatives by** __Sampler__GT
WO#:	Project:	PO/Quote#: P2015-8996

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other	Containers Supplied by: ☐ Client ☐ GT Lab	

Sample Location/ Description	Lab Number	Sample Matrix	SPLP Ext Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers	
***NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG*									
G1811860-001		nHZ / HZ	11/15/2018	9:16	G	SPLP Radium 226, 228	Field Filtered: Y / N HNO3	2	001
		nHZ / HZ					Field Filtered: Y / N		
G1811860-003		nHZ / HZ	11/15/2018	9:16	G	SPLP Radium 226, 228	Field Filtered: Y / N HNO3	2	002
		nHZ / HZ					Field Filtered: Y / N		
G1811860-005		nHZ / HZ	11/15/2018	9:16	G	SPLP Radium 226, 228	Field Filtered: Y / N HNO3	2	003
		nHZ / HZ					Field Filtered: Y / N		
		nHZ / HZ					ield Filtered: Y / N		
		nHZ / HZ					ield Filtered: Y / N		

WO# : 30272445

30272445

Note Deficiencies Here: 10 Day Rush Please - If Possible

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
Leslie Nemeth	11/20/2018	8:00:00	PACE	11/21/18	0930

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: ___Yes or ✓No | Cooler Temp (°C) on receipt: NA

Sample Receiving (1st Review):_____ | Client Support (2nd Review):_____

Pittsburgh Lab Sample Condition Upon Receipt

Face Analytical

Client Name: GeoChem Project#: 30272445

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Label JVB

LIMS Login JVB

Tracking #: 1Z 544 067 03 4736 9547

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☑ no

Thermometer Used NA Type of Ice: Wet Blue (None)

Cooler Temperature Observed Temp _____ °C Correction Factor: _____ °C Final Temp: _____ °C

Temp should be above freezing to 6°C

pH paper Lot# 10D2981 Date and Initials of person examining contents: 11/25/18 JVB

Comments:	Yes	No	N/A	
Chain of Custody Present:	✓			1.
Chain of Custody Filled Out:	✓			2.
Chain of Custody Relinquished:	✓			3.
Sampler Name & Signature on COC:		✓		4.
Sample Labels match COC: -Includes date/time/ID Matrix: WT		✓		5. date on samples is 11.16.18 / no time on any samples
Samples Arrived within Hold Time:	✓			6.
Short Hold Time Analysis (<72hr remaining):		✓		7.
Rush Turn Around Time Requested:		✓		8.
Sufficient Volume:	✓			9.
Correct Containers Used: -Pace Containers Used:	✓ /	/ ✓		10.
Containers Intact:	✓			11.
Orthophosphate field filtered			✓	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered			✓	13.
Organic Samples checked for dechlorination:			✓	14.
Filtered volume received for Dissolved tests			✓	15.
All containers have been checked for preservation. All containers needing preservation are found to be in compliance with EPA recommendation. exceptions: VOA, coliform, TOC, O&G, Phenolics	✓ ✓			16. pH<2 Initial when completed JVB Date/time of preservation Lot # of added preservative
Headspace in VOA Vials (>6mm):			✓	17.
Trip Blank Present: Trip Blank Custody Seals Present		✓ /	/ ✓	18.
Rad Aqueous Samples Screened > 0.5 mrem/hr		✓		Initial when completed: JVB Date: 11/25/18

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

☐ A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

December 17, 2018

Ms. Leslie Nemeth
Geochemical Testing
2005 N. Center Avenue
Somerset, PA 15501

RE: Project: G1811860
Pace Project No.: 30272707

Dear Ms. Nemeth:
Enclosed are the analytical results for sample(s) received by the laboratory on November 27, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carin A. Ferris

Carin Ferris
carin.ferris@pacelabs.com
724-850-5615
Project Manager

Enclosures

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: G1811860
Pace Project No.: 30272707

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: G1811860
Pace Project No.: 30272707

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30272707001	**G1811860-002**	Water	11/15/18 09:16	11/27/18 13:40
30272707002	**G1811860-004**	Water	11/15/18 09:16	11/27/18 13:40

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: G1811860
Pace Project No.: 30272707

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30272707001	**G1811860-002**	EPA 903.1	MK1	1
		EPA 904.0	VAL	1
30272707002	**G1811860-004**	EPA 903.1	MK1	1
		EPA 904.0	VAL	1

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811860
Pace Project No.: 30272707

Method: **EPA 903.1**
Description: 903.1 Radium 226
Client: Geochemical Testing
Date: December 17, 2018

General Information:
2 samples were analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811860
Pace Project No.: 30272707

Method: **EPA 904.0**
Description: 904.0 Radium 228
Client: Geochemical Testing
Date: December 17, 2018

General Information:
2 samples were analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: G1811860
Pace Project No.: 30272707

Sample: G1811860-002 **Lab ID: 30272707001** Collected: 11/15/18 09:16 Received: 11/27/18 13:40 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection dates and times were not present on the sample containers.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.503 ± 0.523 (0.778) C:NA T:84%**	pCi/L	12/14/18 22:03	13982-63-3	
Radium-228	EPA 904.0	**0.244 ± 0.301 (0.636) C:77% T:84%**	pCi/L	12/14/18 14:12	15262-20-1	

Sample: G1811860-004 **Lab ID: 30272707002** Collected: 11/15/18 09:16 Received: 11/27/18 13:40 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection dates and times were not present on the sample containers.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.148 ± 0.409 (0.794) C:NA T:90%**	pCi/L	12/14/18 22:03	13982-63-3	
Radium-228	EPA 904.0	**-0.0576 ± 0.299 (0.705) C:83% T:86%**	pCi/L	12/14/18 14:12	15262-20-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811860
Pace Project No.: 30272707

QC Batch: 322728 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 30272707001, 30272707002

METHOD BLANK: 1572965 Matrix: Water
Associated Lab Samples: 30272707001, 30272707002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.260 ± 0.319 (0.788) C:82% T:79%	pCi/L	12/14/18 14:11	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811860
Pace Project No.: 30272707

QC Batch: 322685 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 30272707001, 30272707002

METHOD BLANK: 1572868 Matrix: Water
Associated Lab Samples: 30272707001, 30272707002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.0834 ± 0.490 (1.00) C:NA T:88%	pCi/L	12/14/18 21:48	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: G1811860
Pace Project No.: 30272707

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty: For Safe Drinking Water Act (SDWA) analyses, the reported Unc. Is the calculated Count Uncertainty (95% confidence interval) using a coverage factor of 1.96. For all other matrices (non-SDWA), the reported Unc. is the calculated Expanded Uncertainty (aka Combined Standard Uncertainty, CSU), reported at the 95% confidence interval using a coverage factor of 1.96.

Gamma Spec: The Unc. reported for all gamma-spectroscopy analyses (EPA 901.1), is the calculated Expanded Uncertainty (CSU) at the 95.4% confidence interval, using a coverage factor of 2.0.

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

Shuttle/Cooler ID#:	**CHAIN OF CUSTODY**	Geochemical Testing

Form F-5002, 04.13

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: Geochemical Testing	**Contact (Company):** Leslie Nemeth	**Phone:** (814) 443-1671
Address: 2005 North Center Avenue	e-mail: lnemeth@geo-ces.com	Fax: (814) 445-6729
City: Somerset **State:** PA **Zip:** 15501	**Sampled by:** Client	**Preservatives by** __Sampler__ **GT**
WO#:	Project:	PO/Quote#: P2019-8994

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other	Containers Supplied by: ☐ Client ☐ GT Lab	

Sample Location/ Description	Lab Number	Sample Matrix	Extraction Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
***NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG*								
G1811860-002		nHZ / HZ WW	11/15/2018	9:16	G	SPLP Radium 226, 228	Field Filtered: Y / N HNO3	2001
		nHZ / HZ					Field Filtered: Y / N	
G1811860-004		nHZ / HZ WW	11/15/2018	9:16	G	SPLP Radium 226, 228	Field Filtered: Y / N HNO3	2002
		nHZ / HZ					Field Filtered: Y / N	
~~G1811860-006~~ 06		nHZ / HZ ~~WW~~	~~11/15/2018~~	~~9:16~~	~~G~~	"	Field Filtered: Y / N ~~HNO3~~	~~2~~
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ						
		nHZ / HZ						

WO# : 30272707

30272707

Note Deficiencies Here: 10 Day Rush Please PA

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
Leslie Nemeth	11/21/2018	8:00:00	Ben Mantua	11-28-18	1340
			BM	11-28-18	

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: ___Yes or ✓No Cooler Temp (°C) on receipt: N/A

Sample Receiving (1st Review):_____ Client Support (2nd Review):_____

Pittsburgh Lab Sample Condition Upon Receipt

Face Analytical

Client Name: Geochem Project# 30272707

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Label BLM
LIMS Login BLM

Tracking #: 1Z 544 007 03 4748 0425

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Thermometer Used N/A Type of Ice: Wet Blue (None)

Cooler Temperature Observed Temp N/A °C Correction Factor: — °C Final Temp: — °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot# 10D2981 / Date and Initials of person examining contents: BLM 11-27-18
Chain of Custody Present:	✓			1.
Chain of Custody Filled Out:	✓			2.
Chain of Custody Relinquished:	✓			3.
Sampler Name & Signature on COC:		✓		4.
Sample Labels match COC: -Includes date/time/ID Matrix: WT		✓		5. No date or time on samples.
Samples Arrived within Hold Time:	✓			6.
Short Hold Time Analysis (<72hr remaining):		✓		7.
Rush Turn Around Time Requested:		✓		8.
Sufficient Volume:	✓			9.
Correct Containers Used: -Pace Containers Used:	✓	✓		10.
Containers Intact:	✓			11.
Orthophosphate field filtered			✓	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered			✓	13.
Organic Samples checked for dechlorination:			✓	14.
Filtered volume received for Dissolved tests			✓	15.
All containers have been checked for preservation. All containers needing preservation are found to be in compliance with EPA recommendation. exceptions: VOA, coliform, TOC, O&G, Phenolics	✓			16. pH<2 Initial when completed: BLM Date/time of preservation: Lot # of added preservative:
Headspace in VOA Vials (>6mm):			✓	17.
Trip Blank Present: Trip Blank Custody Seals Present			✓	18.
Rad Aqueous Samples Screened > 0.5 mrem/hr		✓		Initial when completed: BLM Date: 11-28-18

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

☐ **A check in this box indicates that additional information has been stored in ereports.**

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

December 11, 2018

Ms. Leslie Nemeth
Geochemical Testing
2005 N. Center Avenue
Somerset, PA 15501

RE: Project: G1811860
Pace Project No.: 30272858

Dear Ms. Nemeth:
Enclosed are the analytical results for sample(s) received by the laboratory on November 29, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carin A. Ferris

Carin Ferris
carin.ferris@pacelabs.com
724-850-5615
Project Manager

Enclosures

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: G1811860
Pace Project No.: 30272858

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: G1811860
Pace Project No.: 30272858

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30272858001	**G1811860-006**	Water	11/15/18 00:01	11/29/18 10:15

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: G1811860
Pace Project No.: 30272858

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30272858001	**G1811860-006**	EPA 903.1	MK1	1
		EPA 904.0	VAL	1

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811860
Pace Project No.: 30272858

Method: **EPA 903.1**
Description: 903.1 Radium 226
Client: Geochemical Testing
Date: December 11, 2018

General Information:
1 sample was analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811860
Pace Project No.: 30272858

Method: **EPA 904.0**
Description: 904.0 Radium 228
Client: Geochemical Testing
Date: December 11, 2018

General Information:
1 sample was analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: G1811860
Pace Project No.: 30272858

Sample: G1811860-006 **Lab ID: 30272858001** Collected: 11/15/18 00:01 Received: 11/29/18 10:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.737 ± 0.668 (0.984) C:NA T:96%**	pCi/L	12/10/18 13:33	13982-63-3	
Radium-228	EPA 904.0	**0.320 ± 0.300 (0.607) C:77% T:84%**	pCi/L	12/10/18 13:12	15262-20-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811860
Pace Project No.: 30272858

QC Batch: 322748 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 30272858001

METHOD BLANK: 1573038 Matrix: Water
Associated Lab Samples: 30272858001

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.00649 ± 0.285 (0.668) C:75% T:88%	pCi/L	12/10/18 13:10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811860
Pace Project No.: 30272858

QC Batch: 322747 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 30272858001

METHOD BLANK: 1573037 Matrix: Water
Associated Lab Samples: 30272858001

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.380 ± 0.528 (0.882) C:NA T:87%	pCi/L	12/10/18 13:07	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: G1811860
Pace Project No.: 30272858

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty: For Safe Drinking Water Act (SDWA) analyses, the reported Unc. Is the calculated Count Uncertainty (95% confidence interval) using a coverage factor of 1.96. For all other matrices (non-SDWA), the reported Unc. is the calculated Expanded Uncertainty (aka Combined Standard Uncertainty, CSU), reported at the 95% confidence interval using a coverage factor of 1.96.

Gamma Spec: The Unc. reported for all gamma-spectroscopy analyses (EPA 901.1), is the calculated Expanded Uncertainty (CSU) at the 95.4% confidence interval, using a coverage factor of 2.0.

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

Shuttle/Cooler ID#:	**CHAIN OF CUSTODY**	Geochemical Testing

Form F-5002, 04.13

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: Geochemical Testing	**Contact (Company):** Leslie Nemeth	**Phone:** (814) 443-1671
Address: 2005 North Center Avenue	e-mail: lnemeth@geo-ces.com	Fax: (814) 445-6729
City: Somerset **State:** PA **Zip:** 15501	**Sampled by:** Client	**Preservatives by** __Sampler__**GT**
WO#:	Project:	PO/Quote#: P2015-9008

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other	Containers Supplied by: ☐ Client ☐ GT Lab	

Sample Location/ Description	Lab Number	Sample Matrix	SPLP Ext Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
***NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG*								
G1811860-006		nHZ / HZ WW	11/15/2018		G	SPLP Radium 226, 228	Field Filtered: Y / N HNO3	2
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					/ N	
		nHZ / HZ					/ N	
		nHZ / HZ					N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	

WO# : 30272858

30272858

Note Deficiencies Here: 10 Day Rush Please PA

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
Leslie Nemeth	11/27/2018	8:00:00	Emily Sp PACE	11-29-18	1015

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: ___Yes or ___No Cooler Temp (°C) on receipt: _____

Sample Receiving (1st Review):_____ Client Support (2nd Review):_____

Pittsburgh Lab Sample Condition Upon Receipt

Face Analytical

Client Name: GeoChem Project # # 30272858

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Label ET
LIMS Login ET

Tracking #: 12 544 007 03 4612 5856

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☑ no

Thermometer Used N/A Type of Ice: Wet Blue (None)

Cooler Temperature Observed Temp — °C Correction Factor: — °C Final Temp: — °C

Temp should be above freezing to 6°C

pH paper Lot# 10D2981 Date and Initials of person examining contents: ET 11-29-18

Comments:	Yes	No	N/A	
Chain of Custody Present:	✓			1.
Chain of Custody Filled Out:	✓			2.
Chain of Custody Relinquished:	✓			3.
Sampler Name & Signature on COC:		✓		4.
Sample Labels match COC: -Includes date/time/ID Matrix: WT	✓			5.
Samples Arrived within Hold Time:	✓			6.
Short Hold Time Analysis (<72hr remaining):		✓		7.
Rush Turn Around Time Requested:		✓		8.
Sufficient Volume:	✓			9.
Correct Containers Used: -Pace Containers Used:	✓			10.
Containers Intact:	✓			11.
Orthophosphate field filtered			✓	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered			✓	13.
Organic Samples checked for dechlorination:			✓	14.
Filtered volume received for Dissolved tests			✓	15.
All containers have been checked for preservation. All containers needing preservation are found to be in compliance with EPA recommendation. exceptions: VOA, coliform, TOC, O&G, Phenolics	✓			16. pH<2
				Initial when completed ET Date/time of preservation
				Lot # of added preservative
Headspace in VOA Vials (>6mm):			✓	17.
Trip Blank Present:		✓		18.
Trip Blank Custody Seals Present			✓	
Rad Aqueous Samples Screened > 0.5 mrem/hr		✓		Initial when completed: ET Date: 11-29-18

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

☐ A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

December 07, 2018

Ms. Leslie Nemeth
Geochemical Testing
2005 N. Center Avenue
Somerset, PA 15501

RE: Project: G1811867
Pace Project No.: 30272447

Dear Ms. Nemeth:
Enclosed are the analytical results for sample(s) received by the laboratory on November 21, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carin A. Ferris

Carin Ferris
carin.ferris@pacelabs.com
724-850-5615
Project Manager

Enclosures

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: G1811867
Pace Project No.: 30272447

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: G1811867
Pace Project No.: 30272447

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30272447001	**G1811867-001**	Water	11/15/18 09:16	11/21/18 09:30
30272447002	**G1811867-005**	Water	11/15/18 09:16	11/21/18 09:30

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: G1811867
Pace Project No.: 30272447

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30272447001	**G1811867-001**	EPA 903.1	MK1	1
		EPA 904.0	JLW	1
30272447002	**G1811867-005**	EPA 903.1	MK1	1
		EPA 904.0	JLW	1

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811867
Pace Project No.: 30272447

Method: **EPA 903.1**
Description: 903.1 Radium 226
Client: Geochemical Testing
Date: December 07, 2018

General Information:
2 samples were analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811867
Pace Project No.: 30272447

Method: **EPA 904.0**
Description: 904.0 Radium 228
Client: Geochemical Testing
Date: December 07, 2018

General Information:
2 samples were analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: G1811867
Pace Project No.: 30272447

Sample: G1811867-001 **Lab ID: 30272447001** Collected: 11/15/18 09:16 Received: 11/21/18 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample date on Chain of Custody is SPLP extraction date, no extraction time listed.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.132 ± 0.301 (0.179) C:NA T:90%**	pCi/L	12/06/18 21:43	13982-63-3	
Radium-228	EPA 904.0	**0.844 ± 0.439 (0.782) C:73% T:91%**	pCi/L	12/05/18 12:09	15262-20-1	

Sample: G1811867-005 **Lab ID: 30272447002** Collected: 11/15/18 09:16 Received: 11/21/18 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample date on Chain of Custody is SPLP extraction date, no extraction time listed.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.349 ± 0.364 (0.513) C:NA T:90%**	pCi/L	12/06/18 22:00	13982-63-3	
Radium-228	EPA 904.0	**0.487 ± 0.402 (0.803) C:73% T:82%**	pCi/L	12/05/18 12:09	15262-20-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811867
Pace Project No.: 30272447

QC Batch: 321860 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 30272447001, 30272447002

METHOD BLANK: 1569350 Matrix: Water
Associated Lab Samples: 30272447001, 30272447002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.236 ± 0.358 (0.774) C:81% T:77%	pCi/L	12/05/18 12:08	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811867
Pace Project No.: 30272447

QC Batch: 321861 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 30272447001, 30272447002

METHOD BLANK: 1569351 Matrix: Water
Associated Lab Samples: 30272447001, 30272447002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.278 ± 0.387 (0.646) C:NA T:93%	pCi/L	12/06/18 21:43	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: G1811867
Pace Project No.: 30272447

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty: For Safe Drinking Water Act (SDWA) analyses, the reported Unc. Is the calculated Count Uncertainty (95% confidence interval) using a coverage factor of 1.96. For all other matrices (non-SDWA), the reported Unc. is the calculated Expanded Uncertainty (aka Combined Standard Uncertainty, CSU), reported at the 95% confidence interval using a coverage factor of 1.96.

Gamma Spec: The Unc. reported for all gamma-spectroscopy analyses (EPA 901.1), is the calculated Expanded Uncertainty (CSU) at the 95.4% confidence interval, using a coverage factor of 2.0.

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

Shuttle/Cooler ID#:	**CHAIN OF CUSTODY**	Geochemical Testing

Form F-5002, 04.13

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: Geochemical Testing	**Contact (Company):** Leslie Nemeth	**Phone:** (814) 443-1671
Address: 2005 North Center Avenue	e-mail: lnemeth@geo-ces.com	Fax: (814) 445-6729
City: Somerset **State:** PA **Zip:** 15501	**Sampled by:** Client	**Preservatives by** __Sampler__GT
WO#:	Project:	PO/Quote#: P2018-4996

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other	Containers Supplied by: ☐ Client ☐ GT Lab	

Sample Location/ Description	Lab Number	Sample Matrix	SPLP Ext Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
***NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG*								
G1811867-001		nHZ / HZ	11/15/2018	9:16	G	SPLP Radium 226, 228	Field Filtered: Y / N HNO3	2
		nHZ / HZ					Field Filtered: Y / N	
G1811867-005		nHZ / HZ	11/15/2018	9:16	G	SPLP Radium 226, 228	Field Filtered: Y / N HNO3	2
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Filtered: Y / N	
		nHZ / HZ					Filtered: Y / N	
		nHZ / HZ					Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	

001
002

WO# : 30272447
30272447

Note Deficiencies Here: 10 Day Rush Please - If Possible

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
Leslie Nemeth	11/20/2018	8:00:00	Jennifer Zobon PACE	11/21/18	0930

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: ___Yes or ✓No Cooler Temp (°C) on receipt: NA

Sample Receiving (1st Review):_____ Client Support (2nd Review):_____

Pittsburgh Lab Sample Condition Upon Receipt

Face Analytical

Client Name: GeoChem Project#: 30272447

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Label JVB
LIMS Login JVB

Tracking #: 1Z 544 067 03 4736 9547

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☑ no

Thermometer Used NA Type of Ice: Wet Blue (None)

Cooler Temperature Observed Temp _____ °C Correction Factor: _____ °C Final Temp: _____ °C

Temp should be above freezing to 6°C

pH paper Lot# 10D2981 Date and Initials of person examining contents: 11/25/18 JVB

Comments:	Yes	No	N/A	
Chain of Custody Present:	✓			1.
Chain of Custody Filled Out:	✓			2.
Chain of Custody Relinquished:	✓			3.
Sampler Name & Signature on COC:		✓		4.
Sample Labels match COC: -Includes date/time/ID Matrix: WT		✓		5. Date on samples is 11/16.18 / no time on samples
Samples Arrived within Hold Time:	✓			6.
Short Hold Time Analysis (<72hr remaining):		✓		7.
Rush Turn Around Time Requested:		✓		8.
Sufficient Volume:	✓			9.
Correct Containers Used:	✓			10.
-Pace Containers Used:		✓		
Containers Intact:	✓			11.
Orthophosphate field filtered			✓	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered			✓	13.
Organic Samples checked for dechlorination:			✓	14.
Filtered volume received for Dissolved tests			✓	15.
All containers have been checked for preservation.	✓			16. pH<2
All containers needing preservation are found to be in compliance with EPA recommendation.	✓			
exceptions: VOA, coliform, TOC, O&G, Phenolics				Initial when completed JVB / Date/time of preservation / Lot # of added preservative
Headspace in VOA Vials (>6mm):			✓	17.
Trip Blank Present:		✓		18.
Trip Blank Custody Seals Present			✓	
Rad Aqueous Samples Screened > 0.5 mrem/hr		✓		Initial when completed: JVB Date: 11/25/18

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

☐ **A check in this box indicates that additional information has been stored in ereports.**

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

December 10, 2018

Ms. Leslie Nemeth
Geochemical Testing
2005 N. Center Avenue
Somerset, PA 15501

RE: Project: G1811867
Pace Project No.: 30272705

Dear Ms. Nemeth:
Enclosed are the analytical results for sample(s) received by the laboratory on November 27, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carin A. Ferris

Carin Ferris
carin.ferris@pacelabs.com
724-850-5615
Project Manager

Enclosures

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: G1811867
Pace Project No.: 30272705

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: G1811867
Pace Project No.: 30272705

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30272705001	**G1811867-003**	Water	11/15/18 09:16	11/27/18 13:40
30272705002	**G1811867-007**	Water	11/15/18 09:16	11/27/18 13:40

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: G1811867
Pace Project No.: 30272705

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30272705001	**G1811867-003**	EPA 903.1	KAC	1
		EPA 904.0	VAL	1
30272705002	**G1811867-007**	EPA 903.1	KAC	1
		EPA 904.0	VAL	1

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811867
Pace Project No.: 30272705

Method: **EPA 903.1**
Description: 903.1 Radium 226
Client: Geochemical Testing
Date: December 10, 2018

General Information:
2 samples were analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811867
Pace Project No.: 30272705

Method: **EPA 904.0**
Description: 904.0 Radium 228
Client: Geochemical Testing
Date: December 10, 2018

General Information:
2 samples were analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: G1811867
Pace Project No.: 30272705

Sample: G1811867-003 **Lab ID: 30272705001** Collected: 11/15/18 09:16 Received: 11/27/18 13:40 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection dates and times were not present on the sample containers.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.0821 ± 0.581 (1.16) C:NA T:84%**	pCi/L	12/07/18 12:08	13982-63-3	
Radium-228	EPA 904.0	**-0.217 ± 0.347 (0.854) C:73% T:79%**	pCi/L	12/05/18 15:36	15262-20-1	

Sample: G1811867-007 **Lab ID: 30272705002** Collected: 11/15/18 09:16 Received: 11/27/18 13:40 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection dates and times were not present on the sample containers.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.477 ± 0.498 (0.702) C:NA T:68%**	pCi/L	12/07/18 12:08	13982-63-3	
Radium-228	EPA 904.0	**0.301 ± 0.570 (1.25) C:70% T:57%**	pCi/L	12/05/18 15:36	15262-20-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811867
Pace Project No.: 30272705

QC Batch: 322128 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 30272705001, 30272705002

METHOD BLANK: 1570359 Matrix: Water
Associated Lab Samples: 30272705001, 30272705002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.279 ± 0.434 (0.752) C:NA T:94%	pCi/L	12/07/18 12:08	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811867
Pace Project No.: 30272705

QC Batch: 322129 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 30272705001, 30272705002

METHOD BLANK: 1570360 Matrix: Water
Associated Lab Samples: 30272705001, 30272705002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.115 ± 0.366 (0.825) C:74% T:77%	pCi/L	12/05/18 15:35	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: G1811867
Pace Project No.: 30272705

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty: For Safe Drinking Water Act (SDWA) analyses, the reported Unc. Is the calculated Count Uncertainty (95% confidence interval) using a coverage factor of 1.96. For all other matrices (non-SDWA), the reported Unc. is the calculated Expanded Uncertainty (aka Combined Standard Uncertainty, CSU), reported at the 95% confidence interval using a coverage factor of 1.96.

Gamma Spec: The Unc. reported for all gamma-spectroscopy analyses (EPA 901.1), is the calculated Expanded Uncertainty (CSU) at the 95.4% confidence interval, using a coverage factor of 2.0.

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

Shuttle/Cooler ID#:	**CHAIN OF CUSTODY**	Geochemical Testing

Form F-5002, 04.13

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: Geochemical Testing	**Contact (Company):** Leslie Nemeth	**Phone:** (814) 443-1671
Address: 2005 North Center Avenue	e-mail: lnemeth@geo-ces.com	Fax: (814) 445-6729
City: Somerset **State:** PA **Zip:** 15501	**Sampled by:** Client	**Preservatives by** __Sampler__**GT**
WO#:	Project:	PO/Quote#: P2018-4696

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other	Containers Supplied by: ☐ Client ☐ GT Lab	

Sample Location/ Description	Lab Number	Sample Matrix	Extraction Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
***NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG*								
G1811867-003		nHZ / HZ WW	11/15/2018	9:16	G	SPLP Radium 226, 228	Field Filtered: Y / N HNO3	2001
		nHZ / HZ					Field Filtered: Y / N	
G1811867-007		nHZ / HZ WW	11/15/2018	9:16	G	SPLP Radium 226, 228	Field Filtered: Y / N HNO3	2002
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ						
		nHZ / HZ						
		nHZ / HZ						

WO# : 30272705

30272705

Note Deficiencies Here: 10 Day Rush Please PA

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
Leslie Nemeth	11/21/2018	8:00:00	Ben Mountain	11-27-18	1340

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: ___Yes or ✓No Cooler Temp (°C) on receipt: N/A

Sample Receiving (1st Review):_____ Client Support (2nd Review):_____

Pittsburgh Lab Sample Condition Upon Receipt

Pace Analytical

Client Name: Geochem Project #: 30272705

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Label BLM
LIMS Login BLM

Tracking #: 12 544 007 03 4748 0425

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals Intact: ☐ yes ☐ no

Thermometer Used N/A Type of Ice: Wet Blue (None)

Cooler Temperature Observed Temp N/A °C Correction Factor: — °C Final Temp: — °C

Temp should be above freezing to 6°C

pH paper Lot# 10D2981 Date and Initials of person examining contents: BLM 11-27-18

Comments:	Yes	No	N/A	
Chain of Custody Present:	✓			1.
Chain of Custody Filled Out:	✓			2.
Chain of Custody Relinquished:	✓			3.
Sampler Name & Signature on COC:		✓		4.
Sample Labels match COC: -Includes date/time/ID Matrix: WT		✓		5. No date or time on samples
Samples Arrived within Hold Time:	✓			6.
Short Hold Time Analysis (<72hr remaining):		✓		7.
Rush Turn Around Time Requested:		✓		8.
Sufficient Volume:	✓			9.
Correct Containers Used:	✓			10.
-Pace Containers Used:		✓		
Containers Intact:	✓			11.
Orthophosphate field filtered			✓	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered			✓	13.
Organic Samples checked for dechlorination:			✓	14.
Filtered volume received for Dissolved tests			✓	15.
All containers have been checked for preservation.	✓			16. pH ≤ 2
All containers needing preservation are found to be in compliance with EPA recommendation.	✓			
exceptions: VOA, coliform, TOC, O&G, Phenolics				Initial when completed: BLM Date/time of preservation:
				Lot # of added preservative:
Headspace in VOA Vials (>6mm):			✓	17.
Trip Blank Present:			✓	18.
Trip Blank Custody Seals Present			✓	
Rad Aqueous Samples Screened > 0.5 mrem/hr		✓		Initial when completed: BLM Date: 11-28-18

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

☐ A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

December 07, 2018

Ms. Leslie Nemeth
Geochemical Testing
2005 N. Center Avenue
Somerset, PA 15501

RE: Project: G1811869
Pace Project No.: 30272448

Dear Ms. Nemeth:
Enclosed are the analytical results for sample(s) received by the laboratory on November 21, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carin A. Ferris

Carin Ferris
carin.ferris@pacelabs.com
724-850-5615
Project Manager

Enclosures

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: G1811869
Pace Project No.: 30272448

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: G1811869
Pace Project No.: 30272448

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30272448001	**G1811869-001**	Water	11/15/18 09:16	11/21/18 09:30
30272448002	**G1811869-005**	Water	11/15/18 09:16	11/21/18 09:30

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: G1811869
Pace Project No.: 30272448

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30272448001	**G1811869-001**	EPA 903.1	MK1	1
		EPA 904.0	JLW	1
30272448002	**G1811869-005**	EPA 903.1	MK1	1
		EPA 904.0	JLW	1

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811869
Pace Project No.: 30272448

Method: **EPA 903.1**
Description: 903.1 Radium 226
Client: Geochemical Testing
Date: December 07, 2018

General Information:
2 samples were analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811869
Pace Project No.: 30272448

Method: **EPA 904.0**
Description: 904.0 Radium 228
Client: Geochemical Testing
Date: December 07, 2018

General Information:
2 samples were analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: G1811869
Pace Project No.: 30272448

Sample: G1811869-001 **Lab ID: 30272448001** Collected: 11/15/18 09:16 Received: 11/21/18 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample date on Chain of Custody is SPLP extraction date, no extraction time listed.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.155 ± 0.353 (0.209) C:NA T:84%**	pCi/L	12/06/18 22:00	13982-63-3	
Radium-228	EPA 904.0	**0.360 ± 0.353 (0.721) C:74% T:84%**	pCi/L	12/05/18 12:09	15262-20-1	

Sample: G1811869-005 **Lab ID: 30272448002** Collected: 11/15/18 09:16 Received: 11/21/18 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample date on Chain of Custody is SPLP extraction date, no extraction time listed.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.379 ± 0.577 (0.993) C:NA T:91%**	pCi/L	12/06/18 22:00	13982-63-3	
Radium-228	EPA 904.0	**0.528 ± 0.438 (0.883) C:77% T:82%**	pCi/L	12/05/18 12:10	15262-20-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811869
Pace Project No.: 30272448

QC Batch: 321860 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 30272448001, 30272448002

METHOD BLANK: 1569350 Matrix: Water
Associated Lab Samples: 30272448001, 30272448002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.236 ± 0.358 (0.774) C:81% T:77%	pCi/L	12/05/18 12:08	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811869
Pace Project No.: 30272448

QC Batch: 321861 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 30272448001, 30272448002

METHOD BLANK: 1569351 Matrix: Water
Associated Lab Samples: 30272448001, 30272448002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.278 ± 0.387 (0.646) C:NA T:93%	pCi/L	12/06/18 21:43	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: G1811869
Pace Project No.: 30272448

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty: For Safe Drinking Water Act (SDWA) analyses, the reported Unc. Is the calculated Count Uncertainty (95% confidence interval) using a coverage factor of 1.96. For all other matrices (non-SDWA), the reported Unc. is the calculated Expanded Uncertainty (aka Combined Standard Uncertainty, CSU), reported at the 95% confidence interval using a coverage factor of 1.96.

Gamma Spec: The Unc. reported for all gamma-spectroscopy analyses (EPA 901.1), is the calculated Expanded Uncertainty (CSU) at the 95.4% confidence interval, using a coverage factor of 2.0.

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

Shuttle/Cooler ID#:	**CHAIN OF CUSTODY**	Geochemical Testing

Form F-5002, 04.13

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: Geochemical Testing	**Contact (Company):** Leslie Nemeth	**Phone:** (814) 443-1671
Address: 2005 North Center Avenue	e-mail: lnemeth@geo-ces.com	Fax: (814) 445-6729
City: Somerset **State:** PA **Zip:** 15501	**Sampled by:** Client	**Preservatives by** __Sampler__GT
WO#:	Project:	PO/Quote#: P2015-8996

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other	Containers Supplied by: ☐ Client ☐ GT Lab	

Sample Location/ Description	Lab Number	Sample Matrix	SPLP Ext Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
***NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG*								
G1811869-001		nHZ / HZ	11/15/2018	9:16	G	SPLP Radium 226, 228	Field Filtered: Y / N HNO3	2
		nHZ / HZ					Field Filtered: Y / N	
G1811869-005		nHZ / HZ	11/15/2018	9:16	G	SPLP Radium 226, 228	Field Filtered: Y / N HNO3	2
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	

WO# : 30272448

30272448

Note Deficiencies Here: 10 Day Rush Please - If Possible

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
Leslie Nemeth	11/20/2018	8:00:00	PACE	11/21/18	0930

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: ___Yes or ✓No Cooler Temp (°C) on receipt: NA

Sample Receiving (1st Review):_____ Client Support (2nd Review):_____

Pittsburgh Lab Sample Condition Upon Receipt

Pace Analytical

Client Name: GeoChem

Project # 30272448

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Label JB

LIMS Login JB

Tracking #: 1Z 544 067 03 4732 9547

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☑ no

Thermometer Used NA Type of Ice: Wet Blue (None)

Cooler Temperature Observed Temp _____ °C Correction Factor: _____ °C Final Temp: _____ °C

Temp should be above freezing to 6°C

pH paper Lot# 10D2981 Date and Initials of person examining contents: 11/25/18 JB

Comments:	Yes	No	N/A	
Chain of Custody Present:	✓			1.
Chain of Custody Filled Out:	✓			2.
Chain of Custody Relinquished:	✓			3.
Sampler Name & Signature on COC:		✓		4.
Sample Labels match COC: -Includes date/time/ID Matrix: WT		✓		5. date on samples is 11.16.18 / no time on samples
Samples Arrived within Hold Time:	✓			6.
Short Hold Time Analysis (<72hr remaining):		✓		7.
Rush Turn Around Time Requested:		✓		8.
Sufficient Volume:	✓			9.
Correct Containers Used: -Pace Containers Used:	✓	✓		10.
Containers Intact:	✓			11.
Orthophosphate field filtered			✓	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered			✓	13.
Organic Samples checked for dechlorination:			✓	14.
Filtered volume received for Dissolved tests			✓	15.
All containers have been checked for preservation. All containers needing preservation are found to be in compliance with EPA recommendation. exceptions: VOA, coliform, TOC, O&G, Phenolics	✓			16. pH<2 Initial when completed: JB Date/time of preservation: Lot # of added preservative:
Headspace in VOA Vials (>6mm):			✓	17.
Trip Blank Present:		✓		18.
Trip Blank Custody Seals Present			✓	
Rad Aqueous Samples Screened > 0.5 mrem/hr		✓		Initial when completed: JB Date: 11/25/18

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

☐ A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

December 06, 2018

Ms. Leslie Nemeth
Geochemical Testing
2005 N. Center Avenue
Somerset, PA 15501

RE: Project: G1811870
Pace Project No.: 30272446

Dear Ms. Nemeth:
Enclosed are the analytical results for sample(s) received by the laboratory on November 21, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carin A. Ferris

Carin Ferris
carin.ferris@pacelabs.com
724-850-5615
Project Manager

Enclosures

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: G1811870
Pace Project No.: 30272446

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: G1811870
Pace Project No.: 30272446

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30272446001	**G1811870-001**	Water	11/15/18 09:16	11/21/18 09:30

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: G1811870
Pace Project No.: 30272446

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30272446001	**G1811870-001**	EPA 903.1	MK1	1
		EPA 904.0	JLW	1

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811870
Pace Project No.: 30272446

Method: **EPA 903.1**
Description: 903.1 Radium 226
Client: Geochemical Testing
Date: December 06, 2018

General Information:
1 sample was analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811870
Pace Project No.: 30272446

Method: **EPA 904.0**
Description: 904.0 Radium 228
Client: Geochemical Testing
Date: December 06, 2018

General Information:
1 sample was analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: G1811870
Pace Project No.: 30272446

Sample: G1811870-001 **Lab ID: 30272446001** Collected: 11/15/18 09:16 Received: 11/21/18 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample date on Chain of Custody is SPLP extraction date, no extraction time listed.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.205 ± 0.355 (0.634) C:NA T:92%**	pCi/L	12/06/18 10:42	13982-63-3	
Radium-228	EPA 904.0	**-0.237 ± 0.379 (0.933) C:68% T:83%**	pCi/L	12/05/18 12:09	15262-20-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811870
Pace Project No.: 30272446

QC Batch: 321860 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 30272446001

METHOD BLANK: 1569350 Matrix: Water
Associated Lab Samples: 30272446001

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.236 ± 0.358 (0.774) C:81% T:77%	pCi/L	12/05/18 12:08	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811870
Pace Project No.: 30272446

QC Batch: 321859 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 30272446001

METHOD BLANK: 1569347 Matrix: Water
Associated Lab Samples: 30272446001

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.234 ± 0.459 (0.839) C:NA T:91%	pCi/L	12/06/18 09:57	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: G1811870
Pace Project No.: 30272446

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty: For Safe Drinking Water Act (SDWA) analyses, the reported Unc. Is the calculated Count Uncertainty (95% confidence interval) using a coverage factor of 1.96. For all other matrices (non-SDWA), the reported Unc. is the calculated Expanded Uncertainty (aka Combined Standard Uncertainty, CSU), reported at the 95% confidence interval using a coverage factor of 1.96.

Gamma Spec: The Unc. reported for all gamma-spectroscopy analyses (EPA 901.1), is the calculated Expanded Uncertainty (CSU) at the 95.4% confidence interval, using a coverage factor of 2.0.

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

Shuttle/Cooler ID#:	**CHAIN OF CUSTODY**	Geochemical Testing

Form F-5002, 04.13

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: Geochemical Testing	**Contact (Company):** Leslie Nemeth	**Phone:** (814) 443-1671
Address: 2005 North Center Avenue	e-mail: lnemeth@geo-ces.com	Fax: (814) 445-6729
City: Somerset **State:** PA **Zip:** 15501	**Sampled by:** Client	**Preservatives by** __Sampler__**GT**
WO#:	Project:	PO/Quote#: P2018-89916

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other	Containers Supplied by: ☐ Client ☐ GT Lab	

Sample Location/ Description	Lab Number	Sample Matrix	SPLP Ext Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
***NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG*								
G1811870-001		nHZ / HZ	11/15/2018	9:16	G	SPLP Radium 226, 228	Field Filtered: Y / N HNO3	2
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	

001

WO# : 30272446

30272446

Note Deficiencies Here: 10 Day Rush Please - If Possible

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
Leslie Nemeth	11/20/2018	8:00:00	[signature] PACE	11/21/18	0930

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: ___Yes or ✓No | Cooler Temp (°C) on receipt: NA

Sample Receiving (1st Review):_____ | Client Support (2nd Review):_____

Pittsburgh Lab Sample Condition Upon Receipt

Face Analytical

Client Name: GeoChem Project #: #30272446

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Label JVB

LIMS Login JVB

Tracking #: 1Z 544 067 03 4736 9547

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☑ no

Thermometer Used NA Type of Ice: Wet Blue (None)

Cooler Temperature Observed Temp _____ °C Correction Factor: _____ °C Final Temp: _____ °C

Temp should be above freezing to 6°C

pH paper Lot# 10D2981 Date and Initials of person examining contents: 11/25/18 JVB

Comments:	Yes	No	N/A	
Chain of Custody Present:	✓			1.
Chain of Custody Filled Out:	✓			2.
Chain of Custody Relinquished:	✓			3.
Sampler Name & Signature on COC:		✓		4.
Sample Labels match COC: -Includes date/time/ID Matrix: WT		✓		5. date on samples is 11.16.18 / no time on samples
Samples Arrived within Hold Time:	✓			6.
Short Hold Time Analysis (<72hr remaining):		✓		7.
Rush Turn Around Time Requested:		✓		8.
Sufficient Volume:	✓			9.
Correct Containers Used: -Pace Containers Used:	✓	✓		10.
Containers Intact:	✓			11.
Orthophosphate field filtered			✓	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered			✓	13.
Organic Samples checked for dechlorination:			✓	14.
Filtered volume received for Dissolved tests			✓	15.
All containers have been checked for preservation. All containers needing preservation are found to be in compliance with EPA recommendation. exceptions: VOA, coliform, TOC, O&G, Phenolics	✓ ✓			16. pH<2 Initial when completed: JVB Date/time of preservation: Lot # of added preservative:
Headspace in VOA Vials (>6mm):			✓	17.
Trip Blank Present:		✓		18.
Trip Blank Custody Seals Present			✓	
Rad Aqueous Samples Screened > 0.5 mrem/hr		✓		Initial when completed: JVB Date: 11/25/18

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

☐ A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

December 10, 2018

Ms. Leslie Nemeth
Geochemical Testing
2005 N. Center Avenue
Somerset, PA 15501

RE: Project: G1811870
Pace Project No.: 30272661

Dear Ms. Nemeth:
Enclosed are the analytical results for sample(s) received by the laboratory on November 27, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carin A. Ferris

Carin Ferris
carin.ferris@pacelabs.com
724-850-5615
Project Manager

Enclosures

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: G1811870
Pace Project No.: 30272661

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: G1811870
Pace Project No.: 30272661

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30272661001	**G1811870-003**	Water	11/15/18 09:16	11/27/18 13:40

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: G1811870
Pace Project No.: 30272661

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30272661001	**G1811870-003**	EPA 903.1	KAC	1
		EPA 904.0	VAL	1

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811870
Pace Project No.: 30272661

Method: **EPA 903.1**
Description: 903.1 Radium 226
Client: Geochemical Testing
Date: December 10, 2018

General Information:
1 sample was analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811870
Pace Project No.: 30272661

Method: **EPA 904.0**
Description: 904.0 Radium 228
Client: Geochemical Testing
Date: December 10, 2018

General Information:
1 sample was analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: G1811870
Pace Project No.: 30272661

Sample: G1811870-003 **Lab ID: 30272661001** Collected: 11/15/18 09:16 Received: 11/27/18 13:40 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection dates and times were not present on the sample containers.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.792 ± 0.627 (0.852) C:NA T:85%**	pCi/L	12/07/18 12:08	13982-63-3	
Radium-228	EPA 904.0	**0.427 ± 0.397 (0.808) C:75% T:82%**	pCi/L	12/05/18 15:36	15262-20-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811870
Pace Project No.: 30272661

QC Batch: 322128 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 30272661001

METHOD BLANK: 1570359 Matrix: Water
Associated Lab Samples: 30272661001

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.279 ± 0.434 (0.752) C:NA T:94%	pCi/L	12/07/18 12:08	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811870
Pace Project No.: 30272661

QC Batch: 322129 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 30272661001

METHOD BLANK: 1570360 Matrix: Water
Associated Lab Samples: 30272661001

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.115 ± 0.366 (0.825) C:74% T:77%	pCi/L	12/05/18 15:35	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: G1811870
Pace Project No.: 30272661

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty: For Safe Drinking Water Act (SDWA) analyses, the reported Unc. Is the calculated Count Uncertainty (95% confidence interval) using a coverage factor of 1.96. For all other matrices (non-SDWA), the reported Unc. is the calculated Expanded Uncertainty (aka Combined Standard Uncertainty, CSU), reported at the 95% confidence interval using a coverage factor of 1.96.

Gamma Spec: The Unc. reported for all gamma-spectroscopy analyses (EPA 901.1), is the calculated Expanded Uncertainty (CSU) at the 95.4% confidence interval, using a coverage factor of 2.0.

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

Shuttle/Cooler ID#:	**CHAIN OF CUSTODY**	Geochemical Testing

Form F-5002, 04.13

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: Geochemical Testing	**Contact (Company):** Leslie Nemeth	**Phone:** (814) 443-1671
Address: 2005 North Center Avenue	e-mail: lnemeth@geo-ces.com	Fax: (814) 445-6729
City: Somerset **State:** PA **Zip:** 15501	**Sampled by:** Client	**Preservatives by** __Sampler__**GT**
WO#:	Project:	PO/Quote#: P2018 4998

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other	Containers Supplied by: ☐ Client ☐ GT Lab	

Sample Location/ Description	Lab Number	Sample Matrix	Extraction Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
***NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG*								
G1811870-003		nHZ / HZ WW	11/15/2018	9:16	G	SPLP Radium 226, 228	Field Filtered: Y / N HNO3	2
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Filtered: Y / N	
		nHZ / HZ					Filtered: Y / N	
		nHZ / HZ					Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	

601

WO# : 30272661

30272661

Note Deficiencies Here: 10 Day Rush Please PA

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
Leslie Nemeth	11/21/2018	8:00:00	Ben Mountain	11-27-18	1340

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: ___Yes or ✓No | Cooler Temp (°C) on receipt: N/A

Sample Receiving (1st Review):_____ | Client Support (2nd Review):_____

Pittsburgh Lab Sample Condition Upon Receipt

Face Analytical

Client Name: Geochem Project # #: 30272661

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Label ET
LIMS Login ET

Tracking #: 1Z 544 007 03 4748 0425

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Thermometer Used N/A Type of Ice: Wet Blue (None)

Cooler Temperature Observed Temp N/A °C Correction Factor: — °C Final Temp: — °C

Temp should be above freezing to 6°C

pH paper Lot# 10D2981

Date and Initials of person examining contents: BLM 11-27-18

Comments:	Yes	No	N/A	
Chain of Custody Present:	✓			1.
Chain of Custody Filled Out:	✓			2.
Chain of Custody Relinquished:	✓			3.
Sampler Name & Signature on COC:		✓		4.
Sample Labels match COC: -Includes date/time/ID Matrix: WT		✓		5. No date or time on sample
Samples Arrived within Hold Time:	✓			6.
Short Hold Time Analysis (<72hr remaining):		✓		7.
Rush Turn Around Time Requested:		✓		8.
Sufficient Volume:	✓			9.
Correct Containers Used: -Pace Containers Used:	✓ /	/ ✓		10.
Containers Intact:	✓			11.
Orthophosphate field filtered			✓	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered			✓	13.
Organic Samples checked for dechlorination:			✓	14.
Filtered volume received for Dissolved tests			✓	15.
All containers have been checked for preservation. All containers needing preservation are found to be in compliance with EPA recommendation. exceptions: VOA, coliform, TOC, O&G, Phenolics	✓ ✓			16. pH<2
				Initial when completed: BLM Date/time of preservation:
				Lot # of added preservative:
Headspace in VOA Vials (>6mm):			✓	17.
Trip Blank Present:			✓	18.
Trip Blank Custody Seals Present			✓	
Rad Aqueous Samples Screened > 0.5 mrem/hr		✓		Initial when completed: BLM Date: 11-27-18

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

☐ **A check in this box indicates that additional information has been stored in ereports.**

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

Surface Water Samples (WS-1 and WS-2)

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N. Center Ave.
Somerset, PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

Friday, December 21, 2018

John Shimshock
GENON - CONEMAUGH STATION CCR
CONEMAUGH STATION
PO BOX K
NEW FLORENCE, PA 15944

RE: Conemaugh CCR App IV Order No.: G1811841

Dear John Shimshock:

Geochemical Testing received 2 sample(s) on 11/14/2018 for the analyses presented in the following report.

There were no problems with the analyses and all QC data met NELAC, EPA, and laboratory specifications except where noted in the Case Narrative or Laboratory Results.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Timothy W. Bergstresser
Director of Technical Services

Leslie A. Nemeth
Project Manager

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306PA DEP

CLIENT: GENON - CONEMAUGH STATION CCR
Project: Conemaugh CCR App IV
Lab Order: G1811841

CASE NARRATIVE

No problems were encountered during analysis of this workorder, except if noted in this report.

SAMPLE RECEIPT CHECKLIST

	Response
COC is present	Yes
COC is filled out in ink and legible	Yes
COC relinquished, signature, date, and time	Yes
Samples arrived within hold time	Yes
Containers properly preserved for the requested testing	Yes
Sample containers have legible labels	Yes
Sample preservation verified	Yes
Appropriate sample containers are used	Yes
Sample container(s) received at proper temperature	Yes
Zero headspace where required	Yes
Sufficient volume for all requested analyses	Yes

Comments on the above checklist: None

The radiological analysis (Radium 226 by EPA 903.1; Radium 228 by EPA 904.0) was subcontracted to Pace Analytical (PADEP 65-00282). A copy of the subcontractor's laboratory report is enclosed with this Analytical Report.

Laboratory Results

Geochemical Testing

Date: *21-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	WS-1
Lab Order:	G1811841		Ash Disposal Site
Project:	Conemaugh CCR App IV	**Sampled By:**	Aptim
Lab ID:	G1811841-001	**Collection Date:**	11/14/2018 10:45:00 A
Matrix:	AQUEOUS	**Received Date:**	11/14/2018 5:15:27 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
INORGANIC NON-METALS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	< 0.1	0.1		mg/L	1	11/15/18 10:15 AM	11/15/18 8:43 PM
INORGANIC METALS		Analyst: **LXM**				**EPA 200.2**	**EPA 200.8**
Antimony	< 0.001	0.001		mg/L	1	11/19/18 12:05 PM	11/20/18 10:58 AM
Arsenic	< 0.001	0.001		mg/L	1	11/19/18 12:05 PM	11/20/18 10:58 AM
Lead	< 0.001	0.001		mg/L	1	11/19/18 12:05 PM	11/20/18 10:58 AM
Selenium	< 0.001	0.001		mg/L	1	11/19/18 12:05 PM	11/20/18 10:58 AM
Thallium	< 0.0002	0.0002		mg/L	1	11/19/18 12:05 PM	11/20/18 10:58 AM
INORGANIC METALS		Analyst: **GXI**				**SM 3112 B**	**SM 3112 B**
Mercury	< 0.0002	0.0002		mg/L	1	11/16/18 9:20 AM	11/16/18 1:48 PM
INORGANIC METALS		Analyst: **JEK**				**EPA 200.2**	**EPA 200.7**
Barium	0.03	0.01		mg/L	1	11/19/18 12:05 PM	11/20/18 5:08 PM
Beryllium	< 0.001	0.001		mg/L	1	11/19/18 12:05 PM	11/20/18 5:08 PM
Cadmium	< 0.002	0.002		mg/L	1	11/19/18 12:05 PM	11/20/18 5:08 PM
Chromium	< 0.01	0.01		mg/L	1	11/19/18 12:05 PM	11/20/18 5:08 PM
Cobalt	< 0.005	0.005		mg/L	1	11/19/18 12:05 PM	11/20/18 5:08 PM
Lithium	< 0.01	0.01		mg/L	1	11/19/18 12:05 PM	11/20/18 5:08 PM
Molybdenum	< 0.02	0.02		mg/L	1	11/19/18 12:05 PM	11/20/18 5:08 PM
RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1**
Radium 226	0.336+-0.350	0.494		pCi/L	1		12/11/18 8:59 PM
RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0**
Radium 228	0.0474+-0.371	0.853		pCi/L	1		12/10/18 11:41 AM

Laboratory Results

Geochemical Testing

Date: *21-Dec-18*

CLIENT:	GENON - CONEMAUGH STATION CCR	**Client Sample ID:**	WS-2
Lab Order:	G1811841		Ash Disposal Site
Project:	Conemaugh CCR App IV	**Sampled By:**	Aptim
Lab ID:	G1811841-002	**Collection Date:**	11/14/2018 1:10:00 PM
Matrix:	AQUEOUS	**Received Date:**	11/14/2018 5:15:27 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
INORGANIC NON-METALS		Analyst: **MBG**				**EPA 300.0**	**EPA 300.0**
Fluoride	< 0.1	0.1		mg/L	1	11/15/18 10:15 AM	11/15/18 9:01 PM
INORGANIC METALS		Analyst: **LXM**				**EPA 200.2**	**EPA 200.8**
Antimony	< 0.001	0.001		mg/L	1	11/19/18 12:05 PM	11/20/18 11:07 AM
Arsenic	< 0.001	0.001		mg/L	1	11/19/18 12:05 PM	11/20/18 11:07 AM
Lead	< 0.001	0.001		mg/L	1	11/19/18 12:05 PM	11/20/18 11:07 AM
Selenium	< 0.001	0.001		mg/L	1	11/19/18 12:05 PM	11/20/18 11:07 AM
Thallium	< 0.0002	0.0002		mg/L	1	11/19/18 12:05 PM	11/20/18 11:07 AM
INORGANIC METALS		Analyst: **GXI**				**SM 3112 B**	**SM 3112 B**
Mercury	< 0.0002	0.0002		mg/L	1	11/16/18 9:20 AM	11/16/18 1:50 PM
INORGANIC METALS		Analyst: **JEK**				**EPA 200.2**	**EPA 200.7**
Barium	0.03	0.01		mg/L	1	11/19/18 12:05 PM	11/20/18 5:12 PM
Beryllium	< 0.001	0.001		mg/L	1	11/19/18 12:05 PM	11/20/18 5:12 PM
Cadmium	< 0.002	0.002		mg/L	1	11/19/18 12:05 PM	11/20/18 5:12 PM
Chromium	< 0.01	0.01		mg/L	1	11/19/18 12:05 PM	11/20/18 5:12 PM
Cobalt	< 0.005	0.005		mg/L	1	11/19/18 12:05 PM	11/20/18 5:12 PM
Lithium	< 0.01	0.01		mg/L	1	11/19/18 12:05 PM	11/20/18 5:12 PM
Molybdenum	< 0.02	0.02		mg/L	1	11/19/18 12:05 PM	11/20/18 5:12 PM
RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 903.1**
Radium 226	0.134+-0.306	0.493		pCi/L	1		12/11/18 8:59 PM
RADIOLOGICAL PARAMETERS		Analyst: **SUB**					**EPA 904.0**
Radium 228	0.662+-0.431	0.816		pCi/L	1		12/10/18 11:41 AM

Shuttle/Cooler ID#:	**CHAIN OF CUSTODY**	Geochemical Testing

Form F-5002, 12.16

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: GENON	**Contact (Company):** APTIM	**Phone:** (412) 380 4272
Address: CONEMAUGH	e-mail:	Fax: ( )
City: NEW FLORENCE **State:** PA **Zip:**	**Sampled by:** PATTI ANDERSON and EVAN SCHLEGEL	**State Sampled:** PA
WO#: 6181184	**Project:**	PO/Quote#:

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other		

Sample Location/ Description	Lab Number	Sample Matrix	Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
***NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG*								
WS-1	001	SW	11/14/18	1045	G	SEE BOTTLES	Field Filtered: Y / N 0	4
WS-2	002	SW	11/14/18	1310	G	SEE BOTTLES	Field Filtered: Y / N 0	4
							Field Filtered: Y / N	
							Field Filtered: Y / N	
							Field Filtered: Y / N	
							Field Filtered: Y / N	
							Field Filtered: Y / N	
							Field Filtered: Y / N	
							Field Filtered: Y / N	

Note Deficiencies Here:

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
Patricia M Gamble APTIM	11/14/18	1400	Jesse Smith	11/14/18	17:15

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: Yes or No | Cooler Temp (°C) on receipt: 5

Sample Receiving (1st Review): TM | Client Support (2nd Review):

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

December 12, 2018

Ms. Leslie Nemeth
Geochemical Testing
2005 N. Center Avenue
Somerset, PA 15501

RE: Project: G1811841
Pace Project No.: 30272256

Dear Ms. Nemeth:
Enclosed are the analytical results for sample(s) received by the laboratory on November 20, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carin A. Ferris

Carin Ferris
carin.ferris@pacelabs.com
724-850-5615
Project Manager

Enclosures

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: G1811841
Pace Project No.: 30272256

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: G1811841
Pace Project No.: 30272256

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30272256001	**G1811841-001**	Water	11/14/18 10:45	11/20/18 11:00
30272256002	**G1811841-002**	Water	11/14/18 13:10	11/20/18 11:00

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Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: G1811841
Pace Project No.: 30272256

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30272256001	**G1811841-001**	EPA 903.1	MK1	1
		EPA 904.0	JLW	1
30272256002	**G1811841-002**	EPA 903.1	MK1	1
		EPA 904.0	JLW	1

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Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811841
Pace Project No.: 30272256

Method: **EPA 903.1**
Description: 903.1 Radium 226
Client: Geochemical Testing
Date: December 12, 2018

General Information:
2 samples were analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: G1811841
Pace Project No.: 30272256

Method: **EPA 904.0**
Description: 904.0 Radium 228
Client: Geochemical Testing
Date: December 12, 2018

General Information:
2 samples were analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: G1811841
Pace Project No.: 30272256

Sample: G1811841-001 **Lab ID: 30272256001** Collected: 11/14/18 10:45 Received: 11/20/18 11:00 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.336 ± 0.350 (0.494) C:NA T:91%**	pCi/L	12/11/18 20:59	13982-63-3	
Radium-228	EPA 904.0	**0.0474 ± 0.371 (0.853) C:81% T:75%**	pCi/L	12/10/18 11:41	15262-20-1	

Sample: G1811841-002 **Lab ID: 30272256002** Collected: 11/14/18 13:10 Received: 11/20/18 11:00 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.134 ± 0.306 (0.493) C:NA T:89%**	pCi/L	12/11/18 20:59	13982-63-3	
Radium-228	EPA 904.0	**0.662 ± 0.431 (0.816) C:79% T:75%**	pCi/L	12/10/18 11:41	15262-20-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811841
Pace Project No.: 30272256

QC Batch: 321886 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 30272256001, 30272256002

METHOD BLANK: 1569415 Matrix: Water
Associated Lab Samples: 30272256001, 30272256002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.298 ± 0.463 (0.802) C:NA T:85%	pCi/L	12/11/18 20:44	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: G1811841
Pace Project No.: 30272256

QC Batch: 321887 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 30272256001, 30272256002

METHOD BLANK: 1569416 Matrix: Water
Associated Lab Samples: 30272256001, 30272256002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.220 ± 0.311 (0.763) C:84% T:83%	pCi/L	12/10/18 11:40	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: G1811841
Pace Project No.: 30272256

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty: For Safe Drinking Water Act (SDWA) analyses, the reported Unc. Is the calculated Count Uncertainty (95% confidence interval) using a coverage factor of 1.96. For all other matrices (non-SDWA), the reported Unc. is the calculated Expanded Uncertainty (aka Combined Standard Uncertainty, CSU), reported at the 95% confidence interval using a coverage factor of 1.96.

Gamma Spec: The Unc. reported for all gamma-spectroscopy analyses (EPA 901.1), is the calculated Expanded Uncertainty (CSU) at the 95.4% confidence interval, using a coverage factor of 2.0.

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

Shuttle/Cooler ID#:	**CHAIN OF CUSTODY**	Geochemical Testing

Form F-5002, 04.13

Geochemical Testing • 2005 North Center Avenue • Somerset PA 15501 • (814) 443-1671 • Fax (814) 445-6729

Billing Client: Geochemical Testing	**Contact (Company):** Leslie Nemeth	**Phone:** (814) 443-1671
Address: 2005 North Center Avenue	e-mail: lnemeth@geo-ces.com	Fax: (814) 445-6729
City: Somerset **State:** PA **Zip:** 15501	**Sampled by:** Client	**Preservatives by** __Sampler__**GT**
WO#:	Project:	PO/Quote#: P2018-8940

Sample Matrix:	**GW** Ground Water	**SW** Surface Water	**PW** Potable Water	**WW** Wastewater	**SO** Soil	**SL** Sludge	**nHZ** Not Hazardous / **HZ** Hazardous	**PCBs**
Sample Type:	**G** Grab	**C** Composite	**D** Distribution/DW	**R** Raw/DW	**S** Special/DW	**O** Other	Containers Supplied by: ☐ Client ☐ GT Lab	

Sample Location/ Description	Lab Number	Sample Matrix	Date	Time (Military)	Sample Type	**Analyses Requested	Remarks/ Preservatives, etc	Number of Containers
***NOTE: IF multiple analytes from one bottle, OR if multiple bottles for one analyte, THEN list separately on one line UNLESS LISTED ON ATTACHED FIELD LOG**								
G1811841-001		nHZ / HZ G	11/14/2018	10:45	G	Radium 226, 228	Field Filtered: Y / N HNO3	2
		nHZ / HZ					Field Filtered: Y / N	
G1811841-002		nHZ / HZ G	11/14/2018	1:10	G	Radium 226, 228	Field Filtered: Y / N HNO3	2
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	
		nHZ / HZ					Field Filtered: Y / N	

001

002

WO# : 30272256

30272256

Note Deficiencies Here: PA

Relinquished by (Company & Signature)	Date	Time (Military)	Received by (Company & Signature):	Date	Time (Military)
Leslie Nemeth	11/15/2018	8:00:00	Ben Mountain	11-20-18	1100

SAMPLES MUST BE PRESERVED ON ICE.

Ice present on receipt: ___Yes or ✓No Cooler Temp (°C) on receipt: N/A

Sample Receiving (1st Review):_____ Client Support (2nd Review):_____

Pittsburgh Lab Sample Condition Upon Receipt

Face Analytical

Client Name: Geochem Project #: 30272256

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Label ET
LIMS Login ET

Tracking #: 1Z 544 00703 4854 4524

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Thermometer Used N/A Type of Ice: Wet Blue (None)

Cooler Temperature Observed Temp N/A °C Correction Factor: — °C Final Temp: — °C

Temp should be above freezing to 6°C

pH paper Lot# 10D2481 Date and Initials of person examining contents: BLM 11-20-18

Comments:	Yes	No	N/A	
Chain of Custody Present:	✓			1.
Chain of Custody Filled Out:	✓			2.
Chain of Custody Relinquished:	✓			3.
Sampler Name & Signature on COC:		✓		4.
Sample Labels match COC: -Includes date/time/ID Matrix: WT	✓			5.
Samples Arrived within Hold Time:	✓			6.
Short Hold Time Analysis (<72hr remaining):		✓		7.
Rush Turn Around Time Requested:		✓		8.
Sufficient Volume:	✓			9.
Correct Containers Used: -Pace Containers Used:	✓	✓		10.
Containers Intact:	✓			11.
Orthophosphate field filtered			✓	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered			✓	13.
Organic Samples checked for dechlorination:			✓	14.
Filtered volume received for Dissolved tests			✓	15.
All containers have been checked for preservation. All containers needing preservation are found to be in compliance with EPA recommendation.	✓ ✓			16. pH<2
exceptions: VOA, coliform, TOC, O&G, Phenolics				Initial when completed: BLM Date/time of preservation: Lot # of added preservative:
Headspace in VOA Vials (>6mm):			✓	17.
Trip Blank Present:			✓	18.
Trip Blank Custody Seals Present			✓	
Rad Aqueous Samples Screened > 0.5 mrem/hr		✓		Initial when completed: BLM Date: 11-20-18

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

☐ **A check in this box indicates that additional information has been stored in ereports.**

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.