

Annual Groundwater Monitoring Report

Appalachian Power Company
Mountaineer Plant
Landfill CCR Management Unit
Letart, WV

January 31, 2024

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Abbreviations:

ASD - Alternate Source Demonstration

CCR – Coal Combustion Residual

GWPS - Groundwater protection standards

SSI - Statistically Significant Increase

SSL - Statistically Significant Level

MTLF – Mountaineer Landfill

I. Overview

This *Annual Groundwater Monitoring and Corrective Action Report* (Report) has been prepared to report the status of activities for the preceding year for the landfill CCR unit at Appalachian Power Company's, a wholly-owned subsidiary of American Electric Power Company (AEP), Mountaineer Power Plant. The USEPA's CCR rules require that the Annual Groundwater Monitoring and Corrective Action Report be posted to the operating record for the preceding year no later than January 31st.

In general, the following activities were completed in 2023:

- The Mountaineer Landfill (MTLF) CCR unit began 2023 in detection monitoring and remained in detection monitoring throughout all of 2023.
- Groundwater data underwent various validation tests, including tests for completeness, valid values, transcription errors, and consistent units.
- Groundwater data, flow, and velocities are included in **Appendix 1**.
- The November 2022 detection monitoring event statistical analysis was completed in March 2023 and there were no confirmed statistically significant increases. This statistical analysis report is included in **Appendix 2**.
- The May 2023 detection monitoring event statistical analysis was completed in August 2023 and there were no confirmed statistically significant increases. This statistical analysis report is included in **Appendix 2**.
- The October 2023 detection monitoring event data was received. However, statistical analysis is ongoing and will be completed in 2024.

The major components of this annual report, to the extent applicable at this time, are presented in sections that follow:

- A map, aerial photograph or a drawing showing the CCR management unit(s), all groundwater monitoring wells and monitoring well identification numbers.
- All the monitoring data collected, including the rate and direction of groundwater flow, plus a summary showing the number of samples collected per monitoring well, the dates the samples were collected and whether the sample was collected as part of detection monitoring or assessment monitoring programs (Attached as **Appendix 1**).
- Statistical comparison of monitoring data to determine if there have been SSIs over background concentrations (Attached as **Appendix 2**, where applicable).
- A discussion of whether any alternate source demonstrations were performed, and the conclusions (Attached as Appendix 3, not applicable).

- A summary of any transition between monitoring program, for example the date and circumstances for transitioning from detection monitoring to assessment monitoring (Notices attached as Appendix 4, not applicable).
- Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a statement as to why that happened (Attached as Appendix 5, not applicable).
- Other information required to be included in the annual report such as an alternate monitoring frequency, or assessment of corrective measures, if applicable.

In addition, this report summarizes key actions completed, and where applicable, describes any problems encountered and actions taken to resolve those problems. The report includes a projection of key activities for the upcoming year.

II. Groundwater Monitoring Well Locations and Identification Numbers

Figure 1 depicts the PE-certified groundwater monitoring network, the monitoring well locations and their corresponding identification. The monitoring well distribution adequately covers downgradient and upgradient areas as detailed in the *Groundwater Monitoring Network Evaluation Report* that is posted to AEP's publicly available CCR website. The groundwater quality monitoring network includes the following:

- Two upgradient wells: MW-1612 and MW-30; and
- Five downgradient wells: MW-1611, MW-27, MW-28, MW-38, and MW-39.

III. Monitoring Wells Installed or Decommissioned

There were no monitoring wells installed or decommissioned in 2023. The network design, as summarized in the *Groundwater Monitoring Network Design Report* (2016) and as posted at the CCR web site for Mountaineer Plant, did not change. That design report, viewable on the AEP CCR web site, discusses the facility location, the hydrogeological setting, the hydrostratigraphic units, the uppermost aquifer, downgradient monitoring well locations and the upgradient monitoring well locations.

IV. Groundwater Quality Data and Static Water Elevation Data, With Flow Rate and Direction and Discussion

Appendix 1 contains tables showing the groundwater quality data collected since background through data received in 2023. Static water elevation data from each monitoring event also are shown in **Appendix 1**, along with the groundwater velocity calculations, groundwater flow direction and potentiometric maps developed after each sampling event.

V. Groundwater Quality Data Statistical Analysis

The November 2022 detection monitoring event statistical analysis was completed in March 2023. There were no potential SSIs following the initial sampling event.

The May 2023 detection monitoring event statistical analysis was completed in August 2023. There were no potential SSIs following the initial sampling event.

These statistical analysis reports are included in **Appendix 2**.

The November 2023 detection monitoring event data was received. However, statistical analysis is ongoing and will be completed in 2024. If any potential SSIs are identified, a resampling event will occur. If any SSIs are confirmed, an ASD will be attempted. If successful, the MTLF will remain in detection monitoring. However, if unsuccessful, the MTLF will transition into assessment monitoring.

VI. Alternative Source Demonstrations

No alternative source demonstrations were completed in 2023.

VII. Discussion About Transition Between Monitoring Requirements or Alternate Monitoring Frequency

There has been no transition between detection monitoring and assessment monitoring at Mountaineer Plant's Landfill. Detection monitoring will continue in 2024. The sampling frequency of twice per year will be maintained for the Appendix III parameters (boron, calcium, chloride, fluoride, pH, sulfate, and total dissolved solids).

Regarding defining an alternate monitoring frequency, the groundwater velocity and monitoring well production is high enough at this facility that no modification of the twice-per-year detection monitoring effort is needed.

VIII. Other Information Required

As required by the CCR detection monitoring rules in 40 CFR 257.94, sampling all CCR wells for the Appendix III parameters was completed in 2023. All required information has been included in this annual groundwater monitoring report.

IX. Description of Any Problems Encountered and Actions Taken

No significant problems were encountered. The low flow sampling effort went smoothly, and the schedule was met to support this first annual groundwater report preparation.

X. A Projection of Key Activities for the Upcoming Year

Key activities for 2024 include:

- Complete the statistical analysis of the November 2023 detection event.
- Detection monitoring on a twice per year schedule.
- Evaluation of the detection monitoring results from a statistical analysis viewpoint, looking for any statistically significant increases, or decreases when pH is considered.
- Responding to any new data received in light of what the CCR rule requires.
- Preparation of the 2024 annual groundwater report.

APPENDIX 1 - Groundwater Data Tables and Figures

Tables and figures showing the groundwater monitoring data collected and the rate and direction of groundwater flow. The dates that the samples were collected also are shown.

Groundwater Data Tables

**Table 1. Groundwater Data Summary: MW-26
Mountaineer - LF
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
9/27/2016	Background	0.097	61.5	5.57	0.12	7.5	9.6	322
11/1/2016	Background	0.117	50.5	5.17	0.13	7.4	10.6	270
12/21/2016	Background	0.074	48.6	5.21	0.13	7.6	10.2	316
2/22/2017	Background	0.145	56.2	5.35	0.13	7.4	6.5	325
3/28/2017	Background	0.222	52.9	6.25	0.13	7.4	7.3	334
4/17/2017	Background	0.169	57.1	5.73	0.13	7.3	6.7	320
5/17/2017	Background	0.161	58.6	5.87	0.13	8.1	6.5	343
6/13/2017	Background	0.121	53.7	5.00	0.12	7.4	5.3	324
10/31/2017	Detection	0.165	54.7	5.48	0.13	7.5	5.8	346
1/22/2018	Detection	--	55.7	--	--	7.3	--	--
9/20/2018	Detection	0.214	49.4	6.04	0.16	8.0	6.3	344
11/26/2018	Detection	0.182	53.6	5.97	0.14	7.4	7.2	364
4/9/2019	Detection	0.128	62.8	6.71	0.13	7.3	7.6	370
6/18/2019	Detection	--	--	7.22	--	7.2	--	387
9/9/2019	Detection	0.099	60.2	5.80	0.14	7.4	5.7	353
7/8/2020	Detection	--	--	--	--	7.4	--	366
10/8/2020	Detection	0.103	51.2	5.74	0.16	6.9	6.4	344
1/4/2021	Detection	--	--	--	--	7.5	--	--
5/13/2021	Detection	0.110	60.2	6.56	0.15	7.2	8.5	378
11/3/2021	Detection	0.091	57.5	5.50	0.14	7.1	5.20	340
3/4/2022	Detection	--	--	--	--	7.5	--	--
5/23/2022	Detection	0.099	64.8	5.97	0.13	7.5	7.90	370 L1
7/25/2022	Detection	--	61.8	--	--	7.7	--	--
11/10/2022	Detection	0.103	58.5	5.69	0.13	7.2	6.58	370
5/23/2023	Detection	0.090	57.1 M1	6.05	0.12	7.2	8.1	370
10/26/2023	Detection	0.087	57.0	5.04	0.12	7.1	6.3	350

**Table 1. Groundwater Data Summary: MW-26
Mountaineer - LF
Appendix IV Constituents**

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
9/27/2016	Background	0.13	3.57	917	< 0.005 U1	0.01 J1	0.4	0.214	3.25	0.12	0.165	0.010	< 0.002 U1	1.88	0.1	0.03 J1
11/1/2016	Background	0.11	4.06	871	< 0.005 U1	0.005 J1	0.3	0.220	3.57	0.13	0.043	0.006	< 0.002 U1	3.07	0.1	0.02 J1
12/21/2016	Background	0.12	4.51	872	0.01 J1	0.006 J1	1.27	0.329	3.15	0.13	0.167	0.004	< 0.002 U1	3.52	0.2	0.062
2/22/2017	Background	0.09	4.11	717	0.01 J1	0.01 J1	0.731	0.345	3.60	0.13	0.244	0.012	< 0.002 U1	2.53	0.1	0.04 J1
3/28/2017	Background	0.50	3.95	886	0.028	0.01 J1	1.43	0.532	2.88	0.13	0.517	0.014	< 0.002 U1	1.18	0.2	0.03 J1
4/17/2017	Background	0.09	3.60	802	0.007 J1	0.007 J1	0.328	0.299	1.967	0.13	0.164	0.009	< 0.002 U1	1.08	0.1 J1	0.01 J1
5/17/2017	Background	0.06	4.01	869	< 0.004 U1	0.007 J1	0.238	0.251	3.22	0.13	0.090	0.007	< 0.002 U1	3.99	0.1	0.01 J1
6/13/2017	Background	0.10	3.45	905	0.008 J1	0.008 J1	0.405	0.325	3.28	0.12	0.252	0.018	< 0.002 U1	1.23	0.1	0.01 J1

**Table 1. Groundwater Data Summary: MW-27
Mountaineer - LF
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
9/27/2016	Background	0.276	18.9	1.82	2.23	9.2	4.9	618
11/1/2016	Background	0.288	1.57	1.86	2.38	9.1	7.2	558
12/21/2016	Background	0.219	1.39	1.69	2.44	9.2	7.3	528
2/22/2017	Background	0.282	1.42	1.48	2.27	9.1	4.3	531
3/28/2017	Background	0.387	1.26	1.59	2.32	9.3	4.7	508
4/17/2017	Background	0.312	1.65	1.56	2.30	9.0	5.0	536
5/17/2017	Background	0.290	1.48	1.59	2.38	11.1	4.8	539
6/13/2017	Background	0.293	1.77	1.64	2.33	9.4	4.5	526
10/31/2017	Detection	0.275	1.33	1.63	2.38	9.2	4.2	544
9/20/2018	Detection	0.357	1.14	1.69	2.41	9.1	4.4	550
11/26/2018	Detection	0.292	1.20	1.52	2.37	9.0	3.6	522
4/9/2019	Detection	0.303	1.19	1.54	2.32	9.0	2.9	542
9/10/2019	Detection	0.285	1.13	1.67	2.71	9.1	3.0	530
7/8/2020	Detection	--	1.20	1.63	--	9.1	--	--
10/8/2020	Detection	0.273	1.20	1.67	2.38	8.7	3.4	541
1/4/2021	Detection	--	--	--	--	9.0	--	--
5/13/2021	Detection	0.288	1.07	1.71	2.54	8.9	3.1	541
11/3/2021	Detection	0.280	1.10	1.60	2.54	8.4	1.53	560
3/4/2022	Detection	--	--	--	--	9.3	--	--
5/23/2022	Detection	0.288	1.70	1.57	2.58	9.3	2.78	550 L1
11/10/2022	Detection	0.296	1.24	1.57	2.54	8.9	2.18	550
5/23/2023	Detection	0.272	1.18	1.48	2.58	8.8	3.0	550
10/26/2023	Detection	0.274	1.34	1.48	2.48	8.5	3.1	570

**Table 1. Groundwater Data Summary: MW-27
Mountaineer - LF
Appendix IV Constituents**

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
9/27/2016	Background	0.39	8.05	326	0.654	0.11	11.6	4.95	2.565	2.23	17.3	0.016	0.004 J1	24.2	2.2	0.1 J1
11/1/2016	Background	0.26	5.42	151	0.158	0.02	5.0	0.817	2.003	2.38	4.00	0.007	< 0.002 U1	35.6	0.4	0.03 J1
12/21/2016	Background	0.23	4.26	113	0.093	0.01 J1	2.94	0.502	1.489	2.44	8.87	0.001	< 0.002 U1	34.6	0.3	0.04 J1
2/22/2017	Background	0.06	3.76	94.8	0.054	0.009 J1	1.95	0.320	1.419	2.27	1.28	0.012	0.002 J1	32.1	0.1	0.03 J1
3/28/2017	Background	0.08	4.45	105	0.062	0.008 J1	1.69	0.319	0.888	2.32	1.06	0.016	< 0.002 U1	31.5	0.2	0.02 J1
4/17/2017	Background	0.15	4.54	108	0.085	0.01 J1	2.36	0.511	0.486	2.30	1.45	0.005	0.002 J1	32.0	0.2	0.02 J1
5/17/2017	Background	0.11	4.54	94.6	0.052	0.005 J1	1.33	0.335	0.20279	2.38	0.971	0.015	< 0.002 U1	31.6	0.2	0.01 J1
6/13/2017	Background	0.18	4.55	102	0.082	0.01 J1	2.25	0.600	0.797	2.33	1.39	0.015	< 0.002 U1	30.6	0.2	0.02 J1

**Table 1. Groundwater Data Summary: MW-30
Mountaineer - LF
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
10/26/2016	Background	0.239	16.6	250	3.42	8.7	31.5	--
11/2/2016	Background	0.240	10.9	257	3.41	8.6	19.6	1,350
12/28/2016	Background	0.250	9.91	250	3.43	8.0	19.1	1,280
2/22/2017	Background	0.257	2.76	246	3.18	8.6	11.5	1,220
3/29/2017	Background	0.344	2.54	242	3.31	8.7	0.1 J1	1,270
4/19/2017	Background	0.296	2.91	247	3.28	8.5	11.2	1,210
5/17/2017	Background	0.269	2.97	247	1.34	10.1	4.4	1,290
6/13/2017	Background	0.283	4.06	255	3.28	8.9	10.8	1,170
10/31/2017	Detection	0.315	3.27	257	3.30	8.5	11.4	1,210
9/20/2018	Detection	0.315	4.69	253	3.36	8.6	13.0	1,230
11/26/2018	Detection	--	--	--	--	8.4	--	--
11/27/2018	Detection	0.344	3.16	247	3.40	--	11.7	1,240
4/9/2019	Detection	0.290	2.88	245	3.32	8.4	10.6	1,260
9/10/2019	Detection	0.259	3.39	249	3.76	8.3	9.6	1,260
5/18/2020	Detection	0.271	2.95	264	3.54	8.1	10.8	1,240
10/7/2020	Detection	0.249	2.93	247	2.73	8.0	10.9	1,260
5/14/2021	Detection	0.259	2.63	259	3.38	8.3	9.9	1,250
10/28/2021	Detection	0.261	2.80	253	3.47	8.2	8.09	1,250
5/20/2022	Detection	0.289	2.94	259	3.57	8.6	10.7	1,260 L1
11/9/2022	Detection	0.279	3.37	257	3.34	8.3	8.7	1,100
5/25/2023	Detection	0.241	3.24	271	3.57	7.8	10.6	1,250
10/30/2023	Detection	--	--	288	3.46	8.0	10.9	1,320 S7

**Table 1. Groundwater Data Summary: MW-30
Mountaineer - LF
Appendix IV Constituents**

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
10/26/2016	Background	0.36	7.38	567	0.692	0.10	13.1	33.8	2.588	3.42	33.2	0.034	0.054	68.7	3.8	0.724
11/2/2016	Background	0.26	7.54	576	0.630	0.09	11.7	33.3	1.404	3.41	30.9	0.026	0.016	73.7	2.7	0.654
12/28/2016	Background	0.91	6.87	360	0.502	0.08	18.1	15.9	2.725	3.43	13.8	0.024	0.026	107	2.6	0.350
2/22/2017	Background	0.52	4.65	223	0.082	0.008 J1	3.24	2.40	2.418	3.18	1.68	0.022	0.004 J1	125	0.5	0.258
3/29/2017	Background	0.66	5.45	243	0.149	0.007 J1	6.13	4.24	1.204	3.31	3.62	0.027	0.003 J1	120	0.7	0.381
4/19/2017	Background	1.55	5.80	246	0.140	0.01 J1	5.76	3.91	3.83	3.28	3.49	0.019	0.061	123	0.7	0.365
5/17/2017	Background	0.75	6.90	241	0.120	< 0.005 U1	3.99	3.63	2.395	1.34	3.41	0.027	0.004 J1	128	0.9	0.287
6/13/2017	Background	2.74	6.86	251	0.197	0.02 J1	6.83	5.35	3.45	3.28	4.80	0.027	0.005 J1	118	0.8	0.366

**Table 1. Groundwater Data Summary: MW-38
Mountaineer - LF
Appendix III Constituents**

Geosyntec Consultants, Inc.

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
9/27/2016	Background	0.024	55.7	7.12	0.32	7.1	28.1	410
11/2/2016	Background	0.040	46.3	7.27	0.32	7.0	36.6	358
12/21/2016	Background	0.019	48.2	7.43	0.35	7.4	35.8	404
2/22/2017	Background	0.028	47.2	7.21	0.29	7.0	31.7	409
3/28/2017	Background	0.070	50.0	7.08	0.32	7.0	30.1	390
4/18/2017	Background	0.038	52.5	7.22	0.33	7.0	30.6	422
5/16/2017	Background	0.027	54.5	7.41	0.33	7.6	32.5	421
6/13/2017	Background	0.093	51.4	7.01	0.28	7.0	31.0	406
10/31/2017	Detection	0.045	56.1	7.59	0.38	7.0	28.7	460
1/22/2018	Detection	--	53.8	--	--	6.7	--	419
9/20/2018	Detection	0.068	51.2	7.31	0.36	7.4	31.5	441
11/26/2018	Detection	0.08 J1	48.2	7.06	0.34	7.0	35.2	415
4/9/2019	Detection	0.04 J1	52.0	7.46	0.32	6.9	27.8	427
6/18/2019	Detection	--	--	--	--	7.6	--	--
9/10/2019	Detection	0.03 J1	49.9	7.45	0.35	7.7	28.2	417
10/22/2019	Detection	--	--	--	--	6.9	--	--
5/15/2020	Detection	0.02 J1	48.3	7.59	0.38	6.7	31.4	421
10/8/2020	Detection	0.03 J1	53.4	7.68	0.47	6.8	25.5	452
5/13/2021	Detection	0.03 J1	50.9	7.51	0.43	7.1	23.2	432
10/29/2021	Detection	0.028 J1	44.6	7.26	0.37	6.9	28.7	430
5/20/2022	Detection	0.029 J1	58.8	7.51	0.39	7.2	26.7	440 L1
7/25/2022	Detection	--	53.3	--	--	7.3	--	--
11/9/2022	Detection	0.027 J1	45.4	6.85	0.33	6.9	33.4	380
5/22/2023	Detection	0.023 J1	42.2	7.30	0.36	6.9	27.5	430
10/31/2023	Detection	0.031 J1	49.5	7.25	0.38	6.9	29.5	420

**Table 1. Groundwater Data Summary: MW-38
Mountaineer - LF
Appendix IV Constituents**

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
9/27/2016	Background	0.09	9.82	221	0.023	0.03	1.0	2.72	2.229	0.32	0.442	0.002	< 0.002 U1	2.76	0.2	0.103
11/2/2016	Background	0.07	8.15	179	< 0.005 U1	0.02 J1	0.4	0.855	1.744	0.32	0.113	0.0009 J1	< 0.002 U1	2.10	0.04 J1	0.04 J1
12/21/2016	Background	0.05	6.62	162	< 0.005 U1	0.02	1.67	0.655	2.06	0.35	0.082	< 0.0002 U1	< 0.002 U1	2.50	0.06 J1	0.082
2/22/2017	Background	0.03 J1	5.74	141	< 0.005 U1	0.02	0.526	0.949	1.00	0.29	0.039	0.004	< 0.002 U1	3.37	0.03 J1	0.04 J1
3/28/2017	Background	0.05 J1	11.5	184	< 0.005 U1	0.03	0.197	0.916	0.548	0.32	0.073	0.006	< 0.002 U1	2.47	0.06 J1	0.05 J1
4/18/2017	Background	0.04 J1	6.34	179	< 0.004 U1	0.03	0.111	2.87	0.494	0.33	0.02 J1	0.003	< 0.002 U1	2.30	< 0.03 U1	0.068
5/16/2017	Background	0.06	5.09	186	< 0.004 U1	0.03	0.093	3.66	0.536	0.33	0.01 J1	0.004	< 0.002 U1	3.76	< 0.03 U1	0.062
6/13/2017	Background	0.06	8.09	187	< 0.004 U1	0.03	0.130	2.53	1.268	0.28	0.056	0.013	< 0.002 U1	2.67	0.04 J1	0.056

**Table 1. Groundwater Data Summary: MW-39
Mountaineer - LF
Appendix III Constituents**

Geosyntec Consultants, Inc.

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
9/26/2016	Background	0.143	12.4	3.00	0.77	8.4	< 0.04 U1	350
11/2/2016	Background	0.134	7.88	3.05	0.83	8.4	< 0.04 U1	344
12/21/2016	Background	0.122	10.5	3.07	0.86	8.8	< 0.04 U1	450
2/22/2017	Background	0.134	7.65	2.98	0.80	8.4	< 0.04 U1	374
3/28/2017	Background	0.202	5.95	2.95	0.78	8.4	0.1 J1	310
4/18/2017	Background	0.156	6.48	2.91	0.78	8.3	< 0.04 U1	344
5/16/2017	Background	0.139	6.74	2.98	0.79	9.5	1.5	367
6/14/2017	Background	0.179	6.15	2.92	0.78	8.5	0.1	340
10/31/2017	Detection	0.171	7.25	3.05	0.78	8.3	0.2	385
9/20/2018	Detection	0.182	6.43	2.99	0.80	8.5	0.1 J1	369
11/26/2018	Detection	0.167	6.33	2.93	0.80	8.3	0.07 J1	380
4/9/2019	Detection	0.158	6.65	2.94	0.77	8.3	< 0.06 U1	376
9/9/2019	Detection	0.144	6.78	3.07	0.84	8.1	< 0.06 U1	369
5/15/2020	Detection	0.148	6.15	3.11	0.84	7.9	0.2 J1	374
7/8/2020	Detection	--	--	--	--	8.4	--	--
10/8/2020	Detection	0.133	6.11	2.98	0.89	7.9	< 0.06 U1	404
1/4/2021	Detection	--	--	--	--	8.4	--	--
5/13/2021	Detection	0.148	5.65	3.08	0.85	8.2	0.1 J1	375
10/29/2021	Detection	0.150	6.10	3.01	0.85	8.1	< 0.06 U1	380
5/23/2022	Detection	0.140	6.46	3.02	0.86	8.6	0.18 J1	370 L1
11/9/2022	Detection	0.144	7.60	2.92	0.78	8.2	< 0.06 U1	370
5/25/2023	Detection	0.134	7.07	3.03	0.86	8.0	0.2 J1	360
10/31/2023	Detection	0.142	8.58	2.99	0.83	8.0	0.2 J1	390

**Table 1. Groundwater Data Summary: MW-39
Mountaineer - LF
Appendix IV Constituents**

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
9/26/2016	Background	0.06	4.80	264	0.095	0.01 J1	2.2	1.43	1.142	0.77	2.21	0.016	< 0.002 U1	8.51	0.3	0.04 J1
11/2/2016	Background	0.04 J1	3.89	276	0.068	< 0.004 U1	3.2	0.615	1.941	0.83	0.532	0.011	< 0.002 U1	9.54	0.09 J1	0.03 J1
12/21/2016	Background	0.08	3.95	296	0.202	0.006 J1	6.32	2.34	1.311	0.86	1.79	0.008	< 0.002 U1	8.03	0.6	0.070
2/22/2017	Background	0.03 J1	3.91	243	0.041	0.01 J1	1.41	0.539	1.162	0.80	0.467	0.012	0.002 J1	9.23	0.1	0.03 J1
3/28/2017	Background	0.02 J1	3.58	241	0.01 J1	< 0.004 U1	0.560	0.206	0.793	0.78	0.176	0.015	< 0.002 U1	8.50	0.06 J1	0.02 J1
4/18/2017	Background	0.01 J1	3.70	244	0.007 J1	< 0.005 U1	0.243	0.188	0.1602	0.78	0.113	0.009	< 0.002 U1	8.65	0.04 J1	< 0.01 U1
5/16/2017	Background	0.01 J1	3.88	244	0.004 J1	0.02	0.221	0.174	0.611	0.79	0.073	0.017	< 0.002 U1	9.39	0.04 J1	< 0.01 U1
6/14/2017	Background	0.02 J1	3.76	247	0.008 J1	< 0.005 U1	0.203	0.209	0.47	0.78	0.092	0.028	< 0.002 U1	9.06	0.06 J1	< 0.01 U1

**Table 1. Groundwater Data Summary: MW-1611
Mountaineer - LF
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
9/26/2016	Background	0.136	25.0	8.72	0.56	7.8	17.3	382
11/2/2016	Background	0.140	22.8	9.36	0.61	7.8	22.7	388
12/20/2016	Background	0.124	22.2	9.39	0.64	7.7	21.8	380
2/22/2017	Background	0.175	22.5	9.10	0.57	7.7	18.0	381
3/28/2017	Background	0.210	22.3	8.04	0.50	7.8	15.7	326
4/18/2017	Background	0.155	22.8	8.59	0.56	7.7	17.7	388
5/16/2017	Background	0.190	23.1	9.14	0.60	8.3	18.7	392
6/12/2017	Background	0.158	22.4	9.29	0.57	7.2	19.4	384
10/31/2017	Detection	0.152	24.0	9.80	0.61	7.8	18.9	402
1/22/2018	Detection	--	22.6	--	--	7.5	--	376
9/20/2018	Detection	0.258	23.2	9.48	0.61	7.8	19.0	416
11/26/2018	Detection	0.147	21.9	9.57	0.62	7.7	18.5	387
4/9/2019	Detection	0.139	26.2	7.96	0.46	7.6	20.7	431
6/18/2019	Detection	--	22.8	9.58	--	7.9	--	--
7/10/2019	Detection	--	--	--	--	7.6	--	402
9/9/2019	Detection	0.136	26.1	10.1	0.62	7.7	17.3	402
5/15/2020	Detection	0.135	24.0	9.35	0.61	7.3	20.8	404
10/8/2020	Detection	0.124	24.8	9.44	0.64	7.3	22.2	451
1/4/2021	Detection	--	--	--	--	7.7	--	407
5/13/2021	Detection	0.132	23.5	10.1	0.64	7.7	19.2	405
10/26/2021	Detection	0.125	24.6	9.91	0.63	7.5	20.8	400
5/20/2022	Detection	0.133	25.1	10.7	0.63	7.7	21.1	410 L1
7/25/2022	Detection	--	--	9.48	--	8.1	--	--
11/9/2022	Detection	0.134	26.1	9.89	0.58	7.6	20.8	420
5/25/2023	Detection	0.119	25.3	9.91	0.57	7.6	22.4	390
10/26/2023	Detection	0.119	23.5	10.7	0.60	7.5	20.3	400

**Table 1. Groundwater Data Summary: MW-1611
Mountaineer - LF
Appendix IV Constituents**

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
9/26/2016	Background	0.03 J1	1.01	165	0.046	0.02	1.4	0.370	1.258	0.56	0.482	0.004	< 0.002 U1	6.97	0.07 J1	0.088
11/2/2016	Background	0.03 J1	0.97	156	0.030	0.01 J1	0.9	0.245	2.888	0.61	0.310	0.004	< 0.002 U1	5.83	0.06 J1	0.03 J1
12/20/2016	Background	< 0.01 U1	0.74	140	< 0.005 U1	< 0.004 U1	2.10	0.092	0.772	0.64	0.023	0.002	< 0.002 U1	5.46	< 0.03 U1	< 0.01 U1
2/22/2017	Background	< 0.01 U1	0.75	135	0.007 J1	0.006 J1	0.209	0.096	0.5828	0.57	0.055	0.007	0.002 J1	5.36	0.04 J1	0.208
3/28/2017	Background	0.01 J1	0.60	166	0.01 J1	0.005 J1	0.426	0.108	0.645	0.50	0.195	0.011	< 0.002 U1	7.26	0.07 J1	0.02 J1
4/18/2017	Background	0.01 J1	0.69	155	0.01 J1	0.006 J1	0.337	0.104	0.487	0.56	0.133	0.003	< 0.002 U1	6.01	< 0.03 U1	< 0.01 U1
5/16/2017	Background	0.03 J1	0.75	145	0.008 J1	< 0.005 U1	0.661	0.101	2.534	0.60	0.119	0.006	< 0.002 U1	5.49	0.04 J1	0.02 J1
6/12/2017	Background	0.03 J1	0.76	148	0.007 J1	< 0.005 U1	0.138	0.092	0.508	0.57	0.058	0.018	< 0.002 U1	5.39	0.03 J1	< 0.01 U1

**Table 1. Groundwater Data Summary: MW-1612
Mountaineer - LF
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
10/26/2016	Background	0.637	9.47	38.1	3.02	8.3	272	--
11/2/2016	Background	0.629	8.48	33.4	3.23	8.3	238	850
12/21/2016	Background	0.501	8.96	36.1	3.33	8.1	271	966
2/22/2017	Background	0.473	7.90	35.6	2.95	8.4	288	1,090
3/29/2017	Background	0.673	7.10	23.7	3.50	8.7	190	1,240
4/19/2017	Background	0.589	8.61	22.4	3.26	8.4	226	1,040
5/16/2017	Background	0.565	12.5	27.8	2.88	8.8	346	1,150
6/13/2017	Background	0.532	8.09	27.4	2.98	8.2	334	1,130
10/31/2017	Detection	0.457	7.22	20.2	3.53	8.2	147	914
9/20/2018	Detection	0.543	4.50	14.6	3.78	8.4	63.9	835
11/26/2018	Detection	0.413	4.25	11.5	3.91	8.0	49.2	764
4/9/2019	Detection	0.449	3.21	10.2	4.02	8.3	54.8	725
9/10/2019	Detection	0.438	4.77	11.1	4.34	8.3	31.3	786
5/18/2020	Detection	0.388	4.18	6.75	4.39	8.2	40.5	637
10/7/2020	Detection	0.351	3.43	6.36	3.92	8.3	40.0	662
5/14/2021	Detection	0.351	4.78	6.72	4.15	8.4	36.4	688
10/26/2021	Detection	0.367	3.4	6.24	4.31	8.4	38.0	630
5/19/2022	Detection	0.394	4.40	9.29	4.17	8.6	91.5	740 L1
11/9/2022	Detection	0.407	4.94	8.81	4.09	8.4	107	780
5/22/2023	Detection	0.336	4.00	6.98	4.40	8.3	77.8	670
11/1/2023	Detection	0.365	5.95	7.72	4.14	8.3	104	730

**Table 1. Groundwater Data Summary: MW-1612
Mountaineer - LF
Appendix IV Constituents**

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
10/26/2016	Background	0.31	12.4	66.2	0.033	0.007 J1	1.63	0.367	2.765	3.02	0.391	0.018	< 0.002 U1	62.1	0.2	0.03 J1
11/2/2016	Background	0.35	16.8	80.4	0.009 J1	< 0.004 U1	0.6	0.197	0.973	3.23	0.168	0.014	0.002 J1	67.6	0.08 J1	0.087
12/21/2016	Background	0.13	14.9	62.1	0.007 J1	< 0.004 U1	0.913	0.111	0.947	3.33	0.121	0.011	0.002 J1	52.2	0.1	< 0.01 U1
2/22/2017	Background	0.31	14.4	72.4	0.058	< 0.004 U1	2.13	0.700	1.084	2.95	0.640	0.018	0.003 J1	38.5	0.1	0.04 J1
3/29/2017	Background	0.77	12.4	141	0.290	0.01 J1	3.19	2.60	0.86	3.50	1.37	0.020	0.014	45.9	0.5	0.03 J1
4/19/2017	Background	0.82	10.7	233	0.551	< 0.05 U1	15.5	3.94	0.425	3.26	4.10	0.019	0.004 J1	58.0	1.2	0.2 J1
5/16/2017	Background	0.15	10.4	77.1	0.02 J1	< 0.005 U1	0.445	0.231	2.744	2.88	0.210	0.022	< 0.002 U1	43.1	0.1	0.02 J1
6/13/2017	Background	0.15	10.7	59.6	0.006 J1	< 0.005 U1	0.227	0.101	0.824	2.98	0.023	0.028	< 0.002 U1	34.3	0.06 J1	< 0.01 U1

**Table 1. Groundwater Data Summary
Mountaineer - Landfill**

Geosyntec Consultants, Inc.

Notes:

--: Not analyzed

<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag.

In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.

J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.

In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.

L1: The associated laboratory control sample (LCS) or laboratory control sample duplicate (LCSD) recovery was outside acceptance limits.

M1: The associated matrix spike (MS) or matrix spike duplicate (MSD) recovery was outside acceptance limits.

mg/L: milligrams per liter

pCi/L: picocuries per liter

S7: Sample did not achieve constant weight.

SU: standard unit

µg/L: micrograms per liter

Groundwater Flow Velocity Calculations

**Table 2: Residence Time Calculation Summary
Mountaineer Landfill**

CCR Management Unit	Monitoring Well	Well Diameter (inches)	2023-05		2023-10	
			Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)
Landfill	MW-26 ^[2]	2.0	1.8	34.7	1.5	40.0
	MW-27 ^[2]	2.0	19.7	3.1	18.7	3.3
	MW-30 ^[1]	2.0	5.1	12.0	5.1	11.9
	MW-38 ^[2]	2.0	NC	NC	NC	NC
	MW-39 ^[2]	2.0	18.1	3.4	18.1	3.4
	MW-1611 ^[2]	2.0	11.8	5.1	10.6	5.7
	MW-1612 ^[1]	2.0	16.1	3.8	11.8	5.2

Notes:

[1] - Upgradient Well

[2] - Downgradient Well




NC - Not Calculated.

Groundwater residence time for MW-38 could not be calculated, as it is the only monitoring well for its lithologic unit (valley alluvium) within the monitoring network.

Groundwater Monitoring Network Figure

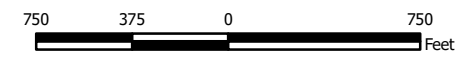


Monitoring Well Network

-  Downgradient Sampling Location
-  Background Sampling Location
-  Landfill

Notes

- Monitoring well coordinates provided by AEP.
- Site features based on information available in Little Broad Run Landfill-CCR Groundwater Monitoring Well Network Evaluation (Arcadis, 2016) provided by AEP.



**Site Layout
CCR Landfill**

AEP Mountaineer Generating Plant
Letart, West Virginia

Geosyntec
consultants

Figure

1

Columbus, Ohio

2018/01/26

Groundwater Flow Direction Maps

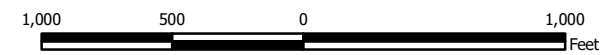


Legend

- | | |
|-----------------------------|---|
| Monitoring Wells | Groundwater Elevation Contours |
| ⊕ Alluvium | — Hydrologic Unit 3 |
| ⊕ Hydrologic Unit 3 | ➔ Approximate Groundwater Flow Direction (Unit 3) |
| ⊕ Hydrologic Unit 4 | — Hydrologic Unit 4 |
| ● MW_Locations_MTN_Landfill | ➔ Approximate Groundwater Flow Direction (Unit 4) |

Notes

1. Monitoring well coordinates and water level data (collected on May 19, 2023) provided by AEP.
2. Site features based on information available in Little Broad Run Landfill-CCR Groundwater Monitoring Well Network Evaluation (Arcadis, 2016) provided by AEP.
3. Water level measurements from MW-25 (screened in shale below Unit 4) and MW-38 (screened in alluvium) were not used in ground water contouring.
4. Groundwater elevation units are feet above mean sea level.



**Potentiometric Surface Map - Uppermost Aquifer
May 2023**

AEP Mountaineer Generating Plant - CCR Landfill
New Haven, West Virginia

Geosyntec
consultants

Figure

2

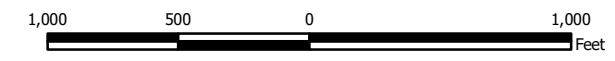
Columbus, Ohio

2023/11/29



Legend	
Monitoring Wells	Groundwater Elevation Contours
⊕ Alluvium	— Hydrologic Unit 3
⊕ Hydrologic Unit 3	- - - Hydrologic Unit 3 (Inferred)
⊕ Hydrologic Unit 4	➡ Approximate Groundwater Flow Direction (Unit 3)
	— Hydrologic Unit 4
	➡ Approximate Groundwater Flow Direction (Unit 4)

- Notes**
1. Monitoring well coordinates and water level data (collected on October 24 and 25, 2023) provided by AEP.
 2. Site features based on information available in Little Broad Run Landfill-CCR Groundwater Monitoring Well Network Evaluation (Arcadis 2016) provided by AEP.
 3. Water level measurements from MW-25 (screened in shale below Unit 4) and MW-38 (screened in alluvium) were not used in ground water contouring.
 4. Groundwater elevation units are feet above mean sea level.



Potentiometric Surface Map - Uppermost Aquifer October 2023	
AEP Mountaineer Generating Plant - CCR Landfill New Haven, West Virginia	
Geosyntec consultants	
Columbus, Ohio	2023/12/07
Figure 3	

APPENDIX 2 – Statistical Analyses

The memorandums summarizing the statistical evaluation follow.

Memorandum

Date: March 1, 2023
To: David Miller (AEP)
Copies to: Benjamin Kepchar (AEP)
From: Allison Kreinberg (Geosyntec)
Subject: Evaluation of Detection Monitoring Data at Mountaineer Plant's Landfill (LF)

In accordance with the United States Environmental Protection Agency's (USEPA's) regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (40 CFR Subpart D, "CCR rule"), the second semiannual detection monitoring event of 2022 at the Landfill (LF), an existing CCR unit at the Mountaineer Power Plant located in New Haven, West Virginia, was completed on November 9-10, 2022. Based on the results, no verification sampling was needed.

Background values for the LF were established in January 2018. After a minimum of four detection monitoring events, the results of those events were compared to the existing background dataset, and the background dataset was updated as appropriate. Revised upper prediction limits (UPLs) were calculated for each Appendix III parameter to represent background values. Lower prediction limits (LPLs) were also calculated for pH. Details on the calculation of these revised background values are described in Geosyntec's *Statistical Analysis Summary – Background Update Calculations* report, dated August 26, 2022.

To achieve an acceptably high statistical power while maintaining a site-wide false-positive rate (SWFPR) of 10% per year or less, prediction limits were calculated based on a one-of-two retesting procedure. With this procedure, a statistically significant increase (SSI) is only concluded if both samples in a series of two exceeds the UPL or, in the case of pH, are below the LPL. In practice, if the initial result did not exceed the UPL and, in the case of pH, is above the LPL, a second sample was not collected or analyzed.

Detection monitoring results and the relevant background values are compared in Table 1. No SSIs were observed at the Mountaineer LF CCR unit, and as a result the Mountaineer LF will remain in detection monitoring.

Evaluation of Detection Monitoring Data – Mountaineer LF
March 1, 2023
Page 2

The statistical analysis was conducted within 90 days of completion of sampling and analysis in accordance with 40 CFR 257.93(h)(2). A certification of these statistics by a qualified professional engineer is provided in Attachment A.

**Table 1: Detection Monitoring Data Comparison
Mountaineer - Landfill**

Geosyntec Consultants, Inc.

Analyte	Unit	Description	MW-26	MW-27	MW-38	MW-39	MW-1611
			11/10/2022	11/10/2022	11/9/2022	11/9/2022	11/9/2022
Boron	mg/L	Intrawell Background Value (UPL)	0.233	0.376	0.0935	0.198	0.233
		Analytical Result	0.103	0.296	0.027	0.144	0.134
Calcium	mg/L	Intrawell Background Value (UPL)	64.7	1.77	57.6	12.4	26.2
		Analytical Result	58.5	1.24	45.4	7.60	26.1
Chloride	mg/L	Intrawell Background Value (UPL)	7.09	1.85	7.76	3.13	10.6
		Analytical Result	5.69	1.57	6.85	2.92	9.89
Fluoride	mg/L	Interwell Background Value (UPL)	4.33				
		Analytical Result	0.13	2.54	0.33	0.78	0.58
pH	SU	Intrawell Background Value (UPL)	7.8	9.5	7.6	8.8	8.0
		Intrawell Background Value (LPL)	7.0	8.6	6.5	7.8	7.2
		Analytical Result	7.2	8.9	6.9	8.2	7.6
Sulfate	mg/L	Intrawell Background Value (UPL)	10.8	7.48	37.9	0.200	23.4
		Analytical Result	6.58	2.18	33.4	0.06	20.8
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	399	618	464	434	446
		Analytical Result	370	550	380	370	420

Notes:

UPL: Upper prediction limit

LPL: Lower prediction limit

Bold values exceed the background value.

Background values are shaded gray.

ATTACHMENT A

Certification by a Qualified Professional Engineer

CERTIFICATION BY QUALIFIED PROFESSIONAL ENGINEER

I certify that the selected statistical method, described above and in the August 26, 2022 *Statistical Analysis Summary* report, is appropriate for evaluating the groundwater monitoring data for the Mountaineer LF CCR management area and that the requirements of 40 CFR 257.93(f) have been met.

David Anthony Miller

Printed Name of Licensed Professional Engineer

David Anthony Miller

Signature



22663

License Number

West Virginia

Licensing State

03.02.23

Date

Memorandum

Date: July 21, 2023

To: David Miller (AEP)

Copies to: Jill Parker-Witt (AEP)

From: Allison Kreinberg (Geosyntec)

Subject: Evaluation of Detection Monitoring Data at Mountaineer Plant's Landfill (LF)

In accordance with the United States Environmental Protection Agency's (USEPA's) regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (40 CFR Subpart D, "CCR rule"), the first semiannual detection monitoring event of 2023 at the Landfill, an existing CCR unit at the Mountaineer Power Plant located in New Haven, West Virginia, was completed on May 22-25, 2023.

Background values for the Landfill were established in January 2018. After a minimum of four detection monitoring events, the results of those events were compared to the existing background dataset, and the background data set was updated as appropriate. Revised upper prediction limits (UPLs) were calculated for each Appendix III parameter to represent background values. Lower prediction limits (LPLs) were also calculated for pH. Details on the calculation of these revised background values are described in Geosyntec's *Statistical Analysis Summary – Background Update Calculations* report, dated August 26, 2022.

To achieve an acceptably high statistical power while maintaining a site-wide false-positive rate of 10% per year or less, prediction limits were calculated based on a one-of-two retesting procedure. With this procedure, a statistically significant increase (SSI) is only concluded if both samples in a series of two exceeds the UPL or, in the case of pH, are below the LPL. In practice, if the initial result did not exceed the UPL and, in the case of pH, is above the LPL, a second sample was not collected or analyzed.

Detection monitoring results and the relevant background values are compared in Table 1. No SSIs were observed at the Mountaineer Landfill CCR unit, and as a result the Mountaineer Landfill will remain in detection monitoring.

Evaluation of Detection Monitoring Data – Mountaineer LF
July 21, 2023
Page 2

The statistical analysis was conducted within 90 days of completion of sampling and analysis in accordance with 40 CFR 257.93(h)(2). A certification of these statistics by a qualified professional engineer is provided in Attachment A.

**Table 1. Detection Monitoring Data Comparison
Detection Summary Memorandum
Mountaineer Power Plant, Landfill**

Analyte	Unit	Description	MW-26	MW-27	MW-38	MW-39	MW-1611
			5/23/2023	5/23/2023	5/22/2023	5/25/2023	5/25/2023
Boron	mg/L	Intrawell Background Value (UPL)	0.233	0.376	0.0935	0.198	0.233
		Analytical Result	0.090	0.272	0.023	0.134	0.119
Calcium	mg/L	Intrawell Background Value (UPL)	64.7	1.77	57.6	12.4	26.2
		Analytical Result	57.1	1.18	42.2	7.07	25.3
Chloride	mg/L	Intrawell Background Value (UPL)	7.09	1.85	7.76	3.13	10.6
		Analytical Result	6.05	1.48	7.3	3.03	9.91
Fluoride	mg/L	Interwell Background Value (UPL)	4.33				
		Analytical Result	0.12	2.58	0.36	0.86	0.57
pH	SU	Intrawell Background Value (UPL)	7.8	9.5	7.6	8.8	8.0
		Intrawell Background Value (LPL)	7.0	8.6	6.5	7.8	7.2
		Analytical Result	7.2	8.8	6.9	8.0	7.6
Sulfate	mg/L	Intrawell Background Value (UPL)	10.8	7.48	37.9	0.200	23.4
		Analytical Result	8.1	3	27.5	0.2	22.4
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	399	618	464	434	446
		Analytical Result	370	550	430	360	390

Notes:

Background values are shaded gray.

Bold values exceed the background value.

LPL: lower prediction limit

mg/L: milligrams per liter

SU: standard units

UPL: upper prediction limit

ATTACHMENT A

Certification by a Qualified Professional Engineer

CERTIFICATION BY QUALIFIED PROFESSIONAL ENGINEER

I certify that the selected statistical method, described above and in the August 26, 2022 *Statistical Analysis Summary* report, is appropriate for evaluating the groundwater monitoring data for the Mountaineer LF CCR management area and that the requirements of 40 CFR 257.93(f) have been met.

David Anthony Miller

Printed Name of Licensed Professional Engineer

David Anthony Miller

Signature



22663

License Number

West Virginia

Licensing State

08.10.2023

Date

APPENDIX 3 – Alternative Source Demonstrations

No alternative source demonstrations were necessary in 2023.

APPENDIX 4 - Notices for Monitoring Program Transitions

Not applicable at this time.

APPENDIX 5 - Well Installation/Decommissioning Logs

Not applicable at this time.