2022 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

FEDERAL CCR RULE

WESTLAND ASH MANAGEMENT FACILITY CELL B, DICKERSON, MARYLAND

GenOn MD Ash Management LLC
25100 Chalk Point Road
Aquasco, Maryland 20608

January 2023

Prepared by:

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EXECUTIVE SUMMARY

This Groundwater Monitoring and Corrective Action Report (Report) has been prepared by Geosyntec Consultants, Inc. (Geosyntec) on behalf of GenOn MD Ash Management LLC (MD Ash) to summarize the groundwater monitoring activities conducted at Cell B at the Westland Ash Management Facility (Site) in Dickerson, Maryland pursuant to the Coal Combustion Residuals (CCR) Rule (40 Code of Federal Regulations [CFR] § 257.90(e)) through 31 December 2022. This executive summary has been included to meet the requirements of 40 CFR § 257.90(e)(6).

In the first quarter and the third quarter of 2022, the Cell B CCR unit was monitored under an assessment monitoring program in accordance with 40 CFR § 257.95. The assessment monitoring program was initiated in January 2018. Two semi-annual groundwater monitoring events (February and August) were completed during 2022 to assess which, if any, constituents listed within Appendix III of 40 CFR Part 257 were detected at concentrations which were statistically significant increases (SSIs) over background concentrations. Statistically significant level (SSL) tests were also completed for Appendix IV constituents during 2022.

During 2022, SSIs above background concentrations were detected for the following Appendix III constituents:

- Boron at Core-2S, D-6R, MW-03, MW-09, MW-10S, MW-12, MW-13, and MW-24S
- Calcium at Core-2S, D-6R, MW-03, MW-09, MW-10S, MW-12, MW-13, and MW-24S
- Chloride at Core-2S, D-6R, MW-03, MW-09, MW-10S, MW-12, MW-24D, and MW-24S
- Fluoride at MW-24S
- pH at MW-03 and MW-24S
- Sulfate at Core-2S, D-6R, MW-03, MW-09, MW-10S, MW-12, MW-13, MW-24D, and MW-24S
- Total Dissolved Solids at Core-2S, D-6R, MW-03, MW-09, MW-10S, and MW-12, MW-24D, and MW-24S

During 2022, SSLs above groundwater protection standards (GWPS) were detected for the following Appendix IV constituents:

- Lithium at D-6R, MW-03, and MW-12
- Molybdenum at MW-03 and MW-12
- Selenium at D-6R, MW-09, MW-10S, and MW-12

An Assessment of Corrective Measures (ACM) was initiated at the Site on 3 December 2018 and completed in March 2019. There has been no public meeting held for the ACM and a remedy has not been selected. Corrective measures progress reports were posted to the public internet site in March 2022 and November 2022 and will continue to be posted until remedy selection and design are complete. The ACM identified a preferred remedy consisting of: (i) removal of ash for beneficial reuse, (ii) maintaining the geomembrane cap on the inactive side slopes of Cell B during

EXECUTIVE SUMMARY (CONTINUED)

ash removal, and (iii) continued groundwater monitoring. Plans for deconstruction were submitted to Maryland Department of the Environment (MDE) in April, May, and June 2019 and November 2022. These plans were approved by MDE in September 2019, October 2020, and December 2022. Ash removal from Cell B-1A was initiated in June 2019 and from Cell B in January 2020 and will continue during 2023. The Site will continue assessment monitoring in 2023.

1. INTRODUCTION

The Federal Coal Combustion Residuals (CCR) Rule (40 Code of Federal Regulations [CFR] § 257.90(e)) (USEPA, 2015) requires owners and/or operators of existing CCR landfills to prepare a Groundwater Monitoring and Corrective Action Report (Report) and post it to the unit's operating record no later than 31 January 2023. Geosyntec Consultants (Geosyntec) has prepared this Report for the Cell B CCR landfill unit at the Westland Ash Management Facility in Dickerson, Maryland (Site). This Report summarizes the groundwater monitoring activities conducted pursuant to the CCR Rule through 31 December 2022.

2. SITE DESCRIPTION

2.1 Site Description

The Site is located in Dickerson, Montgomery County, Maryland (**Figure 1**) and is operated by GenOn MD Ash Management LLC (MD Ash). The Site is a dry ash management operation and does not have CCR surface impoundments (SI) as defined in the CCR Rule. The Site encompasses 180 acres of which approximately 64.4 acres have been used to manage CCR at the Cell B landfill. Cell C is located downgradient of Cell B, is inactive and is not regulated by the Federal CCR Rule. Cell B-1A/B has a geosynthetic liner and a leachate collection system. The unlined portion of Cell B has an underdrain system designed to collect contact stormwater and leachate and convey it to the on-site Wastewater Treatment System (WWTS) for treatment and then impoundment in Pond 003. Pond 003 stores the treated leachate prior to discharge through a National Pollutant Discharge Elimination System (NPDES) outfall. Non-contact storm water runoff is directed to either Pond 002 or towards Big Stream.

Ponds 002 and 003, which are used to manage storm water and leachate (not ash), respectively, are also exempt from the Federal CCR Rule. Features of the Site and their locations are presented on **Figure 2**.

2.2 Regional Physiographic Setting

The Site is located in the Culpepper Basin portion of the Piedmont province of Maryland and was previously used for agricultural purposes. Fractured sandstones and siltstones of the Poolesville Member of the Manassas Sandstone (referred to as the New Oxford Formation by others), with interbedded shale layers, form the upper aquifer at the Site. The overlying saprolite soils are unsaturated. Bedrock bedding planes strike north-south and dip 10-20 degrees to the west.

The groundwater table in the upper aquifer generally follows topography and flows along bedding planes toward the west but is locally influenced by Big Stream to the south and flows along bedrock strike. The hydraulic conductivity of the more fractured interbedded thin shale layers is greater than that of the massive sandstones that comprise most of the bedrock stratigraphic

sequence. Therefore, CCR constituent migration in groundwater is predominately along the shale horizons. Groundwater monitoring wells are screened in the shale layers.

3. GROUNDWATER MONITORING SYSTEM

As described in the *Basis for Groundwater Monitoring Network* (Geosyntec, 2017a), the groundwater monitoring network around Cell B was designed to comply with 40 CFR 257.91.

Groundwater quality is monitored around Cell B through a network of twelve monitoring wells. As shown on **Figure 2**, there are three upgradient monitoring wells (D-2, D-3 and D-4) that are used to measure background conditions and seven downgradient monitoring wells (MW-03, MW-09, MW-10S, MW-12, MW-13, D-6R, and Core-2S) that are used as compliance wells. The nature and extent of contamination is currently being investigated at two offsite monitoring wells (MW-24D and MW-24S).

Federal CCR Rule compliance and background monitoring wells at the Site are designed to monitor the upper aquifer conditions. Monitoring well construction and soil boring logs were provided in Geosyntec (2017a). Compliance and background monitoring well construction details are summarized in **Table 1**.

At the request of the Maryland Department of the Environment (MDE), a piezometer (PZ-Cell B) was installed in Cell B to evaluate the potential presence of groundwater in the central part of the ash of Cell B. MW-16 and MW-17 were previously installed for that purpose in 2016 in another portion of Cell B. In August 2021, a soil boring was advanced through the ash and to the top of bedrock. The presence of groundwater was not observed in the recovered soil cores. A piezometer was installed in the soil boring and gauged weekly for one month to monitor for the potential presence of groundwater. After one month of gauging, the results were provided to the MDE. On 30 November 2021, the MDE responded to the results and stated there was no evidence of groundwater in the ash at Cell B. PZ-Cell B was abandoned on 10 February 2022 following MDE approval on 28 January 2022.

Since SSI were detected at monitoring wells D-6R and MW-12, two new monitoring wells (MW-24S and MW-24D) were installed downgradient of Cell B in August and September 2021. The two new monitoring wells were installed off-site and as close to the property boundary as possible. Monitoring wells MW-24S and MW-24D were installed in the uppermost aquifer and in accordance with 40 CFR 257.95.(g)(1)(i) were incorporated into the monitoring program in 2022. The location of monitoring wells MW-24D and MW-24S is shown in **Figure 2,** construction details are provided on **Table 1,** and boring logs and well constructions forms are included in **Appendix B**.

4. CCR RULE GROUNDWATER MONITORING COMPLETED – 2022

4.1 Groundwater Monitoring

The baseline monitoring program was completed in September 2017 and the Site transitioned to detection monitoring in October 2017. Assessment monitoring began in February 2018. Groundwater monitoring continued in 2022 and was conducted in accordance with the *Sampling and Analysis Plan* (SAP) provided in Geosyntec (2018). Assessment monitoring is performed on a semi-annual basis during the first and third quarters. Two additional wells (MW-24D and MW-24S) were installed in September 2021 to monitoring the potential presence of CCR constituents migrating offsite. Baseline monitoring began at MW-24S in the first quarter 2022 and at MW-24D in the third quarter 2022. **Table 2** and **Table 3** summarize the history of baseline, detection, and assessment monitoring events through 2022.

4.1.1 Detection Monitoring Program

In October 2017, the first detection monitoring program samples were collected. In accordance with 40 CFR § 257.94(a) of the CCR Rule, samples were analyzed for Appendix III list parameters only. Groundwater elevation data and analytical results for Appendix III constituents in background and compliance wells are presented in the *2017 Annual Groundwater Monitoring and Corrective Action Report* (Geosyntec, 2018a). Detection monitoring did not take place during 2022 but Appendix III parameters were monitored at all wells and evaluated for potential SSIs as part of the assessment monitoring program. Analytical data for Appendix III constituents in background and compliance wells are summarized on **Table 5** and **Table 6**, respectively.

4.1.2 Assessment Monitoring Program

An assessment monitoring program was triggered at the Site in January 2018 when statistically significant increases (SSIs) were detected in the monitoring results from the October 2017 groundwater detection monitoring event. In February 2018, in accordance with 40 CFR § 257.95(a) of the CCR Rule, samples were analyzed for all Appendix III and IV list parameters. Resampling for the Appendix IV constituents detected in the February 2018 assessment monitoring event was conducted in May 2018. Assessment monitoring events have been completed semi-annually since May 2018. The tenth and eleventh semi-annual assessment monitoring events were completed in February and August 2022, respectively. Analytical data for Appendix IV constituents in background and compliance monitoring wells are summarized in **Table 7** and **Table 8**, respectively. The Site remains in assessment monitoring.

4.1.3 Groundwater Elevation and Flow Velocities

Groundwater elevation monitoring was conducted in February and August 2022. A synoptic round of water level measurements was made at the start of each monitoring event. Groundwater elevation measurements were collected in accordance with the SAP at CCR Rule monitoring wells

as well as other monitoring wells and piezometers at both Cell B and Cell C. Potentiometric surface maps based on the elevations measured during the February and August 2022 monitoring events are presented on **Figure 3** and **Figure 4**, respectively. Groundwater elevation data are summarized in **Table 4**. As shown on **Figure 3** and **Figure 4**, groundwater around Cell B flows from northeast to southwest. The groundwater elevations and flow directions are very stable across the multiple monitoring events.

The average hydraulic gradient around Cell B ranges from 0.042 ft/ft between monitoring wells D-2 and MW-09 to 0.026 ft/ft between monitoring wells D-2 and MW-03. The groundwater flow velocity calculation is provided in **Appendix A** (Geosyntec, 2019) assuming equivalent Darcy flow, although fracture flow is dominant in the bedrock. **Table A-2** shows the calculated Darcy-equivalent groundwater flow velocities at the Site ranged from 1.81 X 10^{-5} centimeters per second (cm/sec) (18.8 inches/month; 18.8 feet/year) between monitoring wells D-2 and MW-03 to 3.85 X 10^{-6} cm/sec (3.99 inches/month; 3.99 feet/year) between monitoring wells D-2 and MW-13.

4.2 Data Usability

Upon receipt of laboratory analytical reports, the data were evaluated for usability. Analytical data were checked for the following:

- Samples were analyzed within the method-specified hold times;
- Samples were received within holding temperature;
- The chain of custody was complete;
- Precision was within SAP control limits using relative percent differences of blind duplicate samples;
- Matrix spike and matrix spike duplicate recoveries and laboratory control samples were within the SAP control limits; and
- Potential for positive bias was evaluated using method blanks concentrations.

Upon completion of the data usability assessment the data were qualified as needed and added to the data tables. Beryllium, cadmium, and chromium data at MW-13 were rejected due to matrix spike and matrix spike duplicate recoveries that were less than 30%. Those constituents have not had SSIs nor SSLs in prior monitoring events. Therefore, the loss of these three pieces of data were not considered to be consequential to the overall monitoring program. All other data received were considered complete and usable.

5. DETECTION MONITORING STATISTICS

In accordance with 40 CFR § 257.94(e), detection monitoring statistics were used to evaluate groundwater concentrations of Appendix III parameters collected during the February and August 2022 monitoring events.

5.1 Statistically Significant Increases Comparison Test

The baseline monitoring data collected from the three background wells (D-2, D-3, and D-4) between 2015 and 2017 were previously used to select statistical methods for calculating the range of background concentrations for Appendix III constituents. These data are discussed and presented in Geosyntec (2018b). The resulting background concentrations are summarized in **Table 6** based upon upper prediction limit (UPL) methods. The calculations are documented and certified by a P.E. as being appropriate for the background data set in Geosyntec (2017b).

In 2022, at least one Appendix III constituent (except for fluoride) had an SSIs above background groundwater concentrations at each of the seven compliance monitoring wells. MW-03 was the only compliance well to have an SSI detected for pH in 2022 and none of the compliance wells had an SSI for fluoride. **Table 6** provides a comparison of the Appendix III detection monitoring results to the calculated background concentrations. In January 2018, the calculated background concentrations were compared to the results of the detection monitoring event in October 2017. The comparison of those data to the calculated background concentrations resulted in SSIs over background and triggered the initiation of an assessment monitoring program.

6. ASSESSMENT MONITORING STATISTICS

In accordance with 40 CFR § 257.95(g) assessment monitoring statistics were used to evaluate if concentrations of Appendix IV constituents in Cell B compliance wells were SSLs above their respective GWPS.

6.1 Statistically Significant Levels Test

The baseline and assessment monitoring data collected from the background wells were used to calculate background concentration limits for detected Appendix IV constituents using the Upper Tolerance Limit (UTL) method. Groundwater protection standards (GWPS) were established for each detected Appendix IV constituent as the greater of background or (i) the maximum contaminant level (MCL) or (ii) the EPA Regional Screening Level for cobalt, lead, lithium, and molybdenum that do not have MCLs. The baseline and assessment monitoring data collected from the compliance wells between 2015 and 2022 were used to calculate the 95% lower confidence limit (LCL) of the mean concentration for each well for each Appendix IV constituent that exceeded the GWPS in one or more samples. Those LCL concentrations were then compared to the GWPS for each Appendix IV constituent.

Table 9 summarizes the SSLs of Appendix IV parameters detected during the February and August 2022 assessment monitoring events. The data indicate SSLs for lithium, molybdenum, and/or selenium at five of seven Cell B compliance wells.

6.2 Assessment of Corrective Measures

The comparison of those LCLs and the GWPS resulted in statistically significant levels (SSLs) on September 4, 2018 and triggered an Assessment of Corrective Measures (ACM). In accordance with 40 CFR 257.96(a), an ACM was initiated at the Site on 3 December 2018, as required by the Federal CCR Rule when SSLs of Appendix IV constituents are detected above their respective GWPS. The assessment monitoring program continued during the ACM. The ACM report was completed during March 2019.

7. PROBLEMS ENCOUNTERED AND RESOLUTIONS

The August 2022 results for beryllium, cadmium, and chromium at MW-13 were rejected. Therefore, prior results for these constituents at MW-13 were reviewed and it was found that there were no prior SSIs nor SSLs. Therefore, the loss of these three pieces of data were not considered to be consequential to the overall monitoring program.

Due to difficulties with the previous analytical laboratory, a new analytical laboratory was retained. The reporting limits for some constituents are higher at the new laboratory but are below the GWPS, and, therefore, the higher limits are not considered to be consequential to the overall monitoring program.

The two new off-site monitoring wells, MW-24S and MW-24D, have higher pH values compared to landfill leachate collected and treated at the Site and the other Site wells and might be affected by grout contamination during well construction. These wells have been redeveloped and sampled several times, but the higher pH condition persists. The higher pH might also result in unrepresentative concentrations of some constituents in samples from these wells, particularly arsenic. A resolution to this condition is currently being evaluated.

8. STATUS OF MONITORING PROGRAM

As of 31 December 2022, the Site is undergoing assessment monitoring and an Assessment of Corrective Measures has been completed to address SSLs of Appendix IV constituents detected in groundwater.

9. PLANNED KEY ACTIVITIES FOR 2023

January 2023: The 2022 Annual Groundwater Monitoring and Corrective Action Report will be entered into the facility's operating record and notification will be sent to the Maryland Department of Environment (MDE)**.**

February 2023: Collection of first semi-annual assessment monitoring groundwater samples.

March 2023: The 2022 Annual Groundwater Monitoring and Corrective Action Report will be posted to the public internet site. A Semi-Annual Corrective Measures Progress Report documenting progress of selecting and designing the remedy for the SSLs above the GWPSs associated with the Site will be prepared and submitted.

May/June 2023: SSI and SSL testing of the February 2023 assessment monitoring samples.

August 2023: Collection of second semi-annual assessment monitoring groundwater samples.

November 2023: A Semi-Annual Corrective Measures Progress Report documenting progress of selecting and designing the remedy for the SSLs above the GWPSs associated with the Site will be prepared and submitted.

December 2023: SSI and SSL testing of the August 2023 assessment monitoring samples.

December 2023: Preparation of the 2023 Annual Groundwater Monitoring and Corrective Action Report will begin.

Ash removal will continue through 2023 per the MDE approved deconstruction plans.

10. RECOMMENDATIONS

The Site should continue assessment monitoring in 2023.

11. REFERENCES

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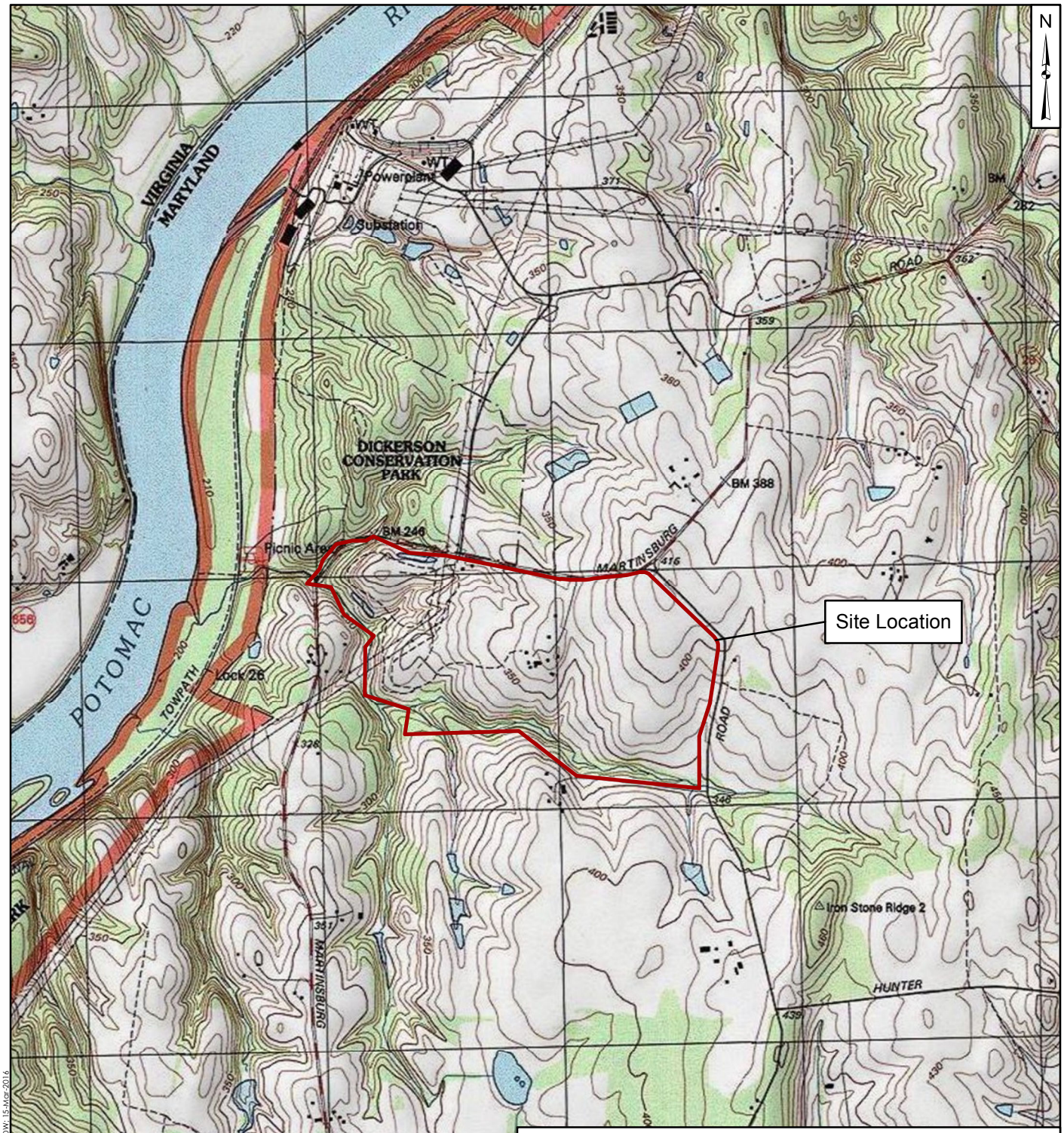
FIGURES



Site Location Map

Westland Ash Management Facility
Dickerson, Maryland

Source:
USGS Topographic Quadrangle - Dickerson, Maryland, provided by the National Geographic Society, i-cubed. © 2011 National Geographic Society, i-cubed

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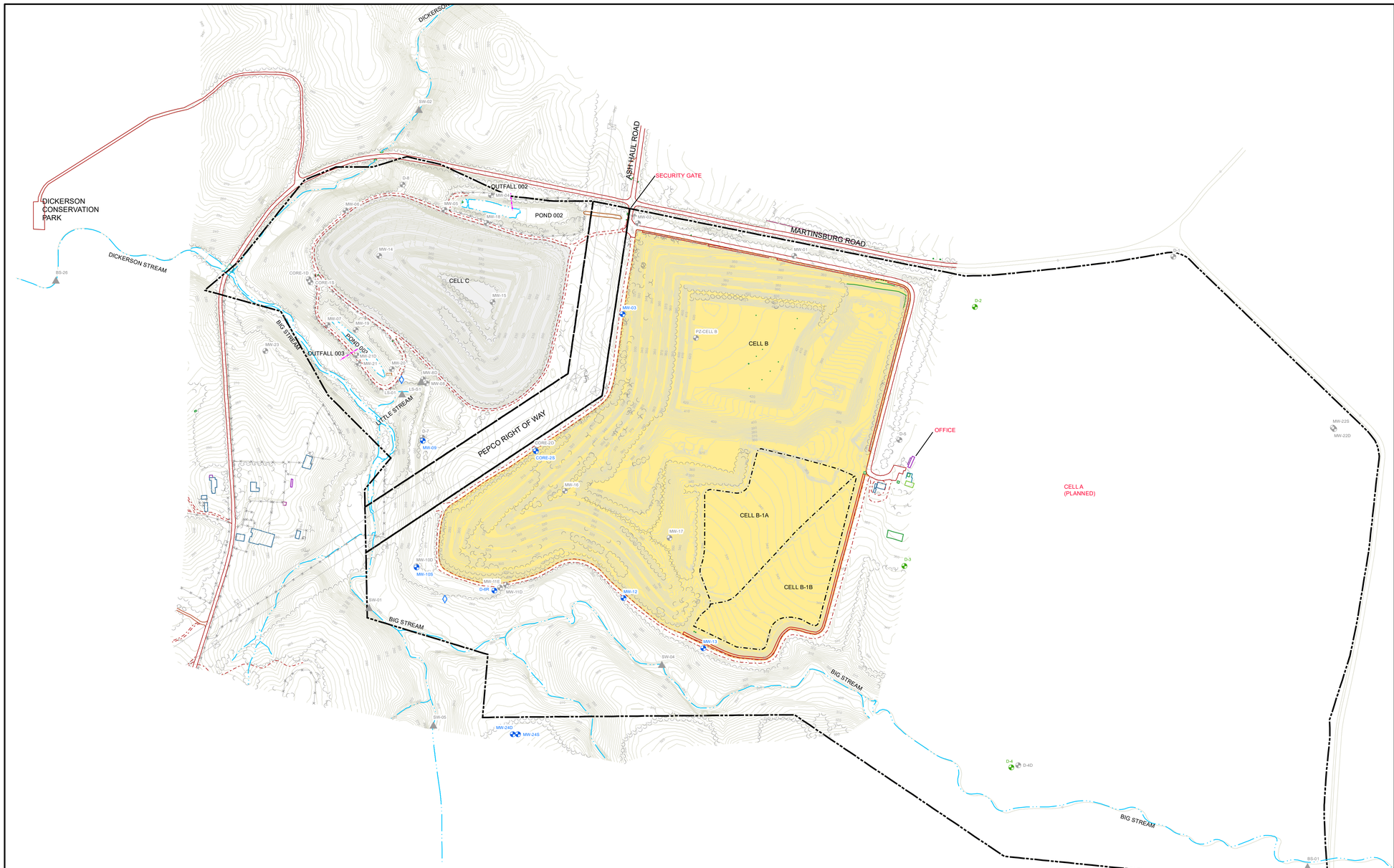
Columbia, Maryland | January 2023

Figure 1

Path: P:\GIS\NRG\GenOn\Maps\Westland\Figure 1-1 WestlandTopo.mxd: mw/RDW: 15-Mar-2016



Legend

- MONITORING WELL USED FOR WATER LEVELS ONLY
- SURFACE WATER STATION USED FOR WATER LEVELS ONLY
- BACKGROUND MONITORING WELL
- COMPLIANCE OR NATURE/EXTENT MONITORING WELL
- NON-CONTACT STORMWATER OUTLET
- PROPERTY BOUNDARY
- NPDES OUTFALL
- WET AREA
- APPROXIMATE CELL LIMIT
- GRADE CONTOUR (FEET, MSL)
- PAVED / UNPAVED ROAD
- UNPAVED ROAD
- TREE LINE
- WATER / CHANNEL LINE
- CCB MANAGEMENT UNITS NOT REGULATED UNDER THE CCR RULE (APPROXIMATE LIMITS)
- CCB MANAGEMENT UNIT REGULATED BY THE CCR RULE (APPROXIMATE LIMITS)

NOTES:
1. EXISTING CONDITIONS COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 28 DECEMBER 2013 EXCEPT AS FOLLOWS.
2. HORIZONTAL CONTROL IS MARYLAND STATE PLANE COORDINATE SYSTEM, NAD83; VERTICAL CONTROL IS NGVD29.

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GenOn

TITLE: SITE FEATURES AND GROUNDWATER MONITORING WELL NETWORK

PROJECT: 2022 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT / FEDERAL CCR RULE

SITE: WESTLAND ASH MANAGEMENT FACILITY, CELL B
DICKERSON, MARYLAND

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DATE

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REVIEWED BY:	MB	FIGURE NO.:	2
APPROVED BY:	RMG		

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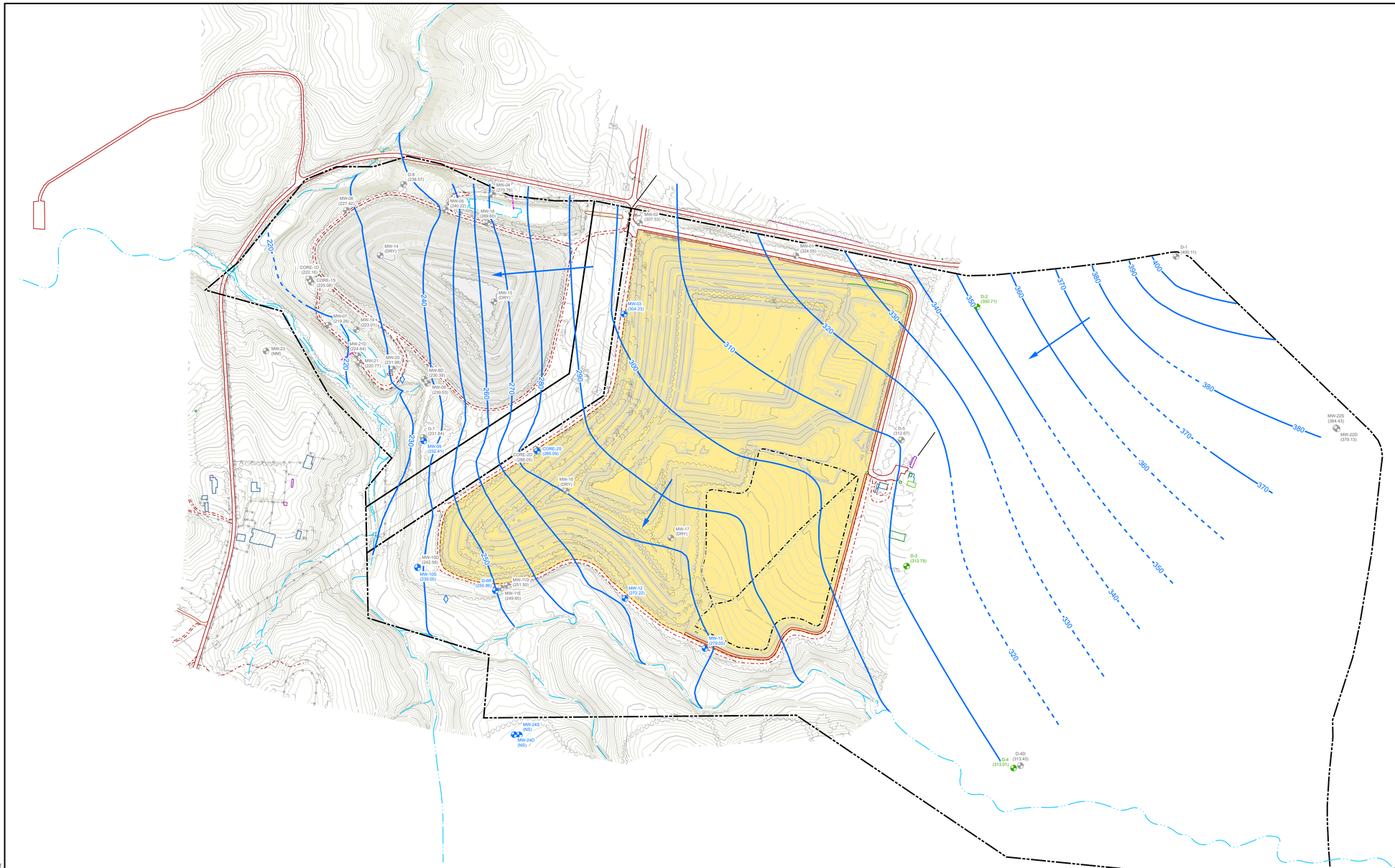

Legend

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- BACKGROUND MONITORING WELL
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- NON-CONTACT STORMWATER OUTLET POTENTIOMETRIC
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(384.43) MEASURED GROUNDWATER ELEVATION (FEET-MSL) (NOTE 2)
(379.13) MEASURED GROUNDWATER ELEVATION (FEET-MSL) (NOTE 3)
NM NOT MEASURED
DRY MONITORING WELL DRY AT TIME OF MEASUREMENT
NS NOT SURVEYED (SEE NOTE 4)

NOTES:
1. SEE FIGURE 2 FOR GENERAL NOTES.

2. POTENTIOMETRIC SURFACE DATA COLLECTED BY GEOSYNTEC CONSULTANTS ON 2 FEBRUARY 2022. MEASURED ELEVATION PROVIDED ADJACENT TO EACH MONITORING WELL ID IN FEET-MEAN SEA LEVEL.

3. MEASURED ELEVATION OF GROUNDWATER IN THIS DEEP WELL WAS NOT USED TO DEVELOP THE POTENTIOMETRIC SURFACE.

4. TOP OF CASING ELEVATIONS FOR MONITORING WELLS MW-24S/D HAVE NOT BEEN SURVEYED.

5. MONITORING WELL MW-23 IS LOCATED ON PRIVATE PROPERTY AND MD ASH NO LONGER HAS ACCESS TO THE PROPERTY.

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SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP

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TITLE: GROUNDWATER POTENTIOMETRIC SURFACE - FEBRUARY 2022

PROJECT: 2022 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT / FEDERAL CCR RULE

SITE: WESTLAND ASH MANAGEMENT FACILITY, CELL B DICKERSON, MARYLAND

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REVIEWED BY:	MB	FIGURE NO.:	3
APPROVED BY:	RMG		

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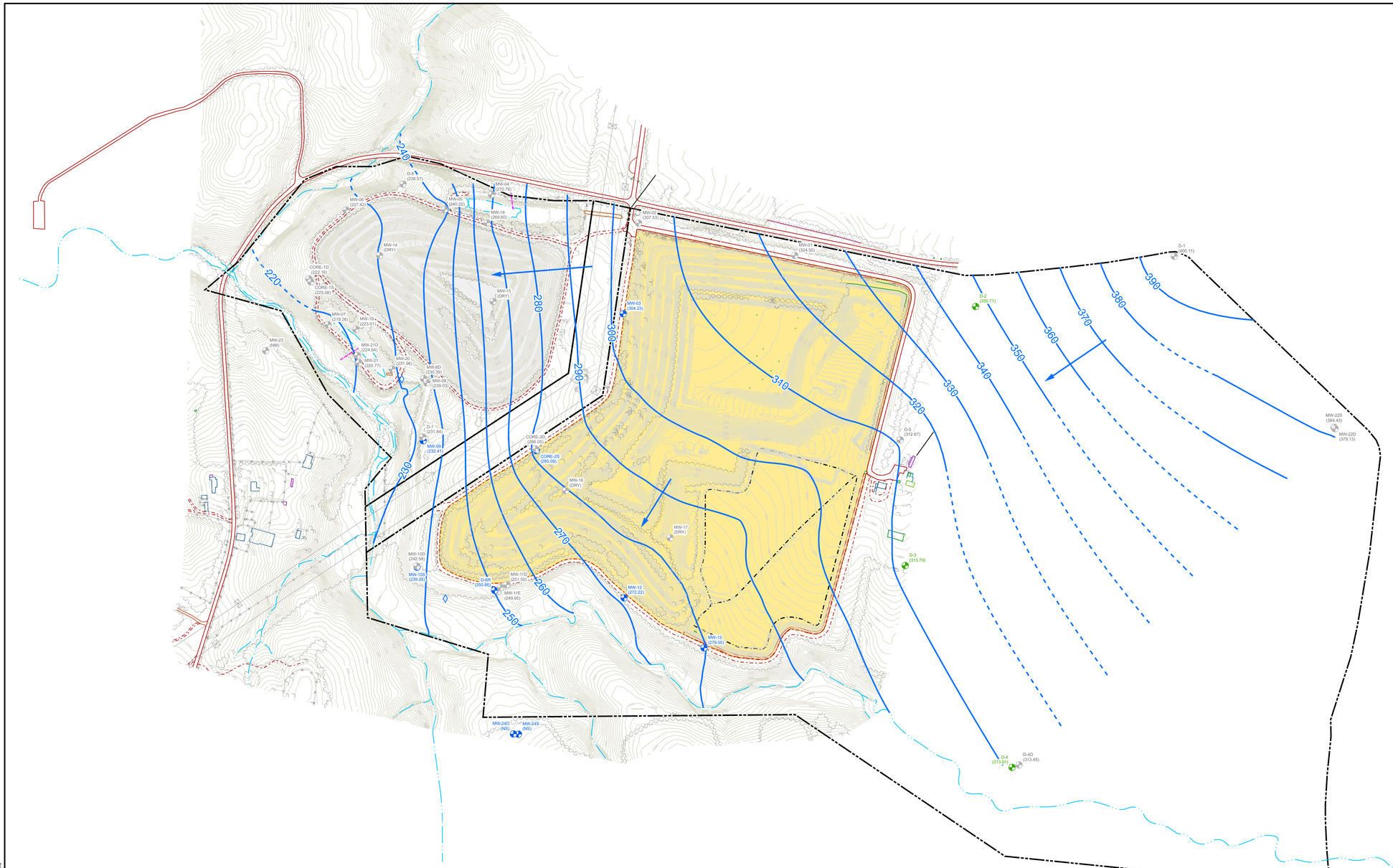

Legend

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2. POTENTIOMETRIC SURFACE DATA COLLECTED BY GEOSYNTEC CONSULTANTS ON 1 AUGUST 2022. MEASURED ELEVATION PROVIDED ADJACENT TO EACH MONITORING WELL ID IN FEET-MEAN SEA LEVEL.

3. MEASURED ELEVATION OF GROUNDWATER IN THIS DEEP WELL WAS NOT USED TO DEVELOP THE POTENTIOMETRIC SURFACE.

4. TOP OF CASING ELEVATIONS FOR MONITORING WELLS MW-24S/D HAVE NOT BEEN SURVEYED.

5. MONITORING WELL MW-23 IS LOCATED ON PRIVATE PROPERTY AND MD ASH NO LONGER HAS ACCESS TO THE PROPERTY.

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TITLE: GROUNDWATER POTENTIOMETRIC SURFACE - AUGUST 2022

PROJECT: 2022 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT / FEDERAL CCR RULE

SITE: WESTLAND ASH MANAGEMENT FACILITY, CELL B DICKERSON, MARYLAND

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DESIGN BY:	BNM	DATE:	JANUARY 2023
DRAWN BY:	BNM	PROJECT NO.:	MEM08231
CHECKED BY:	TW	FILE	WL_Potentiometric_Figures
REVIEWED BY:	MB	FIGURE NO.:	4
APPROVED BY:	RMG		

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TABLES

TABLE 1
WELL CONSTRUCTION DETAILS

FEDERAL CCR RULE - 2022 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
Westland Ash Management Facility, Cell B - MD

Well ID	Purpose	Permit Number	Installation Date	Northing (feet) Maryland State Plane 1900 NAD 1983	Easting (feet) Maryland State Plane 1900 NAD 1983	Ground Surface Elevation (ft msl)	Top of Casing Elevation (ft msl)	Inner Casing Diameter (inches)	Top of Sand Pack (ft bgs)	Screen Interval (ft bgs)	Screen Length (feet)	Screen Slot Size (inch)
CORE-2S	Compliance	MO-15-0119	6/30/2015	555694.88	1181659.23	298.07	300.82	2	33.0	35-45	10	0.010
D-2	Background	Unknown	6/1981	556397.52	1183798.46	358.37	366.03	4	32.0	110-120	10	0.010
D-3	Background	Unknown	6/1981	555135.30	1183455.78	359.32 [1]	361.82	4	40.0	86-96	10	0.010
D-4	Background	Unknown	6/1981	554151.88	1183976.22	335.41 [1]	337.91	4	Unknown	125-135	10	0.010
D-6R	Compliance	Unknown	6/2002	555014.92	1181455.87	277.90	281.075	4	51.0	55-70	15	Unknown
MW-03	Compliance	MO-15-0078	7/2/2015	556361.94	1182081.25	309.96	312.48	2	48.0	50-60	10	0.010
MW-09	Compliance	MO-15-0084	8/4/2015	555744.29	1181107.48	271.00	273.9	2	58.0	60-70	10	0.010
MW-10S	Compliance	MO-15-0100	6/29/2015	555127.15	1181077.31	268.29	271.03	2	36	38-48	10	0.010
MW-12	Compliance	MO-15-0106	8/6/2015	554978.07	1182086.13	293.26	296.11	2	32.0	34-44	10	0.010
MW-13	Compliance	MO-15-0107	8/7/2015	554733.88	1182475.50	308.02	310.77	2	48.0	50-60	10	0.010
MW-24D	Nature/Extent	MO-20-0014	9/21/2021	NS	NS	NS	NS	2	231.0	234-249	15	0.010
MW-24S	Nature/Extent	MO-20-0015	9/27/2021	NS	NS	NS	NS	2	111.0	114-124	10	0.010

Notes:

ft msl feet above mean sea level
ft bgs feet below ground surface
NS Not Surveyed
[1] Elevation is an estimated value

TABLE 2
SUMMARY OF BASELINE MONITORING EVENTS

FEDERAL CCR RULE - 2022 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
Westland Ash Management Facility, Cell B - MD

Monitoring Program:	Baseline Monitoring																				
Monitoring Event:	3Q 2015			4Q 2015			1Q 2016			2Q 2016			3Q 2016			4Q 2016			1Q 2017		
Sample Date: / Well ID	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17
Background Wells																					
D-2			III,IV			III,IV		III,IV		III,IV				III,IV		III,IV			III,IV		
D-3			III,IV			III,IV		III,IV		III,IV				III,IV		III,IV			III,IV		
D-4			III,IV			III,IV		III,IV		III,IV				III,IV		III,IV			III,IV		
Compliance Wells																					
CORE-2S			III,IV [1,2]			III,IV [1,2]		III,IV [1,2]		III,IV				III,IV		III,IV			III,IV		
D-6R			III,IV			III,IV		III,IV		III,IV				III,IV		III,IV			III,IV		
MW-03			III,IV			III,IV		III,IV		III,IV				III,IV		III,IV			III,IV		
MW-09			III,IV			III,IV		III,IV		III,IV				III,IV		III,IV			III,IV		
MW-10S			III,IV			III,IV		III,IV		III,IV				III,IV		III,IV			III,IV		
MW-12			III,IV			III,IV		III,IV		III,IV				III,IV		III,IV			III,IV		
MW-13			III,IV			III,IV		III,IV		III,IV				III,IV			III,IV		III,IV		

Monitoring Program:	Baseline Monitoring						
Monitoring Event:	2Q 2017			3Q 2017			Total Baseline Sampling Events [4]
Sample Date: / Well ID	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	
Background Wells							
D-2	III,IV						8
D-3	III,IV						8
D-4	III,IV						8
Compliance Wells							
CORE-2S	III,IV	III,IV [3]			III,IV [3]	III,IV [3]	10
D-6R	III,IV						8
MW-03	III,IV						8
MW-09	III,IV						8
MW-10S	III,IV						8
MW-12	III,IV						8
MW-13	III,IV						8

Monitoring Program:	Baseline Monitoring												
Monitoring Event:	1Q 2022			2Q 2022			3Q 2022			4Q 2022			Total Baseline Sampling Events [4]
Sample Date: / Well ID	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	
Off-site Nature and Extent of Contamination Monitoring Wells													
MW-24D [5]								III,IV					1
MW-24S [5]		III,IV						III,IV					2

Notes:

III Groundwater samples collected for laboratory analysis of 40 CFR 257 Appendix III parameters.

IV Groundwater samples collected for laboratory analysis of 40 CFR 257 Appendix IV parameters.

[1] Fluoride inadvertantly omitted.

[2] Radium inadvertantly omitted.

[3] Location was sampled for fluoride and radium, only.

[4] All background and compliance monitoring wells met the minimum number of samples collected except MW-24S and MW-24D which were installed in September 2021 as part of the nature and extent of contamination investigation.

[5] MW-24S and MW-24D were incorporated into the federal CCR rule monitoring program in February 2022 and August 2022, respectively.

[6] Monitoring well Core-2S was sampled on 10 different sampling events, which resulted in 8 complete sample sets.

TABLE 3
SUMMARY OF DETECTION/ASSESSMENT MONITORING EVENTS

FEDERAL CCR RULE - 2022 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
Westland Ash Management Facility, Cell B - MD

Monitoring Program:	Detection Monitoring				Assessment Monitoring														
Monitoring Event:	4Q 2017			Total Detection Sampling Events	1Q 2018			2Q 2018			3Q 2018			4Q 2018			1Q 2019		
Sample Date:	Oct-17	Nov-17	Dec-17		Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Well ID																			
Background Wells																			
D-2	III			1		III,IV			III,IV			III,IV						III,IV	
D-3	III			1		III,IV			III,IV			III,IV						III,IV	
D-4	III			1		III,IV			III,IV			III,IV						III,IV	
Compliance Wells																			
CORE-2S	III			1		III,IV			III,IV			III,IV						III,IV	
D-6R	III			1		III,IV			III,IV			III,IV						III,IV	
MW-03	III			1		III,IV			III,IV			III,IV						III,IV	
MW-09	III			1		III,IV			III,IV			III,IV						III,IV	
MW-10S	III			1		III,IV			III,IV			III,IV						III,IV	
MW-12	III			1		III,IV			III,IV			III,IV						III,IV	
MW-13	III			1		III,IV			III,IV			III,IV						III,IV	

Monitoring Program:	Assessment Monitoring																				
Monitoring Event:	2Q 2019			3Q 2019			4Q 2019			1Q 2020			2Q 2020			3Q 2020			4Q 2020		
Sample Date:	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20
Well ID																					
Background Wells																					
D2						III,IV					III,IV						III,IV				
D3					III,IV						III,IV						III,IV				
D4						III,IV					III,IV						III,IV				
Compliance Wells																					
D-6R						III,IV					III,IV						III,IV				
MW-03						III,IV					III,IV						III,IV				
MW-09						III,IV					III,IV						III,IV				
MW-10S						III,IV					III,IV						III,IV				
MW-12						III,IV					III,IV						III,IV				
MW-13						III,IV					III,IV						III,IV				

Monitoring Program:	Assessment Monitoring																				
Monitoring Event:	1Q 2021			2Q 2021			3Q 2021			4Q 2021			1Q 2022			2Q 2022			3Q 2022		
Sample Date:	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22
Well ID																					
Background Wells																					
D2		III,IV						III,IV						III,IV						III,IV	
D3		III,IV						III,IV						III,IV						III,IV	
D4		III,IV						III,IV						III,IV						III,IV	
Compliance Wells																					
CORE-2S		III,IV						III,IV						III,IV						III,IV	
D-6R		III,IV						III,IV						III,IV						III,IV	
MW-03		III,IV						III,IV						III,IV						III,IV	
MW-09		III,IV						III,IV						III,IV						III,IV	
MW-10S		III,IV						III,IV						III,IV						III,IV	
MW-12		III,IV						III,IV						III,IV						III,IV	
MW-13		III,IV						III,IV						III,IV						III,IV	

Monitoring Program:	Assessment Monitoring			
Monitoring Event:	4Q 2022			Total Assessment Sampling Events
Sample Date:	Oct-22	Nov-22	Dec-22	
Well ID				
Background Wells				
D2				11
D3				11
D4				11
Compliance Wells				
CORE-2S				11
D-6R				11
MW-03				11
MW-09				11
MW-10S				11
MW-12				11
MW-13				11

Notes:

III Groundwater samples collected for laboratory analysis of 40 CFR 257 Appendix III parameters.
IV Groundwater samples collected for laboratory analysis of 40 CFR 257 Appendix IV parameters.

TABLE 4
GROUNDWATER ELEVATION MEASUREMENTS

FEDERAL CCR RULE - 2022 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
Westland Ash Management Facility, Cell B - MD

Well ID	Top of Casing Elevation [1] (ft msl)	Depth to Water Measurement Date	Depth to Water (ft btoic)	Groundwater Elevation (ft msl)
CORE-2S	300.82	2/2/2022	15.73	285.09
		8/1/2022	18.27	282.55
D-2	366.03	2/2/2022	15.32	350.71
		8/1/2022	18.93	347.10
D-3	361.82	2/2/2022	48.03	313.79
		8/1/2022	49.75	312.07
D-4	337.91	2/2/2022	24.90	313.01
		8/1/2022	26.53	311.38
D-6R	281.08	2/2/2022	30.22	250.86
		8/1/2022	31.04	250.04
MW-03	312.48	2/2/2022	8.25	304.23
		8/1/2022	10.42	302.06
MW-09	273.90	2/2/2022	41.49	232.41
		8/1/2022	42.54	231.36
MW-10S	271.03	2/2/2022	31.98	239.05
		8/1/2022	32.69	238.34
MW-12	296.11	2/2/2022	23.89	272.22
		8/1/2022	24.00	272.11
MW-13	310.77	2/2/2022	31.72	279.05
		8/1/2022	32.08	278.69
MW-24D	[1]	2/2/2022	81.00	[1]
		8/1/2022	65.03	[1]
MW-24S	[1]	2/2/2022	64.12	[1]
		8/1/2022	38.07	[1]

Notes:

ft msl feet above mean sea level

ft btoic feet below top of inner case

NM Not Measured

[1] Survey data not yet collected for new wells MW-24D and MW-24S; therefore, water level elevations are not estimated.

TABLE 5
APPENDIX III ANALYTICAL DATA - BACKGROUND WELLS

FEDERAL CCR RULE - 2022 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
Westland Ash Management Facility, Cell B - MD

	Analyte:	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS
Well ID	Sample Date	µg/L	mg/L	mg/L	mg/L	S.U.	mg/L	mg/L
D-2	2/6/2018	<10.1 U	36.6	12.1	<0.25 U	7.7	16.7	189
	5/3/2018	<10.1 U	39.4	11.3	<0.25 U	7.8	16.9	207
	8/8/2018	<12.0 U	39.5	14.1	<0.25 U	8.0	15.3	174
	2/18/2019	16.7 J	37.8	10.3	<0.25 U	7.9	15.0	190
	9/4/2019	11.6 J	40.2	12.3 J	<0.25 U	8.0	15.3	196
	2/19/2020	<12.0 U	40.5	11.6	<0.25 U	7.9	15.7	180
	8/21/2020	<12.0 U	37.0	13.0	<0.25 U	7.8	16.0	200
	3/3/2021	19.0 J	39.0	13.0	<0.25 U	7.7	16.0	180
	8/16/2021	18.0 J	39.0	12.0	0.07 J	7.6	15.0	180
	2/7/2022	4.70 J	40.0	13.0	0.05 J	7.5	16.0	250
	8/4/2022	9.60 J	41.0	12.0	0.03 J	7.9	15.0	430
D-3	2/6/2018	<10.1 U	47.4	15.0	<0.25 U	7.9	23.6	241
	5/4/2018	<10.1 U	54.4	17.5	<0.25 U	8.1	24.9	241
	8/8/2018	<12.0 U	51.7	14.0	<0.25 U	8.1	22.9	262
	2/19/2019	<12.0 U	52.2	13.3	<0.25 U	8.3	21.2	259
	8/30/2019	<5.00 UJ	50.6	15.5	<0.25 U	7.7	25.9	238
	2/17/2020	<12.0 U	48.8	14.1	<0.25 U	7.9	25.4	269
	8/24/2020	<12.0 U	51.0	14.0	<0.25 U	7.8	23.0	240
	3/2/2021	<12.0 U	46.0	13.0	0.26 J	8.0	23.0	240
	8/17/2021	<12.0 U	51.0	13.0	0.10 J-	8.1	24.0	250
	8/17/2021 [1]	<12.0 U	51.0	14.0	0.09 J	8.1	23.0	240
	2/7/2022	8.50 J	52.0	14.0	0.05	7.7	23.0	390
	8/5/2022	17 J	51.0	14.0	0.06	7.9	24.0	300
D-4	2/6/2018	27.7 J	NS	9.70	<0.25 U	7.4	15.3	221
	5/4/2018	27.1 J	52.9	12.0	<0.25 U	8.2	15.9	239
	5/4/2018 [1]	12.9 J	51.5	8.70	<0.25 U	8.2	14.5	221
	8/9/2018	<12.0 U	51.0	10.5	<0.25 U	8.3	16.1	192
	2/15/2019	12.4 J	52.1	7.40	<0.25 U	8.1	11.4	199
	9/4/2019	16.3 J	51.3	10.7 J	<0.25 U	7.9	13.1 J	209
	2/18/2020	<12.0 U	51.6	10.8	<0.25 U	8.0	15.5	195
	8/20/2020	16.0 J	50.0	12.0	<0.25 U	7.8	14.0	210
	8/20/2020 [1]	12.0 J	48.0	11.0	<0.25 U	7.9	14.0	200
	3/4/2021	<12.0 U	49.0	12.0	0.27 J	8.1	19.0	180
	8/17/2021	<12.0 U	51.0	10.0	<0.25 U	8.1	13.0	210
	2/8/2022	9.30 J	51.0	10.0	0.04 J	7.9	13.0	190
	8/3/2022	<20.0 U	53.0	11.0	0.04 J	8.0	13.0	290

Notes:

µg/L micrograms per Liter
mg/L milligrams per Liter
S.U. Standard Units
J Constituent detected below reporting limit and is an estimated value.
J- The result is an estimated quantity, but the result may be biased low.
UJ The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise
U Constituent not detected above method detection limit and is shown as less than the reporting limit.
NS Not Sampled
N.D. The sample result is non-detect.
[1] Duplicate sample collected.

TABLE 6
APPENDIX III ANALYTICAL DATA - COMPLIANCE WELLS

FEDERAL CCR RULE - 2022 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
Westland Ash Management Facility, Cell B - MD

	Analyte:	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS
	UPL [1]	25	53.4	17.5	[2]	7.02 - 8.45	25.4	325
Well ID	Sample Date	µg/L	mg/L	mg/L	mg/L	S.U.	mg/L	mg/L
Core-2S	10/26/2017	317	199	181	<0.50 U	7.6	228	1,030
	2/14/2018	421	228	206	<0.50 U	7.6	232	1,040
	5/4/2018	371	234	195	<0.50 U	8.0	227	1,140
	8/8/2018	242	198	182	<0.50 U	7.9	202	728
	2/14/2019	256	191	188	<0.50 U	8.1	189	638
	9/5/2019	374	241	225	<0.50 U	7.8	246	842
	2/14/2020	294	210	196	<0.50 U	8.0	221	712 J+
	2/14/2020 [3]	312	216	179	<0.50 U	7.7	201	820
	8/24/2020	340	230	290	<0.50 U	7.8	270 J	850
	2/26/2021	300	230	250	<0.50 U	7.8	300 J	780
	8/10/2021	310	230	210	<0.50 U	7.7	250	860
	2/3/2022	400	230	250	<0.25 U	7.7	270	1,000
	2/3/2022 [3]	420	230	280	<0.25 U	7.7	310	1,000
	8/3/2022	500	270	240	<0.25 U	8.0	300	1,600
D-6R	10/27/2017	5,180	676	338	<0.50 U	7.3	1,330	2,860
	2/6/2018	5,410	657	309	<0.50 U	7.4	1,330	2,280
	5/3/2018	5,650	648	288	<0.50 U	7.3	1,170	2,730
	8/10/2018	5,490	733	280	<0.50 U	7.6	1,250	2,230
	2/14/2019	5,430	628	413	<0.50 U	7.8	1,180	2,100
	9/5/2019	4,060	482	257	<0.50 U	7.8	852	1,810
	2/17/2020	4,780	537	243	<0.50 U	7.4	1,040	1,880
	8/19/2020	4,900	540	230	<0.50 U	7.5	2,200	1,200
	2/25/2021	5,900	660	250	<0.50 U	7.5	1,200	2,500
	8/11/2021	6,100	730	240	<0.50 U	7.4	1,200	2,500
	2/7/2022	6,300	690	270	<0.50 U	7.1	1,200	2,400
	8/5/2022	5,900	680	280	<0.50 U	7.6	1,300	820 [4]
MW-03	10/26/2017	10,700	494	362	<0.50 U	6.7	1,330	2,640
	2/13/2018	9,750	463	264	<0.50 U	7.1	1,301	2,700
	2/13/2018 [3]	9,390	443	302	<0.50 U	7.1	1,350	2,370
	5/4/2018	9,980	460	209	<0.50 U	7.0	1,130	2,380
	8/13/2018	8,510	341	165	<0.50 U	7.6	980	1,460
	2/15/2019	7,340	274	101	<0.50 U	7.2	567	562
	9/4/2019	13,800	406	160	<0.50 U	7.5	989	1,900
	2/14/2020	10,200	330	116	0.88	6.9	835	1,470
	8/21/2020	14,000	400	250	<0.50 U	7.0	1,200	2,000
	2/26/2021	9,700	310	110	<0.50 U	7.0	1,000	1,400
	8/16/2021	17,000	400	150	0.12	6.7	1,200 J	2,200
	2/3/2022	14,000	400	160	<0.25 U	6.8	1,200	64
	8/4/2022	14,000	420	170	<0.50 U	7.1	1,300 J-	780 J
	8/4/2022 [3]	14,000	400	170	<0.50 U	7.2	1,300	1,100
MW-09	10/26/2017	2,580	276	95.2	<0.50 U	7.4	505	1,410
	2/14/2018	2,660	289	92.9	<0.50 U	7.5	244	1,220
	5/3/2018	2,760	292	85.5	<0.50 U	7.8	475	1,280
	8/9/2018	2,680	287	91.4	<0.50 U	7.6	498	1,050
	2/19/2019	2,710	279	91.8	<0.50 U	7.9	447	996
	9/4/2019	2,780	261	76.6	<0.50 U	7.9	387	1,030
	2/17/2020	2,520	226	73.6	<0.50 U	7.7	342	918
	8/20/2020	2,300	210	73.0	<0.50 U	7.6	500	920
	3/2/2021	2,500	230	69.0	0.26 J	7.8	330	890
	8/10/2021	2,300	210	57.0	<0.50 U	7.8	310	870
	2/8/2022	2,200	200	61.0	<0.25 U	7.8	310	800
	8/3/2022	2,300	220	64.0	<0.25 U	7.8	320	920

TABLE 6
APPENDIX III ANALYTICAL DATA - COMPLIANCE WELLS

FEDERAL CCR RULE - 2022 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
Westland Ash Management Facility, Cell B - MD

	Analyte:	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS
	UPL [1]	25	53.4	17.5	[2]	7.02 - 8.45	25.4	325
Well ID	Sample Date	µg/L	mg/L	mg/L	mg/L	S.U.	mg/L	mg/L
MW-10S	10/26/2017	311	353	86.5	<0.50 U	7.3	608	1,290
	2/14/2018	331	351	81.4	<0.50 U	7.4	587	1,260
	5/3/2018	310	334	54.9	<0.50 U	7.7	409	1,190
	5/3/2018 [3]	314	341	68.0	<0.50 U	7.6	522	1,260
	8/10/2018	305	327	66.9	<0.50 U	7.7	516	1,240
	2/18/2019	309	307	68.3	<0.50 U	7.9	498	1,030
	9/3/2019	411	367	77.4	<0.50 U	7.6	556	1,340
	2/14/2020	386	349	74.2	<0.50 U	7.6	558	954
	8/21/2020	450	330	140 J	<0.50 U	7.7	670	1,300
	3/1/2021	400	310	67.0	0.25 J	7.7	520	1,100
	8/11/2021	350	250	65.0	<0.1 U	7.5	520	1,200
	2/7/2022	440	310	69.0	<0.25 U	7.4	550	1,200
	8/2/2022	490	370	69.0	<0.25 U	7.7	570	1,300
MW-12	10/26/2017	1,990	371	101	<0.50 U	6.7	991	1,990
	2/14/2018	8,050	378	107	<0.50 U	6.8	912	1,810
	5/4/2018	6,280	386	90.2	<0.50 U	7.0	885	1,850
	8/13/2018	5,450	323	67.3	<0.50 U	7.6	716	1,410
	2/19/2019	7,620	376	66.0	<0.50 U	7.6	872	1,680
	9/5/2019	9,290	445	65.7	<0.50 U	7.2	890	1,780
	2/17/2020	9,000	384	113	<0.50 U	6.9	1,040	1,620
	8/19/2020	8,300	360	68.0	<0.50 U	7.1	1,100	1,900
	2/25/2021	7,000	330	50.0	<0.50 U	7.0	740	1,400
	8/11/2021	9,400	370	63.0	0.11	7.1	1,100	2,000
	2/3/2022	11,000	370	74.0	<0.25 U	6.8	1,000	1,700
	8/4/2022	9,800	370	66.0	<0.25 U	7.2	1,100	620 [4]
MW-13	10/30/2017	<50.0 U	44.5	11.0	<0.25 U	7.4	24.9	256
	10/30/2017 [3]	<50.0 U	45.1	10.7	<0.50 U	7.6	24.6	221
	2/13/2018	<50.0 U	49.6	12.6	<0.50 U	8.0	31.4	371
	5/4/2018	21.3 J	50.7	11.3	<0.50 U	8.1	30.8	225
	8/13/2018	<50.0 U	48.4	11.5	<0.50 U	8.2	27.9	221
	2/19/2019	15.8 J	53.2	14.2	<0.50 U	7.9	38.1	284
	9/5/2019	35.6 J	51.3	11.3	<0.50 U	8.0	27.7	243
	9/5/2019 [3]	16.8 J	47.3	10.8	<0.50 U	8.0	24.4	244
	2/14/2020	<30.0 U	53.3	12.5	<0.50 U	7.9	36.0	244
	8/19/2020	18.0 J	47.0	13.0	<0.50 U	7.8	34.0	170
	2/25/2021	18.0 J	55.0	14.0	<0.50 U	7.9	40.0	220
	2/25/2021 [3]	17.0 J	55.0	13.0	<0.50 U	7.9	35.0	200
	8/11/2021	<50.0 U	51.0	13.0	0.12 J+	7.7	35.0	240
	2/3/2022	19.0	55.0	13.0	0.08	7.8	39.0	240
	8/4/2022	43.0	52.0	13.0	0.09	7.7	37.0	43.0
MW-24D [5]	8/2/2022	18.0 J	26.0	34.0	0.77	12.5	160	760
MW-24S [5]	2/8/2022	92	78.0	100	0.83 J	11.9	420	1,700
	8/2/2022	120	78.0	110	0.57 J	11.7	480	1,100

Notes:

Concentration is a statistically significant increase (SSI) over the background concentration.

UPL Upper prediction limit

µg/L micrograms per Liter

mg/L milligrams per Liter

S.U. Standard Units

J Constituent detected below reporting limit and is an estimated value.

J+ The result is an estimated quantity, but the result may be biased high.

U Constituent not detected above method detection limit and is shown as less than the reporting limit.

[1] Subject to change as additional data are generated. Calculations provided in Statistical Analysis Calculations Package for Background Groundwater – Cell B, Westland Ash Storage Facility, Dickerson, MD (Geosyntec, 2018).

[2] The Double Quantification Rule (DQR) is used for background data sets with no detections.

[3] Duplicate sample collected.

[4] The value is suspected to be erroneous because it is inconsistent with historical values

[5] MW-24D and MW-24S were installed as part of the nature and extent of contamination investigation to monitor the potential presence of CCR constituents migrating offsite.

TABLE 7
APPENDIX IV ANALYTICAL DATA - BACKGROUND WELLS

FEDERAL CCR RULE - 2022 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
Westland Ash Management Facility, Cell B - MD

	Analyte:	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt [1]	Fluoride	Lead
Well ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L
D-2	2/14/2018	<0.45 U	0.84 J	329	<0.07 U	<0.15 U	<0.9 U	<1.7 U	<0.25 U	0.34 J
	5/3/2018	<0.45 U	<0.72 U	356	<0.07 U	<0.15 U	0.88 J	NS	<0.25 U	1.10
	8/8/2018	<0.41 U	<0.68 U	360	<0.09 U	<0.15 U	<0.7 U	<1.5 U	<0.25 U	<1.10 U
	2/18/2019	<0.41 U	<0.68 U	337	<0.09 U	<0.15 U	0.88 J	<1.5 U	<0.25 U	<1.10 U
	9/5/2019	0.42 J	<0.68 U	361	<0.09 U	<0.15 U	0.76 J	<1.5 U	<0.25 U	<1.10 U
	2/19/2020	<0.41 U	<0.68 U	353	<0.12 U	<0.15 U	2.20	<1.5 U	<0.25 U	0.40 J
	8/21/2020	1.30	<0.68 U	340	<0.12 U	<0.15 U	0.73 J	<1.5 U	<0.25 U	0.57
	3/3/2021	0.64 J	<0.68 U	340	<0.12 U	<0.15 U	0.53 J	<1.5 U	<0.25 U	0.45 J
	8/16/2021	0.98 J	<0.68 U	370	<0.50 U	<0.50 U	0.72 J	<1.5 U	0.071 J	1.10
	2/7/2022	<5.00 U	<5.00 U	360	<3.50 U	<0.50 U	<7.50 U	<4.0 U	0.048 J	0.34 J
	8/4/2022	0.45 J	0.56 J	370	<0.70 U	<0.50 U	0.41 J	<4.0 U	0.027 J	0.34 J
D-3	2/6/2018	<0.45 U	0.74 J	86.1	<0.07 U	<0.15 U	<0.9 U	<1.7 U	<0.25 U	1.10
	5/4/2018	0.46 J	<0.72 U	93.0	<0.07 U	<0.15 U	<0.9 U	NS	<0.25 U	0.95 J
	8/8/2018	<0.41 U	<0.68 U	95.0	<0.09 U	<0.15 U	0.78 J	<1.5 U	<0.25 U	<1.10 U
	2/19/2019	0.70 J	<0.68 U	105	<0.09 U	<0.15 U	0.77 J	<1.5 U	<0.25 U	1.50 J
	8/30/2019	0.54 J	<0.68 U	81.5	<0.09 U	<0.15 U	<0.7 U	<1.5 U	<0.25 U	<1.10 U
	2/17/2020	<0.41 U	<0.68 U	93.9	<0.12 U	<0.15 U	0.72 J	<1.5 U	<0.25 U	0.92
	8/24/2020	0.45 J	<0.68 U	96.0	<0.12 U	<0.15 U	<0.3 U	<1.5 U	<0.25 U	0.95
	3/2/2021	<0.41 U	<0.68 U	100	<0.12 U	<0.15 U	0.48 J	<1.5 U	0.26 J	1.40
	8/17/2021	<0.41 U	<0.68 U	93.0	<0.12 U	<0.15 U	1.20 J	<1.5 U	0.10 J-	0.90
	8/17/2021 [4]	<0.41 U	<0.68 U	90.0	<0.12 U	<0.15 U	0.86 J	<1.5 U	0.093 J	0.78
	2/7/2022	<5.00 U	<5.00 U	99.0	<3.50 U	<0.50 U	<7.50 U	<4.0 U	0.051	1.10
	8/5/2022	1.10	0.86 J	100	<0.70 U	<0.50 U	2.40 J+	<4.0 U	0.063	2.00
D-4	2/6/2018	<0.45 U	<0.72 U	401	<0.07 U	<0.15 U	<0.9 U	<1.7 U	<0.25 U	0.13 J
	5/4/2018	<0.45 U	<0.72 U	428	<0.07 U	<0.15 U	1.3 J	NS	<0.25 U	1.80
	5/4/2018 [4]	<0.45 U	<0.72 U	426	<0.71 U	<0.15 U	1.8 J	NS	<0.25 U	1.80
	8/9/2018	<0.41 U	<0.68 U	468	<0.09 U	<0.15 U	0.9 J	<1.5 U	<0.25 U	<1.10 U
	2/15/2019	<0.41 U	<0.68 U	428	<0.09 U	<0.15 U	<0.7 U	<1.5 U	<0.25 U	<1.10 U
	9/4/2019	<0.41 U	<0.68 U	422	<0.09 U	<0.15 U	1.0 J	<1.5 U	<0.25 U	<1.10 U
	2/18/2020	<0.41 U	<0.68 U	417	<0.12 U	<0.15 U	1.0 J	<1.5 U	<0.25 U	<0.07 U
	8/20/2020	<0.41 U	<0.68 U	410	<0.12 U	<0.15 U	2.9	<1.5 U	<0.25 U	0.08 J
	8/20/2020 [4]	<0.41 U	<0.68 U	400	<0.12 U	<0.15 U	3.3	<1.5 U	<0.25 U	<0.07 U
	3/4/2021	<0.41 U	<0.68 U	430	<0.12 U	<0.15 U	0.5 J	<1.5 U	0.27 J	0.33 J
	8/17/2021	<0.41 U	<0.68 U	400	<0.12 U	<0.15 U	<0.33 U	<1.5 U	<0.25 U	0.17 J
	2/8/2022	<5.00 U	<5.00 U	440	<3.50 U	<2.50 U	<7.50 U	<4.0 U	0.043 J	<5.00 U
	8/3/2022	<1.00 U	<1.00 U	440	<0.70 U	<0.50 U	<1.5 U	<4.0 U	0.042 J	0.23 J

TABLE 7
APPENDIX IV ANALYTICAL DATA - BACKGROUND WELLS

FEDERAL CCR RULE - 2022 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
Westland Ash Management Facility, Cell B - MD

	Analyte:	Lithium		Mercury		Molybdenum		Selenium		Thallium		Radium-226 [2]		Radium-228 [2]		Radium (226+228) [3]	
Well ID	Sample Date	µg/L		µg/L		µg/L		µg/L		µg/L		pCi/L		pCi/L		pCi/L	
D-2	2/14/2018	<9.00	U	<0.05	U	<3.4	U	<0.50	U	<0.12	U	<0.18	U	<0.09	U	<2.00	U
	5/3/2018	<9.00	U	<0.05	U	<3.4	U	<0.50	U	<0.12	U	1.23		<0.91	U	2.73	J
	8/8/2018	<11.0	U	<0.05	U	<2.0	U	<0.65	U	<0.12	U	3.08		<0.54	U	4.58	J
	2/18/2019	<11.0	U	<0.05	U	<2.0	U	<0.65	U	<0.11	U	0.44	J	<0.57	U	1.94	J
	9/4/2019	<13.0	U	<0.05	U	<2.0	U	<0.65	U	<0.11	U	0.57	J	<0.82	U	2.07	J
	2/19/2020	<11.0	U	<0.06	U	<2.0	U	<0.28	U	<0.13	U	<0.33	U	<0.61	U	<2.00	U
	8/21/2020	<11.0	U	<0.08	U	<2.0	U	<0.28	U	<0.13	U	0.60	J	<-0.89	U	2.10	J
	3/3/2021	<11.0	U	<0.08	U	<2.0	U	<0.28	U	<0.13	U	<0.314	U	<1.99	U	<2.00	U
	8/16/2021	<11.0	U	<0.08	U	<2.0	U	<0.28	U	<0.13	U	0.313		<2.38	U	1.81	J
	2/7/2022	<30.0	U	0.12	J	<10	U	<5.00	U	<0.20	U	1.09		<0.518	U	<2.00	U
	8/4/2022	<30.0	U	<0.20	U	<10	U	<1.00	U	<0.20	U	<0.125	U	<1.25	U	<2.00	U
D-3	2/6/2018	11.0	J	<0.05	U	<3.4	U	<0.50	U	<0.12	U	<0.14	U	<0.96	U	<2.00	U
	5/4/2018	<9.00	U	<0.05	U	<3.4	U	<0.50	U	<0.12	U	0.22	J	<-0.04	U	1.72	J
	8/8/2018	<11.0	U	<0.05	U	<2.0	U	<0.65	U	<0.12	U	<0.28	U	<0.54	U	<2.00	U
	2/19/2019	<11.0	U	<0.05	U	<2.0	U	<0.65	U	<0.11	U	<-0.10	U	<1.07	U	<2.00	U
	8/30/2019	14.4	J	<0.05	U	<2.0	U	<0.65	U	<0.11	U	1.01		<0.64	U	1.01	J
	2/17/2020	<11.0	U	<0.05	U	<2.0	U	<0.28	U	<0.13	U	0.35		<0.01	U	1.85	J
	8/24/2020	<11.0	U	<0.08	U	<2.0	U	<0.28	U	<0.13	U	<0.15	U	<-0.04	U	<2.00	U
	3/2/2021	<11.0	U	<0.08	U	<2.0	U	<0.28	U	<0.13	U	<0.334	U	<1.64	U	<2.00	U
	8/17/2021	14	J	<0.08	U	<2.0	U	0.29	J	<0.13	U	<0.434	U	<1.48	U	<2.00	U
	8/17/2021 [4]	13	J	<0.08	U	<2.0	U	0.36	J	<0.13	U	0.311		<1.57	U	<2.00	U
	2/7/2022	13	J	<0.20	U	<10	U	<5.00	U	<0.20	U	<0.069	U	<0.936	U	<2.00	U
	8/5/2022	<30.0	U	<0.20	U	<10	U	<1.00	U	<0.20	U	<0.419	U	<0.613	U	<2.00	U
D-4	2/6/2018	<9.00	U	<0.05	U	<3.4	U	<0.50	U	<0.12	U	<0.27	U	<-0.14	U	<2.00	U
	5/4/2018	<9.00	U	<0.05	U	<3.4	U	<0.50	U	<0.12	U	1.11		<0.84	U	2.61	J
	5/4/2018 [4]	<9.00	U	<0.05	U	<3.4	U	<0.50	U	<0.12	U	11.6		<0.35	U	13.1	
	8/9/2018	<11.0	U	<0.05	U	<2.0	U	<0.65	U	<0.11	U	2.70		<1.75	U	4.20	J
	2/15/2019	17.4	J	<0.05	U	<2.0	U	<0.65	U	<0.11	U	0.46	J	<0.38	U	1.96	J
	9/4/2019	<13.0	U	<0.05	U	<2.0	U	<0.65	U	<0.11	U	<0.22	U	<0.27	U	<2.00	U
	2/18/2020	<11.0	U	<0.05	U	<2.0	U	<0.28	U	<0.13	U	<0.47	U	<0.15	U	<2.00	U
	8/20/2020	<11.0	U	<0.08	U	<2.0	U	<0.28	U	<0.13	U	0.70	J	1.85	J	2.55	J
	8/20/2020 [4]	<11.0	U	<0.08	U	<2.0	U	<0.28	U	<0.13	U	<0.39	U	<0.24	U	<2.00	U
	3/4/2021	<11.0	U	<0.08	U	<2.0	U	<0.28	U	<0.13	U	<0.385	U	<1.53	U	<2.00	U
	8/17/2021	<11.0	U	<0.08	U	<2.0	U	<0.28	U	<0.13	U	0.417		<1.46	U	<2.00	J
	2/8/2022	<30.0	U	0.17	J	<10	U	<5.00	U	<1.00	U	0.925		1.77		2.695	J
	8/3/2022	<30.0	U	<0.20	U	<10	U	<1.00	U	<0.20	U	0.529		<2.03	U	2.559	J

Notes:

µg/L micrograms per Liter

mg/L milligrams per Liter

pCi/L picocurie per Liter

NS Not Sampled

J Constituent detected below reportable quantitation limit; result is an estimated value.

J- The result is an estimated quantity, but the result may be biased low.

J+ The result is an estimated quantity, but the result may be biased high.

U Constituent not detected above method detection limit.

[1] Appendix IV constituent not detected in February 2018 full scan Assessment Monitoring event. Full Appendix IV list analytes were not analyzed in the May 2018 resampling event.

[2] Radium values shown are the 'result' reported by lab, including non-detects shown with '<'.

[3] The sum of Radium-226 + Radium-228 uses one-half the reporting limit (data not shown) for non-detect (<) values.

[4] Duplicate sample collected.

TABLE 8
APPENDIX IV ANALYTICAL DATA - COMPLIANCE WELLS

FEDERAL CCR RULE - 2022 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
Westland Ash Management Facility, Cell B - MD

	Analyte:	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt [4]	Fluoride	Lead
Well ID	**Sample Date**	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L
Core-2S	2/14/2018	<0.45 U	<0.72 U	61.4	0.074 J	<0.15 U	1.20 J	<1.7 U	<0.25 U	0.19 J
	5/4/2018	<0.45 U	0.90 J	88.7	<0.09 U	<0.15 U	1.60 J	NS	<0.25 U	0.63 J
	8/8/2018	<0.41 U	<0.68 U	76.8	<0.07 U	<0.15 U	<0.70 U	<1.5 U	<0.25 U	<1.10 U
	2/14/2019	<0.41 U	<0.68 U	77.3	<0.09 U	<0.15 U	2.50 J	<1.5 U	<0.25 U	<1.10 U
	9/5/2019	<0.41 U	<0.68 U	73.5	<0.09 U	<0.15 U	0.91 J	<1.3 U	<0.25 U	<1.10 U
	2/14/2020	<0.41 U	<0.68 U	61.9	<0.12 U	<0.15 U	0.53 J	<1.5 U	<0.25 U	<0.07 U
	2/14/20 [1]	<0.41 U	<0.68 U	63.6	<0.12 U	<0.15 U	0.57 J	<1.5 U	<0.25 U	<0.07 U
	8/24/2020	<0.41 U	<0.68 U	61.0	<0.12 U	<0.15 U	<0.33 U	<1.5 U	<0.25 U	<0.07 U
	2/26/2021	<0.41 U	<0.68 U	71.0	<0.12 U	<0.15 U	1.30 J	<1.5 U	<0.25 U	0.48 J
	8/10/2021	0.48 J	0.85 J	85.0	0.14 J	<0.50 U	3.40	<1.5 U	<0.25 U	0.93
	2/3/2022 [1]	<1.00 UJ	<1.00 U	65.0	0.038 J	<0.50 U	<1.50 UJ	<4.0 U	<0.25 U	0.24 J
	8/4/2022	<1.00 U	0.62 J	60.0	<0.70 U	<0.50 U	1.70 J+	<4.0 U	<0.25 U	<1.00 U
D-6R	2/6/2018	<0.45 U	1.30 J	26.5	<0.07 U	<0.15 U	<0.87 U	<1.7 U	<0.25 U	<0.11 U
	5/3/2018	0.86 J	<0.72 U	28.6	<0.07 U	<0.15 U	<0.87 U	NS	<0.25 U	<0.11 U
	8/10/2018	1.10 J	<0.68 U	26.6	<0.09 U	<0.15 U	<0.70 U	<1.5 U	<0.25 U	<1.10 U
	2/14/2019	2.50	<0.68 U	46.0	<0.09 U	<0.15 U	<0.70 U	<1.5 U	<0.25 U	<1.10 U
	9/5/2019	3.50	<0.68 U	66.5	<0.09 U	<0.15 U	0.92 J	<1.3 U	<0.25 U	<1.10 U
	2/17/2020	3.30	<0.68 U	43.3	<0.12 U	<0.15 U	0.68 J	<1.5 U	<0.25 U	<0.07 U
	8/19/2020	2.60	<0.68 U	33.0	<0.12 U	<0.15 U	0.46 J	<1.5 U	<0.25 U	<0.07 U
	2/25/2021	1.00	<0.68 U	39.0	<0.12 U	<0.15 U	0.77 J	<1.5 U	<0.25 U	0.27 J
	8/11/2021	1.40	<0.68 U	28.0	<0.12 U	<0.15 U	0.64 J	<1.5 U	<0.25 U	<0.07 U
	2/7/2022	<5.00 U	<5.00 U	27.0	<3.50 U	<0.50 U	<7.50 U	<4.0 U	<0.50 U	<1.00 U
	8/5/2022	0.43 J	0.85 J	22.0	<0.70 U	<0.50 U	3.80 J+	<4.0 U	<0.50 U	<1.00 U
MW-03	2/13/2018	0.94 J	2.00 J	68.6	0.25 J	0.28 J	10.1	<1.7 U	<0.25 U	1.80
	5/3/2018	0.62 J	0.88 J	42.3	<0.07 U	0.33 J	4.20	NS	<0.25 U	0.28 J
	8/13/2018	<0.41 U	0.98 J	38.2	<0.09 U	<0.15 U	3.20 J	<1.5 U	<0.25 U	<1.10 U
	2/15/2019	<0.41 U	<0.68 U	26.3	<0.09 U	<0.15 U	1.90 J	<1.5 U	<0.25 U	<1.10 U
	9/4/2019	0.54 J	1.20 J	56.9	0.10 J	<0.15 U	4.40	<1.3 U	<0.25 U	<1.10 U
	2/14/2020	<0.41 U	0.70 J	34.4	<0.12 U	0.30 J	2.90	<1.5 U	<0.25 U	<0.07 U
	8/21/2020	<0.41 U	0.79 J	40.0	<0.12 U	0.28 J	3.90	<1.5 U	<0.25 U	<0.07 U
	2/26/2021	<0.41 U	0.72 J	28.0	<0.12 U	0.18 J	2.20	<1.5 U	<0.25 U	0.15 J
	8/16/2021	<0.41 U	1.00 J	49.0	<0.12 U	0.23 J	4.10	<1.5 U	0.12	0.15 J
	2/3/2022	<1.00 U	1.50	42.0	0.11 J	0.82	4.80	<4.0 U	<0.25 U	0.29 J
	8/4/2022 [1]	0.35 J	1.40	41.0	<0.70 U	0.54	0.93 J	<4.0 U	<0.50 U	<1.00 U
MW-09	2/14/2018	1.90	<0.72 U	48.0	<0.07 U	<0.15 U	1.40 J	<1.7 U	<0.25 U	0.27 J
	5/3/2018	2.00	<0.72 U	42.4	<0.07 U	<0.15 U	1.10 J	NS	<0.25 U	0.16 J
	8/9/2018	1.10 J	<0.68 U	64.0	<0.09 U	<0.15 U	1.00 J	<1.5 U	<0.25 U	<1.10 U
	2/19/2019	0.74 J	<0.68 U	64.1	0.11 J	<0.15 U	2.40 J	<1.5 U	<0.25 U	<1.10 U
	9/4/2019	1.70 J	0.80 J	66.3	0.12 J	<0.15 U	4.00 J	1.7 J	<0.25 U	1.10 J
	2/17/2020	0.71 J	0.74 J	47.1	<0.12 U	<0.15 U	1.40 J	<1.5 U	<0.25 U	0.40 J
	8/20/2020	0.56 J	<0.68 U	52.0	<0.12 U	<0.15 U	2.70	<1.5 U	<0.25 U	0.75
	3/2/2021	0.48 J	1.80 J	110	0.38 J	<0.15 U	10.0	6.0	0.26 J	3.60
	8/10/2021	3.30	<0.68 U	46.0	<0.12 U	<0.15 U	2.00	<1.5 U	<0.25 U	0.47 J
	2/8/2022	3.30 J	<5.00 U	42.0	0.11 J	<2.50 U	<7.50 U	<4.0 U	<0.25 U	<5.00 U
	8/3/2022	0.61 J	1.30	110	0.082 J	<0.50 U	4.00 J+	0.94 J	<0.25 U	0.82 J

TABLE 8
APPENDIX IV ANALYTICAL DATA - COMPLIANCE WELLS

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	Analyte:	Lithium	Mercury [4]	Molybdenum	Selenium	Thallium [4]	Radium-226 [2]	Radium-228 [2]	Radium (226+228) [3]
Well ID	**Sample Date**	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	pCi/L	pCi/L
Core-2S	2/14/2018	16.4 J	<0.05 U	<3.4 U	48.5	<0.12 U	<0.03 U	<0.22 U	<2.00 U
	5/4/2018	30.7	NS	<3.4 U	52.8	NS	7.47	<0.29 U	9.47
	8/8/2018	<11.0 U	<0.05 U	2.7 J	47.9	<0.11 U	<1.20 U	<0.24 U	<2.00 U
	2/14/2019	<11.0 U	<0.05 U	2.4 J	47.4	<0.11 U	0.24	<1.44 U	1.74 J
	9/5/2019	<13.0 U	<0.05 U	<2.0 U	56.8	<0.11 U	<0.19 U	<-1.22 U	<2.00 U
	2/14/2020	<11.0 U	0.06 J	<2.0 U	50.1	<0.13 U	0.32 J	<-0.05 U	1.82 J
	2/14/20 [1]	14.2 J	0.12 J	<2.0 U	50.6	<0.13 U	<-0.25 U	0.28 J	0.78 J
	8/24/2020	<11.0 U	<0.08 U	2.7 J	60.0	<0.13 U	<0.35 U	<0.37 U	<2.00 U
	2/26/2021	<11.0 U	<0.08 U	<2.0 U	52.0	<0.13 U	<0.385 U	<1.64 U	<2.00 U
	8/10/2021	<11.0 U	<0.08 U	<2.0 U	63.0	<0.13 U	<0.432 U	<1.46 U	<2.00 U
	2/3/2022 [1]	<30.0 UJ	<0.20 U	<10 U	62.0	<0.20 U	<0.213 U	1.81	2.31 J
	8/4/2022	14.0 J	<0.20 U	<10 U	71.0	0.019 J+	1.29	<1.03 U	2.79 J
D-6R	2/6/2018	863	0.13 J	38.5	81.3	<0.12 U	<0.20 U	<0.42 U	<2.00 U
	5/3/2018	841	0.09 J	43.7	103	<0.12 U	1.01	<1.31 U	2.51 J
	8/10/2018	927	0.39	43.8	96.5	<0.11 U	NS	NS	NS
	2/14/2019	854	0.07 J	46.9	78.7	<0.11 U	0.43	<0.73 U	1.93 J
	9/5/2019	1,140	0.15 J	35.8	47.0	<0.11 U	<0.27 U	<-0.16 U	<2.00 U
	2/17/2020	992	0.33	54.2	70.9	<0.13 U	0.56 J	<0.41 U	2.06 J
	8/19/2020	890	0.20	57.0	79.0	<0.13 U	<0.17 U	<-0.11 U	<2.00 U
	2/25/2021	880	0.36 J	72.0	99.0	<0.13 U	0.849	<1.55 U	2.35 J
	8/11/2021	760	0.42	69.0	93.0	<0.13 U	0.584	<2.13 U	2.08 J
	2/7/2022	860	0.30 J+	84.0	100.0	<0.20 U	<0.395 U	<0.712 U	<2.00 U
	8/5/2022	870	0.15 J	87.0	93.0	<0.20 U	<0.225 U	<0.313 U	<2.00 U
MW-03	2/13/2018	145	1.30	1,030	36.7	<0.12 U	2.98	<0.37 U	4.48 J
	5/3/2018	198	NS	1,290	41.3	NS	7.65	<0.49 U	9.15
	8/13/2018	134	0.46	1,550	32.8	<0.11 U	5.96	<0.28 U	7.46
	2/15/2019	108	0.42	1,120	22.2	<0.11 U	<0.19 U	2.26	2.76 J
	9/4/2019	156	0.83	1,380	28.3	<0.11 U	0.43	<-0.08 U	<2.00 U
	2/14/2020	110	0.63	1,180	25.9	<0.13 U	<0.16 U	1.14 J	1.64 J
	8/21/2020	130	1.20	1,400	29.0	<0.13 U	0.37 J	<-1.10 U	1.87 J
	2/26/2021	95.0	0.62 J	1,200	21.0	<0.13 U	0.323	<1.70 U	1.82 J
	8/16/2021	140	1.20	1,300	29.0	<0.13 U	<0.216 U	<2.12 U	<2.00 U
	2/3/2022	130	1.40	1,400	33.0	0.046 J	<0.338 U	<1.56 U	<2.00 U
	8/4/2022 [1]	120	1.20	1,300	30.0	0.23 J	0.441	<0.865 U	1.94 J
MW-09	2/14/2018	18.8 J	<0.05 U	4.1 J	82.7	<0.12 U	<0.08 U	<0.80 U	<2.00 U
	5/3/2018	<9.00 U	NS	<3.4 U	90.6	NS	1.07	<0.01 U	2.57 J
	8/9/2018	<11.0 U	<0.05 U	5.2 J	81.2	<0.11 U	<0.30 U	<0.15 U	<2.00 U
	2/19/2019	<11.0 U	<0.05 U	<2.0 U	73.0	<0.11 U	<-0.03 U	<0.66 U	<2.00 U
	9/4/2019	<13.0 U	<0.05 U	<2.0 U	70.8	<0.11 U	<0.15 U	<0.69 U	<2.00 U
	2/17/2020	18.6 J	<0.05 U	<2.0 U	67.4	<0.13 U	<0.27 U	<0.03 U	<2.00 U
	8/20/2020	<11.0 U	<0.05 U	<2.0 U	60.0	<0.13 U	2.01	<0.50 U	3.51 J
	3/2/2021	19.0 J	<0.08 U	<2.0 U	50.0	<0.13 U	<0.395 U	<2.13 U	<2.00 U
	8/10/2021	20.0 J	<0.08 U	2.0 J	52.0	<0.13 U	0.402	<2.32 U	1.90 J
	2/8/2022	15.0 J	0.30 J+	<10 U	50.0	<1.00 U	0.713	<0.049	2.21 J
	8/3/2022	12.0 J	<0.20 U	<10 U	47.0	0.026 J+	<0.000 U	<0.395 U	<2.00 U

TABLE 8
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	Analyte:	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt [4]	Fluoride	Lead
Well ID	**Sample Date**	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L
MW-10S	2/14/2018	<0.45 U	0.81 J	67.4	<0.07 U	<0.15 U	2.20	<1.7 U	<0.25 U	<1.10 U
	5/3/2018	<0.45 U	<0.72 U	81.8	<0.07 U	<0.15 U	1.60 J	NS	<0.25 U	<1.10 U
	5/3/2018 [1]	<0.45 U	<0.72 U	76.8	<0.71 U	<0.15 U	1.70 J	NS	<0.25 U	<1.10 U
	8/10/2018	<0.41 U	<0.68 U	87.9	<0.09 U	<0.15 U	1.50 J	<1.5 U	<0.25 U	<1.10 U
	2/18/2019	<0.41 U	<0.68 U	101	<0.09 U	<0.15 U	1.60 J	<1.5 U	<0.25 U	<1.10 U
	9/3/2018	<0.41 U	<0.68 U	61.4	<0.09 U	<0.15 U	1.30 J	<1.3 U	<0.25 U	<1.10 U
	2/14/2020	<0.41 U	<0.68 U	83.6	<0.12 U	<0.15 U	1.90 J	<1.5 U	<0.25 U	0.07 J
	8/21/2020	6.80	11.0	58.0	4.40	5.40	52.0	NS	<0.25 U	5.90
	8/21/2020 [5]	<0.41 U	<0.68 U	58.0	<0.12 U	<0.15 U	1.20 J	<1.5 U	<0.25 U	<0.07 U
	3/1/2021	0.41 J	<0.68 U	110	<0.12 U	<0.15 U	1.50 J	<1.5 U	0.25 J	0.27 J
	8/11/2021	0.64 J	<0.68 U	140	<0.12 U	<0.15 U	3.20	<1.5 U	<0.10 U	0.32 J
	2/7/2022	<5.00 U	<5.00 U	78.0	<3.50 U	<0.50 U	1.90 J+	<4.0 U	<0.25 U	<1.00 U
	8/2/2022	<1.00 U	<1.00 U	59.0	<0.70 U	<0.50 U	3.00 J+	<4.0 U	<0.25 U	0.26 J
MW-12	2/14/2018	0.47 J	<0.72 U	45.0	0.11 J	0.16 J	8.60	<1.7 U	<0.25 U	0.17 J
	5/4/2018	0.48 J	<0.72 U	43.8	<0.07 U	0.21 J	8.40	NS	<0.25 U	<0.11 U
	8/13/2018	0.48 J	<0.68 U	51.8	<0.09 U	<0.15 U	8.10	<1.5 U	<0.25 U	<1.10 U
	2/19/2019	0.58 J	<0.68 U	45.0	<0.09 U	<0.15 U	12.5	<1.5 U	<0.25 U	<1.10 U
	9/5/2019	0.45 J	<0.68 U	44.5	<0.09 U	<0.15 U	9.60	<1.3 U	<0.25 U	<1.10 U
	2/17/2020	0.46 J	0.46 J	41.7	<0.12 U	0.23 J	9.40	<1.5 U	<0.25 U	<0.07 U
	8/19/2020	<0.41 U	<0.68 U	39.0	<0.12 U	<0.15 U	12.0	<1.5 U	<0.25 U	<0.07 U
	2/25/2021	<0.41 U	<0.68 U	39.0	<0.12 U	<0.15 U	7.20	<1.5 U	<0.25 U	0.25 J
	8/11/2021	0.41 J	0.82 J	54.0	0.12 J	0.22 J	9.10	2.9 J	0.11	1.40
	2/3/2022	0.41 J	0.87 J	34.0	0.05 J	0.54	11.0	<4.0 U	<0.25 U	0.18 J
	8/4/2022	0.36 J	0.80 J	35.0	<0.70 U	0.30 J	1.60	<4.0 U	<0.25 U	<1.00 U
MW-13	2/13/2018	<0.45 U	<0.72 U	54.1	<0.07 U	<0.15 U	0.93 J	<1.7 U	<0.25 U	<0.11 U
	5/4/2018	<0.45 U	<0.72 U	50.3	<0.07 U	<0.15 U	<0.87 U	NS	<0.25 U	<0.11 U
	8/13/2018	<0.41 U	<0.68 U	56.9	<0.09 U	<0.15 U	<0.70 U	<1.5 U	<0.25 U	<1.10 U
	2/19/2019	<0.41 U	1.50 J	155	0.91	<0.15 U	9.50	3.5 J	<0.25 U	4.10
	9/5/2019	<0.41 U	<0.68 U	50.7	0.09 J	<0.15 U	1.90 J	<1.3 U	<0.25 U	<1.10 U
	9/5/19 [1]	<0.41 U	<0.68 U	50.8	0.16 J	<0.15 U	4.00 J	<1.3 U	<0.25 U	<1.10 U
	2/14/2020	<0.41 U	<0.68 U	59.4	<0.12 U	<0.15 U	2.00 J	<1.5 U	<0.25 U	0.22 J
	8/19/2020	<0.41 U	<0.68 U	54.0	<0.12 U	<0.15 U	3.90 J	<1.5 U	<0.25 U	0.078 J
	2/25/2021	<0.41 U	<0.68 U	58.0	<0.12 U	<0.15 U	0.69 J	<1.5 U	<0.25 U	0.075 J
	2/25/2021 [1]	<0.41 U	<0.68 U	60.0	<0.12 U	<0.15 U	0.61 J	<1.5 U	<0.25 U	<0.07 U
	8/17/2021	<0.41 U	<0.68 U	42.0	<0.12 U	<0.15 U	0.74 J	<1.5 U	0.12 J+	<0.07 U
	2/3/2022	<1.00 U	<1.00 U	58.0	0.05 J	<0.50 U	1.90	<4.0 U	0.08	0.44 J
	8/4/2022	<1.00 U	0.70 J	55.0	<0.70 R	<0.50 R	<1.50 R	<4.0 U	0.086	<1.00 U
MW-24D [6]	8/2/2022	0.93 J	24.0	200	<3.50 U	0.16 J	42.0	29	0.77	3.40
MW-24S [6]	2/8/2022	8.70	12.0	570	<3.50 U	<2.50 U	8.10	2.9 J	0.83 J	<5.00
	8/2/2022	4.50	15.0	330	0.037 J	<0.50 U	11.0	3.2 J	0.57 J	1.10

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	Analyte:	Lithium		Mercury [4]		Molybdenum		Selenium		Thallium [4]		Radium-226 [2]		Radium-228 [2]		Radium (226+228) [3]	
Well ID	**Sample Date**	µg/L		µg/L		µg/L		µg/L		µg/L		pCi/L		pCi/L		pCi/L	
MW-10S	2/14/2018	21.7		<0.05	U	<3.4	U	207		<0.12	U	0.46		<0.61	U	1.95	J
	5/3/2018	<9.00	U	NS		<3.4	U	241		NS		8.12		<-0.35	U	9.62	
	5/3/2018 [1]	<9.00	U	NS		<3.4	U	238		<0.11	U	12.2		<1.21	U	13.7	
	8/10/2018	15.9	J	0.08	J	<2.0	U	223		<0.11	U	3.65		<-0.03	U	5.15	
	2/18/2019	<11.0	U	<0.05	U	<2.0	U	215		<0.11	U	<0.00	U	<0.57	U	<2.00	U
	9/3/2018	15.5	J	<0.05	U	<2.0	U	200		<0.11	U	<0.43	U	<0.43	U	<2.00	U
	2/14/2020	<11.0	U	<0.05	U	<2.0	U	192		<0.13	U	<0.26	U	<-0.01	U	<2.00	U
	8/21/2020	16.0	J	<0.08	U	<2.0	U	10.0		2.10		<0.15	U	<0.39	U	<2.00	U
	8/21/2020 [5]	16.0	J	<0.08	U	<2.0	U	160		<0.13	U	<0.47	U	<0.39	U	<2.00	U
	3/1/2021	19.0	J	<0.08	U	<2.0	U	160		<0.13	U	<0.238	U	<1.27	U	<2.00	U
	8/11/2021	<11.0	U	<0.08	U	<2.0	U	140		<0.13	U	0.367		<2.56	U	1.87	J
	2/7/2022	19.0	J	0.13	J	<10	U	160		<0.20	U	1.01		<0.236	U	2.51	J
	8/2/2022	16.0	J	<0.20	U	<10	U	160		<0.20	U	<0.208	U	<0.901	U	<2.00	U
MW-12	2/14/2018	206		0.47		748		267		<0.12	U	<0.30	U	<-0.15	U	<2.00	U
	5/4/2018	256		NS		814		303		NS		7.56		<0.23	U	9.06	
	8/13/2018	238		0.20		824		297		<0.11	U	6.62		<0.46	U	8.12	
	2/19/2019	195		0.41		797		254		<0.11	U	<0.23	U	2.21	J	2.71	J
	9/5/2019	293		0.47		999		269		<0.11	U	0.75	J	<-1.16	U	2.25	J
	2/17/2020	227		0.55		873		251		<0.13	U	0.75	J	<0.55	U	2.25	J
	8/19/2020	200		0.43		820		270		<0.13	U	0.53	J	<0.33	U	2.03	J
	2/25/2021	200		0.31	J	730		210		<0.13	U	0.448		<2.66	U	1.95	J
	8/11/2021	190		0.37		880		250		<0.13	U	<0.475	U	<1.69	U	<2.00	U
	2/3/2022	180		0.65		930		250		<0.20	U	<0.261	U	<1.60	U	<2.00	U
	8/4/2022	130		0.40		810		240		0.11	J	0.440		<-0.176	U	1.94	J
MW-13	2/13/2018	<9.00	U	<0.05	U	<3.4	U	1.1	J	<0.12	U	3.52		<0.18	U	5.02	
	5/4/2018	<9.00	U	NS		<3.4	U	1.8	J	NS		9.20		<-0.09	U	10.7	
	8/13/2018	<11.0	U	<0.05	U	<2.0	U	1.3	J	<0.11	U	5.53		<1.38	U	7.03	
	2/19/2019	<11.0	U	<0.05	U	9.7	J	1.7	J	<0.11	U	0.63	J	<1.23	U	2.13	J
	9/5/2019	<13.0	U	<0.05	U	<2.0	U	1.6	J	<0.11	U	0.85	J	<-0.37	U	2.35	J
	9/5/19 [1]	<13.0	U	<0.05	U	<2.0	U	1.3	J	<0.11	U	<0.08	U	<-0.27	U	<2.00	U
	2/14/2020	<11.0	U	<0.08	U	<2.0	U	1.9		<0.13	U	<0.31	U	<0.26	U	<2.00	U
	8/19/2020	<11.0	U	<0.08	U	<2.0	U	1.8		<0.13	U	<0.12	U	<1.54	U	<2.00	U
	2/25/2021	<11.0	U	<0.08	U	<2.0	U	2.1		<0.13	U	<0.260	U	<1.92	U	<2.00	U
	2/25/2021 [1]	<11.0	U	<0.08	U	<2.0	U	2.0		<0.13	U	<0.357	U	<1.32	U	<2.00	U
	8/17/2021	<11.0	U	<0.08	U	<2.0	U	1.7		<0.13	U	0.462		<2.33	U	1.96	J
	2/3/2022	<30.0	U	<0.20	U	<10.0	U	2.3		<0.20	U	<0.263	U	<1.74	U	<2.00	U
	8/4/2022	<30.0	U	<0.20	U	<10.0	U	1.8		<0.20	U	0.329		1.55		1.88	J
MW-24D [6]	8/2/2022	1,200		<0.20	U	89.0		13		0.022	J	0.843		<1.21	U	2.34	J
MW-24S [6]	2/8/2022	240		0.35		41.0		<5.00	U	<1.00	U	0.757		<0.562	U	2.26	J
	8/2/2022	280		0.10	J	34.0		0.66	J	<0.20	U	0.537		2.06		2.60	J

Notes:

µg/L micrograms per Liter

mg/L milligrams per Liter

pCi/L picocurie per Liter

NS Not Sampled

J Constituent detected below reportable quantitation limit; result is an estimated value.

J+ Constituent detected below reporting limit; result is an estimated value with a high bias.

R Sample results rejected due to Matrix Spike/Matrix Spike Duplicate Recoveries less than 30%

U Constituent not detected above method detection limit.

[1] Duplicate sample collected

[2] Radium values shown are the 'result' reported by lab, including non-detects shown with '<'.

[3] The sum of Radium-226 + Radium-228 uses one-half the reporting limit (data not shown) for non-detect (<) values.

[4] Appendix IV constituent not detected in February 2018 full scan Assessment Monitoring event. Full Appendix IV list analytes were not analyzed in the May 2018 resampling event.

[5] Sample re-analyzed within holding time.

[6] MW-24D and MW-24S were installed as part of the nature and extent of contamination investigation to monitor the potential presence of CCR constituents migrating offsite.

TABLE 9
STATISTICALLY SIGNIFICANT LEVELS - APPENDIX IV CONSTITUENTS

FEDERAL CCR RULE - 2022 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
Westland Ash Management Facility, Cell B - MD

WELL ID	Antimony		Arsenic		Beryllium		Chromium		Cobalt		Lithium		Mercury		Molybdenum		Radium 226, 228 Combined		Selenium	
	GWPS = 6 µg/L		GWPS = 10 µg/L		GWPS = 4 µg/L		GWPS = 100 µg/L		GWPS = 6 µg/L		GWPS = 40 µg/L		GWPS = 2 µg/L		GWPS = 100 µg/L		GWPS = 5 pCi/L		GWPS = 50 µg/L	
	SSL	Trend	SSL	Trend	SSL	Trend	SSL	Trend	SSL	Trend	SSL	Trend	SSL	Trend	SSL	Trend	SSL	Trend	SSL	Trend
Core-2S																				
D-6R											●	↑							●	-
MW-03											●	↓			●	↑				
MW-09																			●	-
MW-10S																			●	-
MW-12											●	-			●	-			●	↓
MW-13																				

Definitions:

µg/L micrograms per Liter
pCi/L picocuries per Liter
SSL Statistically Significant Level
SSI Statistically Significant Increase
LCL Lower Confidence Limit
GWPS Groundwater Protection Standard

Legend:

	Not evaluated because no SSI for the constituent in this well.
	No SSL (LCL does not exceed GWPS).
-	Constituent does not have a significant increasing trend in this monitoring well (based on Mann Kendall Trend Analysis).
↑	Increasing trend for the constituent in this monitoring well (based on Mann Kendall Trend Analysis).

SSL Legend: Ratio of LCL over GWPS

●	LCL is greater than GWPS by 1 to 2 times
●	LCL is greater than GWPS by >2 to 10 times
●	LCL is greater than GWPS by >10 times

Notes:

[1] Barium, cadmium, fluoride, lead, and thallium did not exceed their GWPS in any compliance well in any monitoring event; thus, the LCL was not calculated for these constituents.

[2] Trend analysis was not performed for well/constituent pairs that did not have SSLs per the Statistical Analysis Calculations Package for Compliance Well Appendix IV Assessment Monitoring Data, 2022 Second Semi-Annual Monitoring Event - Cell B, Westland Ash Storage Facility, Dickerson, MD

APPENDIX A

Groundwater Flow Velocity Calculation

Appendix A

Groundwater Velocity Calculation

Westland Ash Management Facility Cell B

Dickerson, Maryland

1. Governing Equation

Groundwater flow velocity at the Site was calculated between several monitoring wells around Cell B. The calculations were performed using the following equation.

$$V_{\eta} = \frac{K}{\eta} \times \frac{\Delta h}{\Delta l}$$

Where:

V_{η} = Groundwater velocity (cm per second)
K = Hydraulic conductivity estimated through aquifer pumping tests (cm per second)
η = Effective porosity % (unitless)
Δh = Change in groundwater elevation between two points (feet)
Δl = Distance between two points (feet)

This equation is for Darcy flow through porous media, but is a reasonable approximation at the site-wide scale for fractured bedrock at Westland.

2. Hydraulic Conductivity

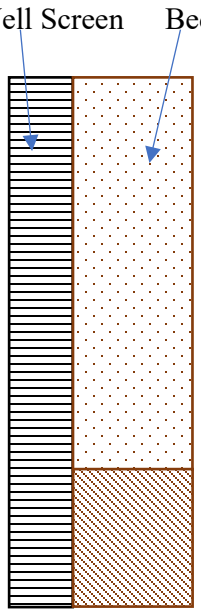
Hydraulic conductivity (*K*) was calculated at select monitoring wells around Cell B. The boreholes for monitoring wells Core 2S, MW-03, MW-09, MW-10S, MW-12, and MW-13 were packer tested prior to well installation. The location of the packer tested wells are shown on **Figure 2**. Straddle packer tests were used to calculate *K* of each monitoring well. The *K* value for each packer test interval within a given borehole was averaged, which generated an average *K* for each test interval. Average *K* values are presented in **Table A-1**. The average of the K value between two monitoring wells is presented in **Table A-2**.

3. Average Porosity

As shown on **Table A-1**, each monitoring well has an average porosity (η) calculated for each screen interval. The averaged η values were obtained from *Groundwater and Wells, Second Edition, Driscoll* [Driscoll, 1986]. A range for η is presented in [Driscoll, 1986] and the average for each η range was used in the calculation. The published η values and the calculated average η values are presented in **Table A-1**.

The averaged η value was then used to estimate an η value for each screen based on the geology observed during the well installation. See diagram below to see how η was estimated for each boring monitoring well screen.

EXAMPLE POROSITY ESTIMATION FOR WELL SCREEN



$$Average\ \eta\ of\ the\ well\ screen = (\eta_{SS} \times 0.8) + \ (\eta_{MS} \times 0.2)$$

$$Average\ \eta\ of\ the\ well\ screen = (5_{SS} \times 0.8) + \ (31_{MS} \times 0.2)$$

$$Average\ \eta\ of\ the\ well\ screen = (4) + \ (6.2)$$

$$Average\ \eta\ of\ the\ well\ screen = 10.2\%$$

The top 8 feet of the screen is screened in unweathered sandstone (SS). The average η of SS is 5%.

The bottom 2 feet of the screen is screened in siltstone (MS). The average η of MS is 31%.

Boring logs were provided in *Basis for Groundwater Monitoring Network* [Geosyntec, 2017a].

After the average η value was calculated for each well screen, the average of the η values between the two monitoring wells along a groundwater flow path was calculated. See **Table A-1** for the calculated average η for each monitoring well screen. The average η value between the two monitoring wells was the η used to calculate the groundwater velocity. Average η value between monitoring wells is presented in **Table A-2**.

4. Monitoring Well Selection

To estimate groundwater velocity, monitoring wells upgradient and downgradient of Cell B were selected. Ideally, monitoring wells should be along a groundwater flow path. Based on that requirement, the groundwater velocity was calculated between D-2 and the downgradient monitoring wells. See **Figure 3** and **Figure 4** for the selected well locations relative to groundwater flow.

5. Groundwater Velocity

Groundwater velocity around Cell B ranged from 1.81 X 10^{-5} centimeters per second (cm/sec) (18.8 feet/year) between monitoring wells D-2 and MW-3 to 3.85 X 10^{-6} cm/sec (3.99 feet/year) between monitoring wells D-2 and MW-13. The average groundwater velocity around Cell B was calculated at 5.75 X 10^{-6} cm/sec (5.95 feet/year). **Table A-2** presents the calculated groundwater velocities. Therefore, to be considered independent samples, groundwater monitoring events should be at least 1.5 months apart for groundwater to completely travel through the 8-inch diameter borehole.

APPENDIX A
TABLE A-1
Groundwater Flow Velocity Variables

Westland Ash Management Facility, Cell B
Dickerson, Maryland

Groundwater Velocity Equation

$$V_\eta = \frac{K}{\eta} \times \frac{\Delta h}{\Delta l}$$

V_η = linear groundwater velocity (cm/sec)
K = hydraulic conductivity (cm/sec)
η = effective porosity (unitless)
Δh = change in head between wells (ft)
Δl = distance between wells (ft)

Well ID:	Average Hydraulic Conductivity (K) (cm/sec) [3]
D-2 [1]	5.73E-05
Core-2S	7.22E-06
D-6R [2]	1.89E-05
MW-03	3.32E-04
MW-09	5.08E-08
MW-10S	1.12E-05
MW-12	2.66E-05
MW-13	5.04E-06

Upgradient Well	Downgradient Well	Δl (ft)	Δh (ft) [6]
D-2	Core-2S	2,220	64.55
D-2	D-6R	2,737	97.07
D-2	MW-03	1,710	45.04
D-2	MW-09	2,772	115.74
D-2	MW-10S	2,997	108.76
D-2	MW-12	2,207	74.99
D-2	MW-13	2,115	68.41

Rock Type	Effective Porosity % (η) [4]	Average η
Sandstone (SS)	5	5
Sandstone (mod. Weathered)	15	15
Sandstone (highly weathered)	30	30
Siltstone (MS)	21 - 41	31

Well Location	Geology Observed in Screened Intreval	Average η of Screen
D-2 [5]	Unknown	27.5
Core-2S	50/50 High-moderate weather SS	22.5
D-6R [5]	Unknown	27.5
MW-03	Highly Weathered SS	30.0
MW-09	Moderately Weathered SS and MS	27.8
MW-10S	Highly/Moderately Weathered SS and MS	24.2
MW-12	Highly Weathered SS	30.0
MW-13	Highly Weathered SS	30.2

Notes:
ft - feet
cm/sec - centimeters per second
[1] - Hydraulic conductivity is an average of the Cell B compliance monitoring wells.
[2] - Hydraulic conductivity is an average of MW-12 and MW-10s, which are located on either side of D-6R.
[3] - Average hydraulic conductivity is the average of the hydraulic conductivity calculated in the interval in which the well is screened.
[4] - Porosity is an average of the rock types observed at the Site.
[5] - Average porosity of the screen is an average of the Cell B compliance well screen porosity values.
[6] - Groundwater elevation used to calculate groundwater velocity from the August 2022 monitoring events.

APPENDIX A
Table A-2
Groundwater Flow Velocity Calculation

Westland Ash Management Facility, Cell B
Dickerson, Maryland

Well ID:	Hydraulic Conductivity (K) (cm/sec)	Average Porosity of Screen Interval (%)	Average K (cm/sec) [1]	Average η	Δ h (ft)	Δ l (ft)	Δ h/Δ l	Linear Velocity (cm/sec)	Linear Velocity (feet/year)
Core-2S	7.22E-06	22.5	3.54E-05	0.24975	64.55	2,220	0.0291	**4.13E-06**	**4.27**
D-6R	1.89E-05	27.5	4.13E-05	0.27450	97.07	2,737	0.0355	**5.33E-06**	**5.52**
MW-03	3.32E-04	30.0	1.98E-04	0.28725	45.04	1,710	0.0263	**1.81E-05**	**18.8**
MW-09	5.08E-08	27.8	3.19E-05	0.27625	115.74	2,772	0.0418	**4.81E-06**	**4.98**
MW-10S	1.12E-05	24.2	3.74E-05	0.25825	108.76	2,997	0.0363	**5.26E-06**	**5.44**
MW-12	2.66E-05	30.0	4.51E-05	0.28725	74.99	2,207	0.0340	**5.34E-06**	**5.52**
MW-13	5.04E-06	30.2	3.43E-05	0.28825	68.41	2,115	0.0323	**3.85E-06**	**3.99**

Groundwater Velocity Mean	**5.75E-06 cm/sec**	**5.95 feet/year**
Groundwater Velocity Median	**5.26E-06 cm/sec**	**5.44 feet/year**

Groundwater Velocity Equation

$$V_\eta = \frac{K}{\eta} \times \frac{\Delta h}{\Delta l}$$

V_η = linear groundwater velocity
K = hydraulic conductivity (cm/sec)
η = effective porosity (unitless)
Δh = change in head between wells (ft)
Δl = distance between wells (ft)
[1] Average hydraulic conductivity is the average hydraulic conductivities between D-2 and identified well.

APPENDIX B

MW-24D/S Boring Logs and Well Construction Forms

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MONITORING WELL MW-24D

LOG OF BORING

PROJECT Westland Ash Management Facility

LOCATION Dickerson, MD

STARTED 08/24/2021 **COMPLETED** 09/20/2021 **TOC ELEV.** NA **SURF. ELEV.** --- **COORDINATES** N: --- E: ---

CONTRACTOR Eichelbergers, Inc. **EQUIPMENT** T4W Carrier Mounted **DRILLING METHOD** Air Rotary

DRILLED BY C. Wealand **LOGGED BY** T. Wilson/C. Black **CHECKED BY** M. Bauer **BORING DEPTH** 250 ft bgs

GROUNDWATER DEPTHS (ft bgs): 24.98 **BACKFILLED** NA

NOTES: 6 inch casing installed through overburden to 18 ft BGS.

DEPTH (ft bgs)	REMARKS	MATERIAL DESCRIPTION
5		(0') Silty CLAY with sand and gravel (CL); red, dry (Saprolite).
10	106 sec/ft drilling rate at 10'	(6') SANDSTONE; red.
15	6" steel casing installed	
20		(21') SILTSTONE; dark reddish gray.
25		
30	24 sec/ft drilling rate at 30'	(32') SANDSTONE; dark reddish gray, trace cobbles.

GROUND WATER DEPTH (ft BLS)

WELL DATA
2" Sch 40 PVC riser (3' ags) with guard posts

2" Sch 40 PVC riser

Bentonite-cement grout

Permanent 6 inch steel casing installed to 18 ft bgs and grouted in place

(Continued Next Page)

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LOG OF BORING

PROJECT Westland Ash Management Facility

LOCATION Dickerson, MD

DEPTH (ft bgs)	GRAPHIC LOG	REMARKS	MATERIAL DESCRIPTION	GROUND WATER DEPTH (ft BLS)	WELL DATA
40			(32') SANDSTONE; dark reddish gray, trace cobbles. *(continued)*		2" Sch 40 PVC riser; Bentonite-cement grout
45		Soft drilling	(42.5') SILTSTONE; dark reddish gray.		
50		36 sec/ft drilling rate at 50'	(48') SANDSTONE; dark reddish gray.		
55			(51') SILTSTONE; red.		
60			(56') SANDSTONE; dark reddish gray, with interbedded siltstone, trace calcite.		
65					
70		40 sec/ft drilling rate at 70'			

(Continued Next Page)

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LOG OF BORING

PROJECT Westland Ash Management Facility

LOCATION Dickerson, MD

DEPTH (ft bgs)	GRAPHIC LOG	REMARKS	MATERIAL DESCRIPTION	GROUND WATER DEPTH (ft BLS)	WELL DATA
			(56') SANDSTONE; dark reddish gray, with interbedded siltstone, trace calcite. *(continued)*		2" Sch 40 PVC riser
			(78') SILTSTONE; red, with interbedded sandstone, trace calcite and crystalline clasts.		Bentonite-cement grout
80					
85					
90		40 sec/ft drilling rate at 90'			
95					
100					
105					
110		44 sec/ft drilling rate at 110'			

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LOG OF BORING

PROJECT Westland Ash Management Facility

LOCATION Dickerson, MD

DEPTH (ft bgs)	GRAPHIC LOG	REMARKS	MATERIAL DESCRIPTION	GROUND WATER DEPTH (ft BLS)	WELL DATA
120			(78') SILTSTONE; red, with interbedded sandstone, trace calcite and crystalline clasts. *(continued)*		2" Sch 40 PVC riser; Bentonite-cement grout
125					
130		36 sec/ft drilling rate at 130'			
135					
140					
145					
150		24 sec/ft drilling rate at 150'			

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LOG OF BORING

PROJECT Westland Ash Management Facility

LOCATION Dickerson, MD

DEPTH (ft bgs)	REMARKS	MATERIAL DESCRIPTION	GROUND WATER DEPTH (ft BLS)	WELL DATA
160	Water	(78') SILTSTONE; red, with interbedded sandstone, trace calcite and crystalline clasts. *(continued)*		2" Sch 40 PVC riser; Bentonite-cement grout
165		(165') SANDSTONE; dark reddish gray, trace calcite.		
170	36 sec/ft drilling rate at 170'			
175				
180		(181') SILTSTONE; red.		
185	Cuttings wet			
190	48 sec/ft drilling rate at 190'	(191') SANDSTONE; light reddish gray, with intebedded siltstone, trace calcite.		

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MONITORING WELL MW-24D

LOG OF BORING

PROJECT Westland Ash Management Facility

LOCATION Dickerson, MD

DEPTH (ft bgs)	GRAPHIC LOG	REMARKS	MATERIAL DESCRIPTION	GROUND WATER DEPTH (ft BLS)	WELL DATA
200		Cuttings dry	(191') SANDSTONE; light reddish gray, with intebedded siltstone, trace calcite. *(continued)*		2" Sch 40 PVC riser Bentonite-cement grout
205					
210		72 sec/ft drilling rate at 210'			
215			(216') SILTSTONE; red.		
220					
225			(223') SANDSTONE; dark reddish gray, with intebedded siltstone, trace calcite.		Bentonite pellets #1 Filter sand
230		56 sec/ft drilling rate at 230'			

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MONITORING WELL MW-24D

LOG OF BORING

PROJECT Westland Ash Management Facility

LOCATION Dickerson, MD

DEPTH (ft bgs)	GRAPHIC LOG	REMARKS	MATERIAL DESCRIPTION	GROUND WATER DEPTH (ft BLS)	WELL DATA
240		72 sec/ft drilling rate at 240'	(223') SANDSTONE; dark reddish gray, with intebedded siltstone, trace calcite. *(continued)*		2" Sch 40 PVC 0.010" slotted screen
245					
250			Bottom of borehole at 250.0 feet.		2" Sch 40 PVC sump
255					
260					
265					
270					

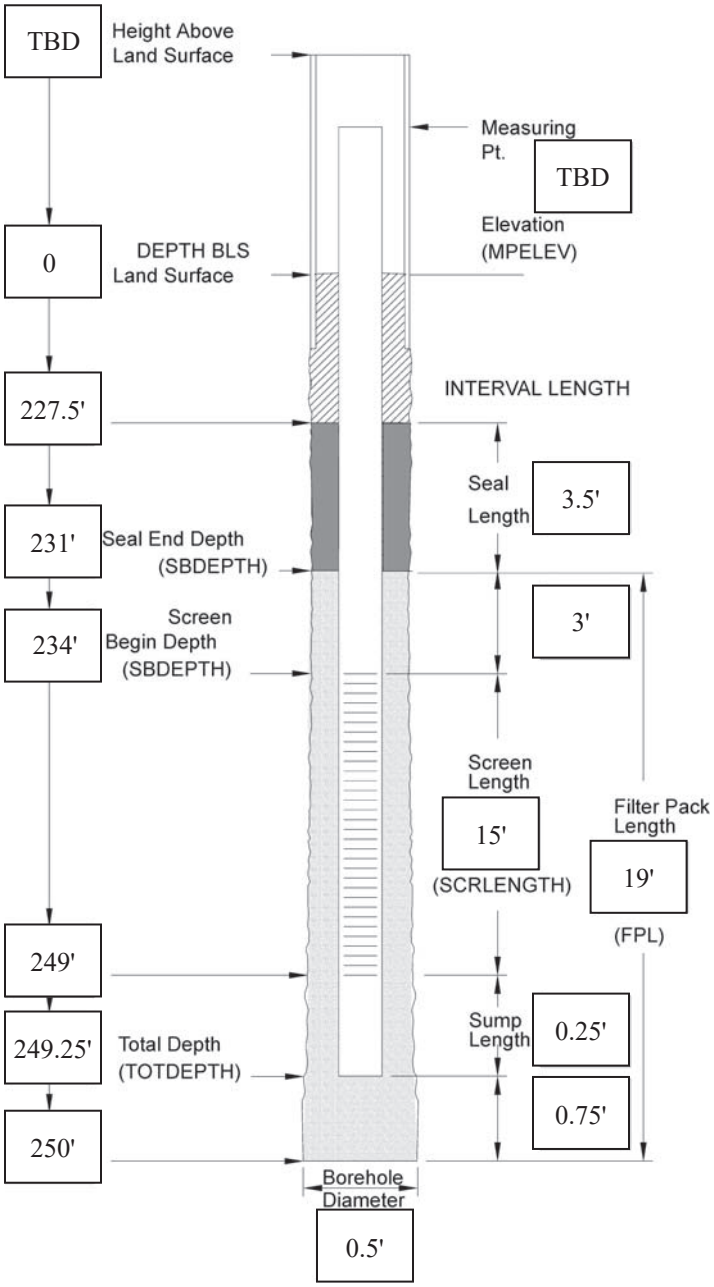
Additional Notes:

WELL CONSTRUCTION LOG
ABOVE GROUND COMPLETION

Well I.D.: MW-24D

Drilling Company: Eichelbergers
Drillers: Chris Wealand
Geologist/Engineer: Carter Black
Signature: C. Black

Site: Westland Offsite
Project Number: MEM0823O
Installation Method: Air Rotary
Casing Installation Date: 9/20/2021
Well Type: Monitoring Well
Well Completion Method: Stick up
Geologic Completion Zone: Interbedded Sandstone/Siltstone



Well Completion
Guard Posts **YES** Date: 9/28/2021
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6" Steel Casing
Depth BGS: 18' Weep Hole **NO**
Grout
Composition/Proportions: 95% Type I/II Portland Cement, 5% Bentonite Mix
Placement Method: Pump through Tremie Pipe

Seal Date: 9/21/2021
Type: 3/8" Coated Bentonite Pellets
Source: Pel-Plug
Set-up/Hydration Time: 30 minutes
Placement Method: Surface Pour/Gravity
Vol. Fluid Added: None
Filter Pack
Type: #1 Sand
Source: Filpro
Amount Used: 6 - 50 lb bags
Placement Method: Surface Pour/Gravity
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameters: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.010 in.
Percent Open Area: 3.25%
Sump or Bottom Cap **YES**
Type/Length: 0.25' Schedule 40 PVC Sump
Backfill Plug YES
Material: #1 Sand
Placement Method: Surface Pour/Gravity
Set-up/Hydration Time: None
Total Water Volume During Construction
Introduced (Gal): 0 Recovered (Gal): 100
Reviewed By: Mark Bauer Date: 12/5/2022

Comments
The well was developed using air lifting.

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MONITORING WELL MW-24S

LOG OF BORING

PROJECT Westland Ash Management Facility

LOCATION Dickerson, MD

STARTED 09/22/2021 **COMPLETED** 09/27/2021 **TOC ELEV.** NA **SURF. ELEV.** --- **COORDINATES** N: --- E: ---

CONTRACTOR Eichelbergers, Inc. **EQUIPMENT** T4W Carrier Mounted **DRILLING METHOD** Air Rotary

DRILLED BY C. Wealand **LOGGED BY** T. Wilson/S. Chase **CHECKED BY** M. Bauer **BORING DEPTH** 125 ft bgs

GROUNDWATER DEPTHS (ft bgs): 24.98 **BACKFILLED** NA

NOTES: 6 inch casing installed through overburden to 18 ft BGS.

DEPTH (ft bgs)	REMARKS	MATERIAL DESCRIPTION
5		(0') Silty CLAY with sand and gravel (CL); red, dry (Saprolite).
10	106 sec/ft drilling rate at 10'	(6') SANDSTONE; red.
15	6" steel casing installed	
20		(21') SILTSTONE; dark reddish gray.
25		
30	24 sec/ft drilling rate at 30'	(32') SANDSTONE; dark reddish gray, trace cobbles.

GROUND WATER DEPTH (ft BLS)

WELL DATA
2" Sch 40 PVC riser (3' ags) with guard posts

2" Sch 40 PVC riser

Bentonite-cement grout

Permanent 6 inch steel casing installed to 18 ft bgs and grouted in place

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LOG OF BORING

PROJECT Westland Ash Management Facility

LOCATION Dickerson, MD

DEPTH (ft bgs)	GRAPHIC LOG	REMARKS	MATERIAL DESCRIPTION	GROUND WATER DEPTH (ft BLS)	WELL DATA
40			(32') SANDSTONE; dark reddish gray, trace cobbles. *(continued)*		2" Sch 40 PVC riser; Bentonite-cement grout
45		Soft drilling	(42.5') SILTSTONE; dark reddish gray.		
50		36 sec/ft drilling rate at 50'	(48') SANDSTONE; dark reddish gray.		
55			(51') SILTSTONE; red.		
60			(56') SANDSTONE; dark reddish gray, with interbedded siltstone, trace calcite.		
65					
70		40 sec/ft drilling rate at 70'			

(Continued Next Page)

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MONITORING WELL MW-24S

LOG OF BORING

PROJECT Westland Ash Management Facility

LOCATION Dickerson, MD

DEPTH (ft bgs)	GRAPHIC LOG	REMARKS	MATERIAL DESCRIPTION	GROUND WATER DEPTH (ft BLS)	WELL DATA
80			(56') SANDSTONE; dark reddish gray, with interbedded siltstone, trace calcite. *(continued)*		2" Sch 40 PVC riser
			(78') SILTSTONE; red, with interbedded sandstone, trace calcite and crystalline clasts.		Bentonite-cement grout
85					
90		40 sec/ft drilling rate at 90'			
95					
100					
105					Bentonite pellets
110		44 sec/ft drilling rate at 110'			#1 Filter sand

(Continued Next Page)

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MONITORING WELL MW-24S

LOG OF BORING

PROJECT Westland Ash Management Facility

LOCATION Dickerson, MD

DEPTH (ft bgs)	GRAPHIC LOG	REMARKS	MATERIAL DESCRIPTION	GROUND WATER DEPTH (ft BLS)	WELL DATA
120			(78') SILTSTONE; red, with interbedded sandstone, trace calcite and crystalline clasts. *(continued)*		2" Sch 40 PVC 0.010" slotted screen
125			Bottom of borehole at 125.0 feet.		2" Sch 40 PVC sump
130					
135					
140					
145					
150					

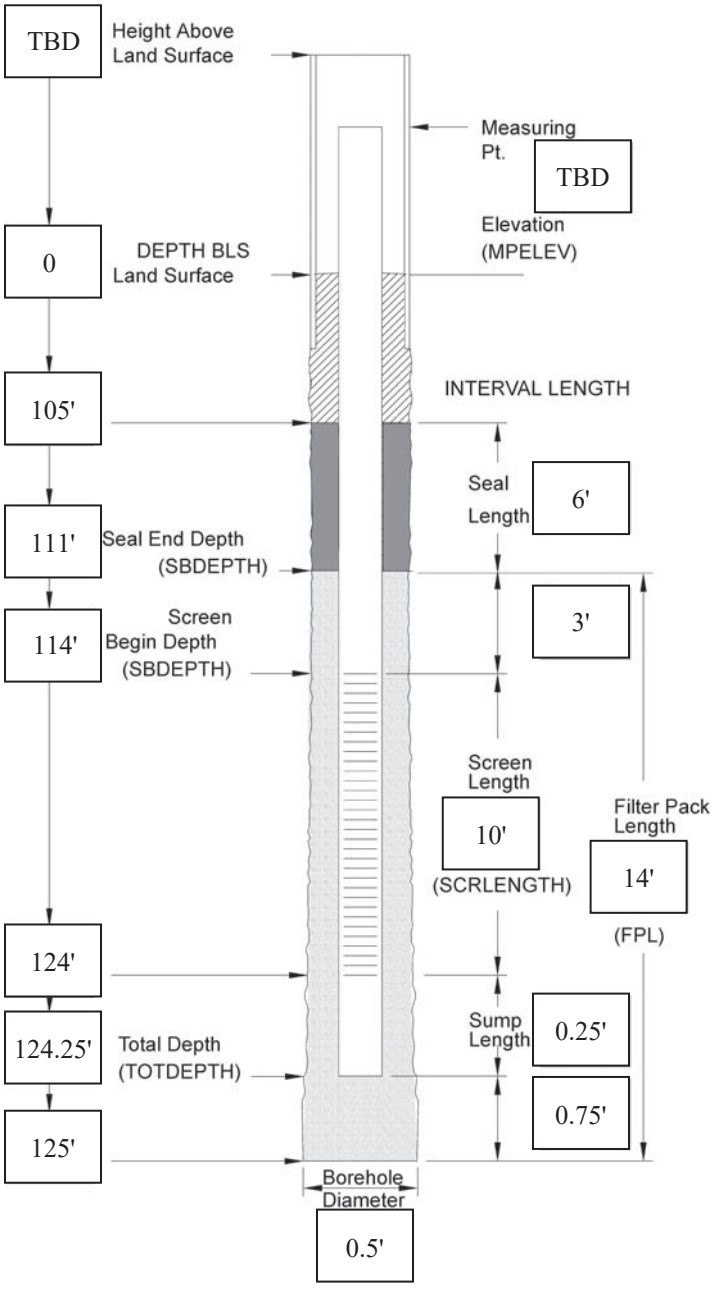
Additional Notes:

WELL CONSTRUCTION LOG
ABOVE GROUND COMPLETION

Well I.D.: MW-24S

Drilling Company: Eichelbergers
Drillers: Chris Wealand
Geologist/Engineer: Sarah Chase
Signature: Sarah Chase

Site: Westland Offsite
Project Number: MEM0823O
Installation Method: Air Rotary
Casing Installation Date: 9/27/2021
Well Type: Monitoring Well
Well Completion Method: Stick up
Geologic Completion Zone: Siltstone



Comments
The well was developed using surge and purge.
Well Tag ID: MO-20-0015

Well Completion
Guard Posts **YES** Date: 9/28/2021
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6" Steel Casing
Depth BGS: 18' Weep Hole **NO**
Grout
Composition/Proportions: 95% Type I/II Portland Cement, 5% Bentonite Mix
Placement Method: Pump through Tremie Pipe

Seal Date: 9/27/2021
Type: 3/8" Coated Bentonite Pellets
Source: Pel-Plug
Set-up/Hydration Time: 15 hours
Placement Method: Surface Pour/Gravity
Vol. Fluid Added: None
Filter Pack
Type: #1 Sand
Source: Filpro
Amount Used: 5 - 50 lb bags
Placement Method: Surface Pour/Gravity
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameters: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.010 in.
Percent Open Area: 3.25%
Sump or Bottom Cap **YES**
Type/Length: 0.25' Schedule 40 PVC Sump
Backfill Plug YES
Material: #1 Sand
Placement Method: Surface Pour/Gravity
Set-up/Hydration Time: None
Total Water Volume During Construction
Introduced (Gal): 0 Recovered (Gal): 100
Reviewed By: Mark Barnes Date: 12/5/2022