2022 ANNUAL CCR RULE GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

McELROY'S RUN COAL COMBUSTION BYPRODUCT DISPOSAL FACILITY

Pleasants Power Station
Pleasants County, West Virginia

Prepared for:

Allegheny Energy Supply Company
A Wholly Owned Subsidiary of FirstEnergy

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Tetra Tech Project No. 212C-SW-00070

January 2023

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1.0 INTRODUCTION

This 2022 Annual Coal Combustion Residuals (CCR) Groundwater Monitoring and Corrective Action Report was prepared by Tetra Tech, Inc. (Tetra Tech) on behalf of Allegheny Energy Supply Company (AESC), for the McElroy's Run Coal Combustion Byproduct Disposal Facility ("CCBDF", "CCR units", or "site") associated with the Pleasants Power Station (hereinafter referred to as the "Station"). The CCR unit and Station are located in Pleasants County, West Virginia. This report was developed to comply with the requirements of § 257.90(e) of the federal CCR Rule (40 CFR, Part 257, Subpart D). In accordance with § 257.90(e)(6), an overview of the current status of the CCR groundwater program at the site is provided in the table below, and discussed in Sections 2.0 through 5.0 of this report:

Status Summary for Reporting Period (January 1 to December 31, 2022)	
Groundwater Monitoring Program in Effect as of January 1, 2022 - 257.90(e)(6)(i)	Assessment Monitoring (Sampling Event AM-8)
Groundwater Monitoring Program in Effect as of December 31, 2022 - 257.90(e)(6)(ii)	Assessment Monitoring (Sampling Event AM-10)
Appendix III SSI's during Reporting Period - 257.90(e)(6)(iii)	n/a – Site in Assessment Monitoring
Appendix IV SSL's during Reporting Period - 257.90(e)(6)(iv)	Arsenic in GW-19, -23, -24, -25, -26, and -29 (Same parameter and same wells as Sampling Events AM-1 through AM-8) Molybdenum in GW-20 (Same parameter and same well as Sampling Events AM-7 and AM-8)
Assessment of Corrective Measures - 257.90(e)(6)(iv)	Initiated April 2019 Completed October 2019
Assessment of Corrective Measures Public Meeting - 257.90(e)(6)(iv)	n/a – Selection of Remedy Ongoing
Selection of Remedy - 257.90(e)(6)(v)	On-going, with Semi-Annual Progress Reports prepared for 2022
Corrective Action - 257.90(e)(6)(vi)	n/a - Selection of Remedy Ongoing

1.1 BACKGROUND AND SITE CHARACTERISTICS

CCRs produced at the Station are placed in the CCBDF, which is located approximately one mile east-southeast of the Station. The facility consists of both a wet disposal area (impoundment) and dry disposal area (landfill) developed in the McElroy's Run watershed. Taken together, the landfill and impoundment are regulated under West Virginia Department of Environmental Protection (WVDEP) Solid Waste/National Pollutant Discharge Elimination System (NPDES) Water Pollution Control Permit No. WV0079171 and also under the CCR Rule. A WVDEP groundwater monitoring program for the facility has been in effect since 1994 and a separate CCR Rule groundwater monitoring program was established in 2017. West Virginia State Legislative Rule 33 CSR-1B, which adopts the federal CCR Rule at 40 CFR Part 257, was promulgated on March 1, 2022. WVDEP subsequently issued Administrative Order No. 10076 on July 29, 2022, recognizing the groundwater monitoring program established for the site under the CCR Rule on an interim basis until such time as a major permit modification permanently establishing the CCR Rule monitoring well network as the sole program for the site is approved. As per the CCR Rule, the landfill and impoundment are considered two separate, existing CCR units that share a common boundary (the impoundment dam). As provided by the CCR Rule, a multi-unit groundwater monitoring system has been established for the CCBDF.

The impoundment is situated in the upper portion of the watershed, is unlined, and has been in continuous use since the late 1970s. The landfill is situated in the lower portion of the watershed (adjacent to and overlying the impoundment dam), is lined, and has been in continuous use since the early 1990s. At the current water level, the surface impoundment area is approximately 250 acres. The impoundment dam was constructed with a clay-filled cutoff trench at the upstream toe and with a clay blanket on the upstream face for a low permeability seepage barrier. The downstream portion of the dam was constructed using compacted fly ash and intermittent layers of bottom ash for blanket drains connected to sloping chimney drains that collect and convey seepage to discharge pipes for monitoring. The downstream face of the dam is covered by the landfill facility which WVDEP considers to be a buttress for the dam.

The landfill consists of three primary development stages (I, II, and III in the original WVDEP permit drawings and now referred to as 1, 2, and 3) which are further subdivided into construction subareas (e.g., Stage 1G, 2A, etc.). At this time, development and disposal operations have only been performed in the Stage 1 and 2 areas while the Stage 3 area remains undeveloped. Up until 2009, all the landfill subareas were constructed with a compacted clay liner system that included an underlying combined groundwater underdrain/leak detection system and overlying

leachate collection system. However, since 2009 (in subareas 1G and 2B), a composite geosynthetic liner system (geosynthetic clay liner and geomembrane) has been used which also includes an underlying combined groundwater underdrain/leak detection system and overlying leachate collection system. For all portions of the landfill that overlie the downstream face of the impoundment dam, a bottom ash blanket drain layer has also been installed beneath the liner system. Leachate and contact stormwater runoff from the Stage 1 and 2 disposal areas are managed in Sedimentation Pond Nos. 1 and 2, which are geosynthetic-lined impoundments located immediately down-valley of the future Stage 3 landfill development area.

Groundwater in the CCBDF area occurs primarily within fractured bedrock, principally in the following sandstone units (listed in descending order): the Morgantown sandstone, Grafton sandstone, Jane Lew sandstone, and the Saltsburg sandstone. Groundwater has also been identified in the Ames limestone and Harlem Coal (in association with the Jane Lew sandstone), and, to a lesser extent, the redbed units at the site. Generally, the fine-grained rock units (e.g., redbeds) typically serve as aquitards to limit vertical groundwater migration, while the coarser grained rock units (e.g., sandstones) typically have more well-developed and open fracture systems and are the primary conduits for groundwater migration. The fractured bedrock of multiple sandstone units, including the Morgantown sandstone, Grafton sandstone, Jane Lew sandstone, and Saltsburg sandstone, has been collectively identified as the uppermost aquifer for CCR Rule groundwater monitoring for the combined landfill and impoundment CCR units.

Historic and recent groundwater level data indicate groundwater flow at the CCBDF as being primarily controlled by topography (more important for vertical migration across groundwater flow units along the valley margins near where the units outcrop) with limited, secondary control by orientation (strike and dip) of the rock units (i.e., migration down-dip within a groundwater flow unit). Groundwater is interpreted to generally flow north from the topographically higher areas located to the south of the impoundment, with some flow divergence towards the northwest and to the northeast near the northern boundary of the site. West and northwest of the impoundment dam, topography may be the dominant influence on groundwater flow, as the multiple sandstone units underlying the site are eroded and discontinuous across the valley. Groundwater flow northwest of the dam and under the landfill is in the downstream direction of McElroy's Run toward the west. Flow in all of the rock units exhibit very little seasonal and temporal fluctuations. Water level data from the current reporting period (2022) were used for contouring groundwater flow patterns at the site. A more detailed discussion of the site's geologic and hydrogeologic characteristics is provided in Section 2.0 of this report.

1.2 REGULATORY BASIS

As required by § 257.90(e) of the CCR Rule, Owners or Operators of existing CCR landfills and surface impoundments were to prepare an initial Annual Groundwater Monitoring and Corrective Action Report ("AGMCA Report") no later than January 31, 2018, and annually thereafter. According to the subject section, "For the preceding calendar year, the annual report must document the status of the groundwater monitoring and corrective action program for the CCR unit, summarize key actions completed, describe any problems encountered, discuss actions to resolve the problems, and project key activities for the upcoming year."

This report has been developed to meet the general requirements above and the specific requirements of §§ 257.90(e)(1) through (6), which include:

(1) A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit (see Figures 2-1 and 2-2);

(2) Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken (see Section 2.1.1);

(3) In addition to all the monitoring data obtained under §§ 257.90 through 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs (see Sections 3.0 and 4.0 and Table 3-1);

(4) A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels; see Section 2.3);

(5) Other information required to be included in the annual report as specified in §§ 257.90 through 257.98 (see Sections 4.1 and 5.0 and Tables 4-1 and 4-2); and

(6) A section at the beginning of the annual report that provides an overview of the current status of groundwater monitoring and corrective action programs for the CCR unit. (See Section 1.0).

In addition, the Owner or Operator must place the report in the facility's operating record as required by § 257.105(h)(1), provide notification of the report's availability to the appropriate State Director within 30 days of placement in the operating record as required by § 257.106(h)(1), and place the report on the facility's publicly accessible website, also within 30 days of placing the report in the operating record, as required by § 257.107(h)(1).

1.3 OVERVIEW OF REPORT CONTENTS

Section 1.0 of this report provided an overview of the CCR groundwater program status, CCR unit characteristics, regulatory basis, and a summary of the requirements for CCR Annual Groundwater Monitoring and Corrective Action Reports. Section 2.0 summarizes the status of key actions pertaining to CCR groundwater monitoring and activities completed during 2022 for the CCBDF and plans for the upcoming year. Section 3.0 presents Detection Monitoring (DM) results from groundwater sampling events completed in 2022. Section 4.0 presents Assessment Monitoring (AM) results from groundwater sampling events completed in 2022. Finally, Section 5.0 presents a summary of the Selection of Remedy (SoR) activities that were performed for the CCR units during 2022, including additional Nature and Extent (N&E) of Release characterization activities performed using the new wells installed at the site in 2021 and 2022.

2.0 GENERAL INFORMATION

This section provides an overview of the status of the CCR groundwater monitoring program through 2022 and key activities planned for 2023.

2.1 STATUS OF THE CCR GROUNDWATER MONITORING AND CORRECTIVE ACTION PROGRAM

During calendar year 2022 (January 1st through December 31st), the following key actions were completed with regard to the CCR groundwater monitoring program for the CCBDF.

2.1.1 Groundwater Monitoring Well System

As documented in the facility's previous AGMCA Reports (accessible at http://ccrdocs.firstenergycorp.com/), the certified CCR monitoring well network currently consists of three upgradient (background) wells (GW-7, -21, and -22), seven downgradient wells to monitor the northern side of the combined CCR units (GW-9, -19, -20, -23, -24, -25, and -26), and three downgradient wells to monitor the western side of the combined CCR units (GW-27, -28, and -29). There are also three downgradient (GW-30, -31, and -32) and two side-gradient (GW-33A and GW-34) N&E of Release wells installed in 2021 and 2022 as part of ongoing SoR activities at the site. All of these wells are summarized in attached Table 2-1 and shown on attached Figures 2-1 and 2-2. As detailed in the 2020 AGMCA Report, only GW-7 is currently being used for upgradient/background interwell comparisons based on a combination of factors which include: statistical dissimilarity that precludes upgradient well grouping; recurring problems with the availability of sufficient volumes of recoverable water in GW-21; and the slow drop and subsequent stabilization of groundwater levels in some of the CCR network wells installed in 2016 that resulted in a modified interpretation of groundwater flow patterns along the northern boundary of the site.

During the current reporting period, the CCR monitoring well network was modified as per one of two key planned activities outlined in the 2021 AGMCA Report. These planned activities included installation of two additional monitoring wells, one positioned downgradient (GW-30) and one positioned side-gradient (GW-33B) of the CCR units. These new well locations were selected to better determine the extent of arsenic concentrations greater than the GWPS in groundwater along the north and northeastern facility boundary, to monitor potential arsenic migration beyond the facility boundary that could affect the downgradient property(ies), and to evaluate potential natural attenuation impacts on arsenic concentrations downgradient of the CCR units. The new

wells were originally supposed to be installed with the other SoR/N&E of Release wells installed in 2021 (documented in the 2021 AGMCA Report), however, due to protracted parcel acquisition negotiations with the landowner for the GW-30 location, and issues with borehole collapse and return of significant volumes of natural oil and gas with the borehole cuttings in GW-33B, these SoR activities were not able to be completed in 2021. In early 2022, an assessment of alternative drilling methods to prevent borehole collapse and to control the release of natural oil and gas for GW-33B was performed. It was determined that installation of this well at or near its originally targeted location could not be performed safely, so it was removed from the 2022 work plan which instead focused on the installation of GW-30. As additional data from the other new SoR/N&E of Release wells is collected, the potential need, value, and risks associated with installing GW-33B will be reassessed at a future date.

SoR activities related to GW-30 were able to resume in March 2022 once FE closed on acquiring the parcel upon which the proposed well was located. Following its installation, the new monitoring well was developed and left to stabilize hydraulically and geochemically before initial SoR/N&E sampling. As shown on Figures 2-1 and 2-2, the new monitoring well is located along and beyond the northern boundary. Since groundwater flow in the uppermost aquifer at the CCR unit (Grafton Sandstone) is primarily controlled by topography with limited, secondary control by orientation (strike and dip) of the rock units and flows primarily to the north and northeast beneath the impoundment, the new location was positioned downdip/downgradient of existing monitoring well GW-9.

The new well was drilled and installed on March 15 and 16, 2022, by a West Virginia Department of Environmental Protection (WVDEP) certified well driller in accordance with USEPA and WVDEP requirements for installation of typical groundwater monitoring wells. The borehole was drilled using hollow-stem auger and air rotary/air hammer drilling techniques. The depth of the borehole was determined in the field by an on-site geologist based on the targeted Grafton Sandstone formation. A detailed log of the borehole was maintained, documenting the borehole lithology, water-bearing zones, and other pertinent information (see Attachment A).

Upon completing and clearing the borehole by airlifting, the monitoring well was then installed in the borehole. GW-30 was constructed of a 4-inch diameter Schedule 40 polyvinyl chloride (PVC) well screen and casing. The larger diameter was utilized in the new well to improve the availability of sufficient volumes of sampling water. The monitoring well was constructed with a 20-foot length of 0.010-inch slotted screen and the annulus around the well screen was filled with 20-40 silica filter sand up to 5 feet above the top of the screen. A 5-foot-thick bentonite seal was placed above

the filter sand and the remaining annulus was filled with cement-bentonite grout to the surface. The new well was completed at the ground surface with a steel protective casing with an aluminum lockable cap, and a concrete pad was constructed around the protective casing. Well construction information was recorded on a monitoring well construction sheet as provided in Attachment A.

GW-30 was successfully developed on March 17, 2022. The new well was developed by first purging the standing formation water using a portable submersible pump, allowing the well to partially recover, then surging it with potable water obtained from the Station followed by pumping the well dry again (see Attachment A). No rising and falling head slug tests could be performed due to GW-30 having insufficient water volume at the time of development.

The ground surface, top of PVC well casing, and top of the protective casing at the new monitoring well location were surveyed on April 13, 2022 with horizontal and vertical location tied into the existing survey network for the site. The well will be added to the certified CCR monitoring well network for either AM and/or Corrective Action Monitoring (CAM) once sufficient data have been collected to confirm its usefulness in better characterizing potential natural attenuation impacts on arsenic concentrations downgradient of the CCR units.

2.1.2 Groundwater Monitoring Plan

Consistent with the work performed and summarized in previous AGMCA Reports, the CCR unit's Groundwater Monitoring Plan (GWMP) was followed during all 2022 field sampling and laboratory analysis activities and for statistically evaluating groundwater monitoring data developed from the CCR sampling and analysis program. No changes to the facility's GWMP occurred during 2022.

2.1.3 Background Groundwater Sampling

As documented in the 2017 and 2018 AGMCA Reports, eight independent rounds of background groundwater samples were collected from each CCR monitoring well and each sample was analyzed for all Appendix III and IV parameters prior to initiating the facility's CCR DM program in October 2017. No modifications to this background dataset occurred during 2022.

2.1.4 Statistical Methods

As documented in the 2017 and 2018 AGMCA Reports, the background dataset discussed in Section 2.1.3 of this Report was used to select the appropriate statistical evaluation methods for each CCR groundwater monitoring parameter to identify any Statistically Significant Increases (SSIs) over background concentrations and to determine whether any concentrations were at Statistically Significant Levels (SSLs) above their respective Groundwater Protection Standards

(GWPS) established for the site. These statistical methods are available on the facility's publicly accessible website and no changes were made to them during 2022.

2.2 PROBLEMS ENCOUNTERED/RESOLVED

Consistent with previous sampling events, GW-23, GW-24, GW-25, and GW-26 were sampled with HYDRASleeves™ during both the AM-9 and AM-10 events due to insufficient volumes of recoverable water to allow for sampling using the wells' dedicated bladder pumps. This sampling method resulted in extreme turbidity issues for GW-26 during both AM-9 and AM-10, where the samples were too turbid to register readings on the flow through cell and the samples were noted to be "dark brown/grey in color and extremely turbid" during both events. As with all past sampling events, these four wells also exhibited petroleum impacts (odor and sheen) with wells GW-23 and GW-24 being noted as having "heavy sheen, odor, and free product" present during both AM-9 and AM-10.

During AM-9, an attempt was made to sample upgradient well GW-22, however, the bladder pump was again malfunctioning. After attempting to troubleshoot the pump issues to no avail, sample collection was abandoned. A separate mobilization was performed on April 13, 2022 to obtain a sample from GW-22 which was collected using a portable bladder pump unit. The pump in GW-22 was removed from the well and is being stored for service by the vendor from which the pump was purchased. As such, during the AM-10 event, GW-22 was also sampled with a HYDRASleeve™.

Additionally, while upgradient well GW-21 was unable to be regularly sampled during previous events due to insufficient volumes of recoverable water, it was able to be sampled during AM-9 and AM-10 with HYDRASleeves™. The data obtained from GW-21 during AM-9 and AM-10 will be compiled with the existing GW-21 dataset and used to determine whether or not it is statistically appropriate to group its results with the dataset for upgradient well GW-22.

Lastly, during SoR/N&E of Release sampling on December 30, 2022 (discussed in Section 5.0 of this report), an insufficient volume of recoverable water was available in GW-30 to complete sampling of the well.

Other than the issues discussed above, there were no other significant problems encountered during 2022 with regard to the CCR groundwater monitoring program.

2.3 TRANSITION BETWEEN MONITORING PROGRAMS

As documented in the 2018 AGMCA Report, the CCR units transitioned from DM to AM that year. As part of this transition, all required notifications were issued, appropriate GWPS for Appendix IV parameters were established, and the first two AM sampling events (AM-1 and AM-2) were completed that year. Statistical evaluations of the AM-1, -2, and -3 sampling events were performed and documented in the 2019 AGMCA Report and the data indicated there were SSLs in one or more well comparisons. Based on the parameters for which SSLs were identified, an Appendix IV Alternative Source Demonstration (ASD) was then undertaken but not all of the Appendix IV SSLs that were identified could be attributed to alternative sources. As such, N&E of Release characterization activities and an Assessment of Corrective Measures (ACM) were completed and are documented in the 2019 AGMCA Report. Since that time and throughout 2022, the CCR unit has remained in AM with ongoing SoR activities being performed as discussed in Section 5.0 of this report, which included additional SoR/N&E of Release characterization work.

2.4 KEY ACTIVITIES PLANNED FOR THE UPCOMING YEAR

The following are the key CCR groundwater compliance activities planned for 2023:

- Continue with AM by conducting the semi-annual rounds of sampling and analysis for Appendix III and Appendix IV constituents [per 40 CFR § 257.96(b)] and evaluate the need to update the background data sets and associated Upper Prediction Limits (UPLs).
- Service the bladder pump for GW-22. If the pump cannot be repaired by the vendor and returned to functional status, a new bladder pump will need be purchased for installation and use in GW-22.
- If any new SSLs are identified, provide appropriate notification [per § 257.95(g)] then potentially conduct an Appendix IV ASD [per § 257.95(g)(3)(ii)] to determine if a source other than the CCR units may be causing the new SSLs. Concurrent with undertaking an Appendix IV ASD, characterize the Nature and Extent of the new Appendix IV release and provide appropriate notification depending on the findings [per §§ 257.95(g)(1) and (2), respectively].
- If any new SSLs are identified and an ASD is either not undertaken, indicates that an alternative source is not responsible for all the new SSLs identified, or is not completed within 90 days of identifying there are new SSLs, then initiate and perform an Assessment of Corrective Measures for the new SSLs in accordance with § 257.96.

- Conduct SoR activities in compliance with § 257.97(a), which states that as soon as feasible after completion of the ACM, select a remedy that, at a minimum, meets the performance standards listed in § 257.97(b) and the evaluation factors listed in § 257.97(c) These activities are currently in progress and include continued sampling of SoR/N&E of Release monitoring wells GW-30, -31, -32, -33A, and -34; evaluating the historic groundwater monitoring dataset for relationships between key parameters affecting arsenic natural attenuation and arsenic concentrations in groundwater; and completing development of the Arsenic Natural Attenuation Evaluation Work Plan.
- As required by § 257.97(d), specify, as part of the selected remedy, a schedule(s) for implementing and completing remedial activities. The schedule will require the completion of remedial activities within a reasonable period of time taking into consideration the factors set forth in §§ 257.97(d)(1) through (d)(6).
- As required by § 257.97(a), continue preparing semi-annual reports describing the progress in selecting and designing the remedy.
- Should all required SoR activities be completed in 2023, prepare a final report describing the selected remedy. The final report will include a certification from a qualified professional engineer that the remedy selected meets the requirements of the CCR Rule selection criteria and the final report will be placed in the facility's operating record as required by § 257.105(h)(12).
- As required by § 257.96(e), discuss the results of the ACM at least 30 days prior to the final SoR, in a public meeting with interested and affected parties.

3.0 DETECTION MONITORING INFORMATION

3.1 GROUNDWATER ANALYTICAL RESULTS SUMMARY

As noted in Section 2.3, site-wide AM was performed throughout 2022. As part of the AM program, all DM (Appendix III) parameters were also analyzed during each AM sampling event.

The need to statistically evaluate the 2022 Appendix III data to identify SSIs and determine if AM was necessary was precluded by the CCR units already being in AM during all of 2022, so no statistical analysis of the data was necessary. The 2022 Appendix III data that was collected and validated is presented in Table 3-1 with the intent of using it during the next update of the background dataset and associated UPLs, which will help increase the statistical power of future analyses.

4.0 ASSESSMENT MONITORING INFORMATION

4.1 GROUNDWATER ANALYTICAL RESULTS SUMMARY

In accordance with 40 CFR §§ 257.95(b) and (d)(1), the CCR groundwater sampling and analysis program implemented during 2022 consisted of two AM sampling events (AM-9 and AM-10) performed between March 15 and 22, 2022, and between August 23 and September 1, 2022, respectively. For both AM events, all Appendix III and all Appendix IV constituents were analyzed with the exception of combined radium 226/228 during AM-9, which was incorrectly excluded from the sampling event. However, as documented in the CCR unit's 2019 Appendix IV ASD, multiple lines of evidence (LOE) indicate that elevated concentrations of combined radium 226/228 found in groundwater can be attributed to historical and current oil and gas exploration and production activities that have occurred at the site and, as such, the lack of radium data for AM-9 did not affect the 2022 AM program evaluations for the CCR units. The analyses that were performed exceed the requirements of § 257.95 which only stipulate analyzing for all Appendix IV parameters once per year. Laboratory analysis and subsequent validation of the sample data were completed on August 5, 2022, and January 4, 2023, for AM9 and AM-10, respectively. Table 3-1 presents the validated analytical results for these events.

Statistical evaluations of 2022 AM data included sampling events AM-9 and AM-10, respectively. All statistical evaluation work was performed in accordance with the certified methods included in both the facility's operating record and the publicly accessible website, and the results were used to determine whether there were any detected Appendix IV parameters at SSLs above the CCR unit's established GWPS. As documented in the 2018 AGMCA Report, site-specific Appendix IV GWPS were established for the CCR units using the higher of the federal Maximum Contaminant Level (MCL) or UPL for each parameter or, for those parameters that do not have MCLs, the higher of the EPA Risk Screening Level (RSL) or the UPL. The site-specific GWPS and the results of the statistical evaluations of AM-9 and AM-10 are presented in Tables 4-1 (northern boundary) and 4-2 (western boundary) and discussed below.

For the northern boundary monitoring wells, results from statistical analysis of the AM-9 and AM-10 data were generally consistent with results of the AM-1 to AM-8 data, including recurring SSLs in multiple downgradient wells for arsenic (GW-19, -23, -24, -25, and -26), barium (GW-23, -24, -25, and -26), lithium (GW-23, -24, -25, and -26), and combined radium 226/228 (GW-23, -24, -25, and -26). As documented in the CCR unit's 2019 Appendix IV ASD, multiple LOE indicate that the elevated concentrations of barium and combined radium 226/228 can be attributed to

historical and current oil and gas exploration and production activities that have occurred at the site, and that a high potential exists that the elevated lithium concentrations are also attributable to these oil and gas activities. During AM-9 and AM-10 there was also a recurring SSL for molybdenum in GW-20 (molybdenum was first identified as a potential SSL in GW-20 during AM-3 and AM-4, but the exceedances were attributed to sample turbidity issues, which was later confirmed by results below the associated GWPS during AM-5 and AM-6). However, recurrence of the molybdenum GWPS exceedances during AM-7 and AM-8 and continuing during AM-9 and AM-10, during which all samples had low turbidities, indicates that this parameter is an SSL in GW-20. As such, appropriate notification of the SSL, performing an Appendix IV ASD to determine if a source other than the CCR units may be causing the molybdenum SSLs, and characterizing the N&E of the molybdenum release will be performed in accordance with the associated CCR Rule requirements cited in Section 2.4 of this report.

In addition to the SSLs discussed above, there were also new SSLs identified for beryllium, chromium, cobalt, and lead for GW-26 during AM-9 and/or AM-10. However, as discussed in Section 2.2, GW-26 was sampled with a HYDRASleeve™ due to the low standing water depths, and this sampling method resulted in the samples being extremely turbid. In accordance with the CCR unit's GWMP, in the event that sampling methods other than low-flow pumping are required for a given well, a separate set of field-filtered samples are collected for that well and analyzed for dissolved concentrations to allow for a determination of sample turbidity effects. The tables below present the total and dissolved concentrations for the four new SSL parameters along with the corresponding total to dissolved (T:D) concentration ratios for each event.

	GW-26 (AM-9)			
	Beryllium	**Chromium**	**Cobalt**	**Lead**
Total	0.008361	Not an SSL	0.042818	0.042134
Dissolved	0.00022		0.000475	0.0011
T:D Ratio	38.0		90.1	38.3

Note: All concentrations reported above are in mg/L.

	GW-26 (AM-10)			
	Beryllium	**Chromium**	**Cobalt**	**Lead**
Total	0.011734	0.2327	0.096496	0.078415
Dissolved	0.000088	0.0018	0.00019	0.00044
T:D Ratio	133.3	129.3	507.9	178.2

Note: All concentrations reported above are in mg/L.

Looking at this data it is seen that the T:D ratios are very high for all four parameters and are indicative of significant turbidity effects on the measured beryllium, chromium, cobalt, and lead concentrations in the well. Although lithium was determined during the Appendix IV ASD to be attributable to oil and gas activities, turbidity is also a contributing factor in GW-26 with lithium total to dissolved ratios of 9.5 and 23 for AM-9 and AM-10, respectively.

For the western boundary monitoring wells, results from statistical analysis of the AM-9 and AM-10 data were generally consistent with results of the AM-1 to AM-8 data, with a recurring SSL for arsenic limited to downgradient well GW-29. However, during AM-10, arsenic concentrations in GW-29 were just below the GWPS (0.01 mg/L) with a measured concentration of 0.009188 mg/L. There was also a recurring SSL in GW-29 during AM-9 and AM-10 for lithium that was first identified during both AM-7 and AM-8. After a first-time GWPS exceedance for combined radium 226/228 was identified in GW-27 during AM-8, combined radium 226/228 was below its respective GWPS during AM-10. As documented in the CCR unit's 2019 Appendix IV ASD, multiple LOE indicate that the elevated concentrations of combined radium 226/228 can be attributed to historical and current oil and gas exploration and production activities that have occurred at the site, and that a high potential exists that the elevated lithium concentrations are also attributable to these oil and gas activities.

Taking into account the ASD exclusions for barium, combined radium 226/228, and lithium, the turbidity issues with GW-26 resulting in elevated metals concentrations, and the data presented in Tables 4-1 and 4-2, arsenic and molybdenum were the only Appendix IV constituents detected at SSLs above their respective GWPS under the CCR units' AM program during the reporting period, and arsenic currently remains the only parameter that is the focus of ongoing SoR activities for the CCR units (pending the findings of the forthcoming molybdenum ASD) as discussed in Section 5.0 of this report.

5.0 SELECTION OF REMEDY

As previously noted in Section 2.3 of this report, throughout 2022 the CCR unit remained in AM with ongoing SoR activities being performed. As detailed in the CCR units' 2019 ACM Report, the evaluation of viable remediation technologies for addressing arsenic in groundwater at the site determined that Monitored Natural Attenuation (MNA), combined with source control by the eventual installation of a final cover system on the CCR units, ranked highest among the evaluated options. Therefore, the 2022 SoR activities were focused on developing additional information and data to determine if the preferred remedy identified during the ACM meets the performance standards listed in 40 CFR § 257.97(b), while considering the evaluation factors listed in § 257.97(c).

5.1 CURRENT STATUS OF THE SELECTION OF REMEDY PROGRAM

As outlined in the Semi-Annual SoR Progress reporting included as Attachment B of this report, the following activities were performed during the current reporting period to support final remedy selection at the site:

- In order to better characterize the extent of arsenic in groundwater and to evaluate potential natural attenuation impacts on arsenic concentrations downgradient of the CCR units, the last of the new downgradient monitoring wells (GW-30) was installed and developed as detailed in Section 2.1.1 of this report.
- Two rounds of SoR/N&E of Release characterization sampling for GW-31, -32, -33A, and -34 were completed between February 1 and 3, 2022, and between December 28 and 30, 2022. However, due to an insufficient recoverable volume of water, GW-30 could not be sampled during the December 2022 event. Additionally, due to an issue with the portable pump, GW-34 was sampled by bailer for both the February and December 2022 events. The results from the February SoR/N&E sampling event are presented in Table 5-1 (laboratory results from the December 2022 sampling event had not yet been received at the time this report was prepared). In addition to arsenic, analyses were performed for all other CCR Rule Appendix III and Appendix IV parameters in order to begin building a background dataset for use when the wells are eventually incorporated into the AM and/or CAM network.
- The 2021 drilling work for GW-33B was suspended due to formation instability/repeated borehole collapse and return of significant volumes of natural oil and gas in the drill cuttings. In early 2022, an assessment of alternative drilling methods to prevent borehole

collapse and to control the release of natural oil and gas for GW-33B was performed. It was determined that installation of this well at or near its originally targeted location could not be performed safely, so it was removed from the 2022 work plan which instead focused on the installation of GW-30. As additional data from the other new SoR/N&E of Release wells is collected, the potential need, value, and risks associated with installing GW-33B will be reassessed at a future date..

- Continued development of a Natural Attenuation Evaluation Work Plan to include evaluating historic concentrations of parameters which can affect the natural attenuation of arsenic (e.g., iron, pH, ORP, etc.) as well as planning the sampling and analysis program that would be associated with future MNA activities.
- Continued a review of candidate technologies with regard to their potential to meet the performance standards listed in § 257.97(b) and the evaluation factors listed in § 257.97(c).
- Assessed March and August 2022 groundwater flow patterns in the monitoring network areas downgradient of the CCR units and confirmed they were consistent with established flow patterns at the site. Water level data from GW-30, -31, -32, -33B, and -34 were not included in these assessments as they were collected at different times than the AM event data and were also exhibiting a continuing trend of post-development water level stabilization.
- Completed statistical evaluations of the AM-9 and AM-10 analytical data to determine whether there were any detected Appendix IV parameters at SSLs above the CCR unit's established GWPS other than arsenic and those previously determined by the 2019 Appendix IV ASD to be attributable to other sources, with molybdenum identified as an SSL above its respective GWPS in a single well. SSLs for beryllium, chromium, cobalt, and lead in GW-26 during AM-9 and/or AM-10 are attributable to sample turbidity.

Ongoing and/or new SoR activities that are planned for 2023 have been included in Section 2.4 of this report.

TABLES

TABLE 2-1
CCR RULE GROUNDWATER MONITORING SYSTEM WELL SUMMARY
McELROY's RUN CCB DISPOSAL FACILITY – 2022 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

Well	Year Installed	Formation Monitored	Ground Surface Elevation (ft MSL)	Total Well Depth (ft bgs)	Monitored Interval (ft bgs)	Monitored Interval (ft MSL)	Casing ID and Material
Certified Upgradient (Background) Monitoring Wells							
GW-7	1994	Grafton SS, Ames LS	918.40	101.2	75.7 – 100.7	817.70 – 842.70	4" - Sch. 40 PVC
GW-21*	2016	Morgantown SS	1033.01	234.2	214.2 – 234.2	798.77 – 818.77	2" - Sch. 40 PVC
GW-22*	2016	Morgantown SS	1045.18	370.2	350.2 – 370.2	675.02 – 695.02	2.5" - Sch. 80 PVC
Certified Downgradient Monitoring Wells							
GW-9	1994	Ames LS, Jane Lew SS, Pittsburgh RB	797.42	177.7	137.2 – 177.2	620.22 – 660.22	4" - Sch. 40 PVC
GW-19	1995	Birmingham RB, Grafton SS, Ames LS	920.64	238.9	198.9 – 238.9	681.74 – 721.74	2" - Sch. 40 PVC
GW-20	1995	Lower Clarksburg RB	923.00	150.5	100.5 – 150.5	772.50 – 822.50	2" - Sch. 40 PVC
GW-23	2016	Grafton SS	974.40	392.9	372.9 – 392.9	581.53 – 601.53	2.5" - Sch. 80 PVC
GW-24	2016	Grafton SS	941.55	271.1	251.1 – 271.1	670.50 – 690.50	2" - Sch. 40 PVC
GW-25	2016	Grafton SS	1006.22	303.7	283.7 – 303.7	702.53 – 722.53	2" - Sch. 40 PVC
GW-26	2016	Grafton SS	984.16	288.2	268.2 – 288.2	695.95 – 715.95	2" - Sch. 40 PVC
GW-27	2016	Saltsburg SS	675.30	48.3	38.3 – 48.3	626.96 – 636.96	2" - Sch. 40 PVC
GW-28	2016	Saltsburg SS	801.95	175.6	165.6 – 175.6	626.38 – 636.38	2" - Sch. 40 PVC
GW-29	2016	Grafton SS	928.49	166.0	156.0 – 166.0	762.45 – 772.45	2" - Sch. 40 PVC
Nature & Extent of Release Characterization Wells**							
GW-30**	2022	Grafton SS	733.80	114.0	86.0 – 114.0	619.80– 647.80	4" - Sch. 40 PVC
GW-31**	2021	Grafton SS	1044.68	360.0	333.0 – 361.0	683.68 – 711.68	4" - Sch. 80 PVC
GW-32**	2021	Grafton SS	918.64	424.0	398.0 – 426.0	492.64 – 520.64	4" - Sch. 80 PVC
GW-33A**	2021	Morgantown SS	1052.42	467.0	432.0 – 467.0	585.42 – 620.42	4" - Sch. 80 PVC
GW-34**	2021	Grafton SS	1043.68	543.5	515.0 – 548.0	495.68 – 528.68	4" - Sch. 80 PVC

Notes: SS = sandstone LS = limestone RB = red beds MSL = mean sea level bgs = below ground surface ID = inside diameter PVC = polyvinyl chloride

* = Currently used only for water level measurements

** = Not currently part of certified monitoring network but may transition to use as Corrective Action Monitoring wells and/or be incorporated as new Assessment Monitoring wells in the certified monitoring well network

			APPENDIX III (all Chemical Constituents reported as TOTAL RECOVERABLE)[1]							APPENDIX IV (all Chemical Constituents reported as TOTAL RECOVERABLE)[1]													
SAMPLING EVENT NO.[2]	WELL ID[3]	SAMPLE DATE	BORON METALS MG/L	CALCIUM METALS MG/L	CHLORIDE MISC MG/L	FLUORIDE MISC MG/L	PH[4] MISC S.U.	SULFATE MISC MG/L	TDS MISC MG/L	ANTIMONY METALS MG/L	ARSENIC METALS MG/L	BARIUM METALS MG/L	BERYLLIUM METALS MG/L	CADMIUM METALS MG/L	CHROMIUM METALS MG/L	COBALT METALS MG/L	LEAD METALS MG/L	LITHIUM METALS MG/L	MERCURY METALS MG/L	MOLYBDENUM METALS MG/L	SELENIUM METALS MG/L	THALLIUM METALS MG/L	RADIUM-226 RADIOCHEM PCI/L	RADIUM-228 RADIOCHEM PCI/L
20 (AM-9)	GW-7	3/17/2022	0.2865	2.74	123	7.965 J-	8.32	0.0385 U	1340	0.003 U	0.0008 U	0.083022	0.00022 U	0.001 U	0.0045 U	0.000475 U	0.0011 U	0.025294	0.000163 U	0.00315 U	0.00425 U	0.0004 U	NA	NA
21 (AM-10)	GW-7	8/25/2022	0.2769	1.5699	123	8.2066	8.44	0.1495 J	1305	0.0012 U	0.000591 J	0.7938	0.000088 U	0.0004 U	0.0018 U	0.00019 U	0.00044 U	0.022597	0.000163 U	0.00126 U	0.0017 U	0.00016 U	0.0322 U	1.75
20 (AM-9)	GW-9	3/21/2022	0.1056 J	11.618	7.27 J-	0.23	7.81	119	808	0.0012 U	0.000343 J	0.059099	0.000088 U	0.0004 U	0.0018 U	0.00019 U	0.00044 U	0.017463	0.000163 U	0.00126 U	0.0017 UJ	0.00016 U	NA	NA
21 (AM-10)	GW-9	8/24/2022	0.1394 J	7.0293	62.08	0.7558	8.05	22.82	1100	0.0012 U	0.001211	0.095696	0.000088 U	0.0004 U	0.0018 U	0.00019 U	0.00044 U	0.016572	0.000163 U	0.00126 U	0.0017 U	0.00016 U	0.108 U	1.25
20 (AM-9)	GW-19	3/22/2022	0.2214	9.83	580	1.576	7.64	0.0385 U	2490	0.0012 U	0.130301	1.26111	0.000088 U	0.0004 U	0.0018 U	0.00019 U	0.00044 U	0.018949	0.000163 U	0.00126 U	0.0017 UJ	0.00016 U	NA	NA
20 (AM-9)	GW-19 (D)	3/22/2022	0.2231	9.85	608	1.582	7.64	0.0385 U	2344	0.0012 U	0.127942	1.19767	0.000088 U	0.0004 U	0.0018 U	0.00019 U	0.00044 U	0.018883	0.000163 U	0.00126 U	0.0017 UJ	0.00016 U	NA	NA
21 (AM-10)	GW-19	8/30/2022	0.2159	10.782	628.8	1.8935	7.67	0.0714 U	2620	0.003 U	0.146838	1.29719	0.00022 U	0.001 U	0.0045 U	0.000475 U	0.0011 U	0.018163	0.000163 U	0.00315 U	0.00425 U	0.0004 U	1.21	1.6
20 (AM-9)	GW-20	3/17/2022	0.24	5.73	527	5.636 J-	7.75	28.1 J+	1926.667	0.003 U	0.002379	0.227373	0.00022 U	0.001 U	0.0045 U	0.000475 U	0.0011 U	0.018805	0.000163 U	0.103571 J+	0.021768	0.0004 U	NA	NA
21 (AM-10)	GW-20	8/23/2022	0.2334	5.9318	514.1	5.8367	8.13	27.72	2333.333	0.0012 U	0.002229	0.205708	0.000088 U	0.0004 U	0.0018 U	0.00019 U	0.00044 U	0.016757	0.000163 U	0.101729	0.016431	0.00016 U	0.894	0.308 U
20 (AM-9)	GW-21	3/22/2022	0.1722 J	10.778	941	1.788	8.00	143	2920	0.0012 U	0.007826	0.18367	0.000088 U	0.0004 U	0.0018 U	0.000328 J	0.00044 U	0.019174	0.000163 U	0.215269	0.026589	0.00016 U	NA	NA
21 (AM-10)	GW-21	8/24/2022	0.1874	14.2995	984.7	1.6558	8.08	158.9	3630	0.0012 U	0.00828	0.172351	0.000088 U	0.0004 U	0.005967	0.000342 J	0.000532 J	0.018779	0.000163 U	0.216405	0.026318	0.00016 U	0.21	1.18
20 (AM-9)	GW-22[5]	4/13/2022	0.163 J	16.337	439 D	1.515	7.62	48.3	1333	0.0012 U	0.163713 D	0.091541 D	0.000088 UD	0.0004 UD	0.0018 UD	0.00019 UD	0.00044 UD	0.012133 D	0.000163 U	0.061479 D	0.0017 UD	0.00016 UD	NS	NS
21 (AM-10)	GW-22	9/1/2022	0.1054 J	25.9137	110.1	1.0645	7.23	63.3	753.333	0.003 U	0.163565	0.088299	0.00022 U	0.001 U	0.0045 U	0.000475 U	0.0011 U	0.011471	0.000163 U	0.075904	0.00425 U	0.0004 U	0.169	0.308 U
20 (AM-9)	GW-23	3/16/2022	0.2378	703	12990	0.025 UJ	6.84	0.37 J+	33060	0.006 U	0.030423	13.63499	0.00044 U	0.002 U	0.009 U	0.002094	0.0022 U	0.206372	0.000163 U	0.0063 U	0.0085 U	0.0008 U	NA	NA
21 (AM-10)	GW-23	8/24/2022	0.2543	829.9933	13130	0.025 U	6.65	0.2524	33100	0.006 U	0.032199	16.17036	0.002609	0.002 U	0.009 U	0.002975	0.002765	0.197519	0.000163 U	0.0063 U	0.0085 U	0.0008 U	17.8	93.6
20 (AM-9)	GW-24	3/16/2022	0.2914	384	9850	0.025 UJ	7.05	0.866 J+	22580	0.003 U	0.026492	14.7551	0.00022 U	0.001 U	0.0045 U	0.001707	0.0011 U	0.081277	0.000163 U	0.005154 J+	0.005937	0.0004 U	NA	NA
21 (AM-10)	GW-24	8/25/2022	0.3566	419.3939	9378	0.025 U	6.97	0.0385 U	23160	0.006 U	0.03999	16.55133	0.00044 U	0.002 U	0.009 U	0.002306	0.000551 J	0.075334	0.000163 UJ	0.007678	0.0085 U	0.00016 U	18.6	47
20 (AM-9)	GW-25	3/16/2022	0.1824 J	355	9102	0.025 UJ	7.67	0.61 J+	20540	0.003 U	0.043286	10.81588	0.00022 U	0.001 U	0.0045 U	0.001108	0.0011 U	0.062561	0.000163 U	0.01162 J+	0.00425 U	0.0004 U	NA	NA
21 (AM-10)	GW-25	8/30/2022	0.1629 J	367.7429	8509	0.025 U	7.04	0.3482	21120	0.003 U	0.037157	10.66258	0.00022 U	0.001 U	0.009 U	0.001391	0.0011 U	0.061624	0.000163 U	0.01281	0.004907	0.0004 U	16.5	25.2
20 (AM-9)	GW-26	3/17/2022	0.2127	122	830	1.349 J-	8.37	0.348 J+	5380	0.006 U	0.025553	2.032152	0.008361	0.002 U	0.097124 J+	0.042818	0.042134	0.103633	0.00163 U	0.006596 J+	0.012094	0.0008 U	NA	NA
21 (AM-10)	GW-26	8/25/2022	0.1965 J	226.8313	936.1	1.4553	8.28	0.2835 J+	5400	0.0012 U	0.03871	2.89946	0.011734	0.000587 J	0.2327	0.096496	0.078415	0.198692	0.000163 U	0.007319	0.008533	0.000513	8.81	31.5
20 (AM-9)	GW-27	3/16/2022	0.0976 J	55.92	128	0.293 J-	7.56	1.654 J+	580	0.003 U	0.0008 U	1.01186	0.00022 U	0.001 U	0.0045 U	0.000475 U	0.0011 U	0.015847	0.000163 U	0.003268 J+	0.00425 U	0.0004 U	NA	NA
21 (AM-10)	GW-27	8/23/2022	0.0949 J	54.2205	127.8	0.1933	7.61	4.1318	568	0.0012 U	0.00032 U	0.963313	0.000088 U	0.0004 U	0.0018 U	0.00019 U	0.00044 U	0.015729	0.000163 U	0.004034	0.0017 U	0.00016 U	0.222 U	1.99
21 (AM-10)	GW-27 (D)	8/23/2022	0.0922 J	54.3208	127.5	0.1905	7.61	4.0602	684	0.0012 U	0.00032 U	0.931061	0.000088 U	0.0004 U	0.0018 U	0.00019 U	0.00044 U	0.015193	0.000163 U	0.004145	0.0017 U	0.00016 U	0.506	0.665 U
20 (AM-9)	GW-28	3/15/2022	0.2456	6.76	681	2.004 J-	7.74	0.613	2300	0.003 U	0.00462	0.281235	0.00022 U	0.001 U	0.0045 U	0.000475 U	0.0011 U	0.024233	0.000163 U	0.036162 J+	0.00425 U	0.0004 U	NA	NA
21 (AM-10)	GW-28	8/23/2022	0.2241	7.0972	696.7	2.1238 J+	7.73	0.773	2670	0.0012 U	0.004332	0.284538	0.000088 U	0.0004 U	0.0018 U	0.00019 U	0.00044 U	0.025376	0.000163 U	0.039006	0.0017 U	0.00016 U	0.239 U	0.903 U
20 (AM-9)	GW-29	3/15/2022	0.3303	12.29	962	1.225 J-	7.80	0.632 J+	3640	0.003 U	0.012906	1.26797	0.00022 U	0.001 U	0.0045 U	0.000475 U	0.0011 U	0.04472	0.000163 U	0.005797 J+	0.00425 U	0.0004 U	NA	NA
21 (AM-10)	GW-29	8/23/2022	0.3366	12.388	1024	1.2319 J+	7.79	0.6088	4240	0.0012 U	0.009188	1.2627	0.000088 U	0.0004 U	0.0018 U	0.00019 U	0.00044 U	0.047222	0.000163 U	0.005758	0.0017 U	0.00016 U	0.165 U	0.142 U

NOTES:

[1] Lab analyses were completed by Beta Lab and Eurofins/TestAmerica Laboratories, Inc., both of which are accredited/certified laboratories: Beta Lab NSF/ISR ISO 9001:2015 Cert. No. 83761-IS8 (Exp. 01-16-24) and Eurofins/TestAmerica WVDEP Certificate No. 381, Expiration Date: 10-31-22.

[2] Event Nos. 20 and 21 correspond to Assessment Monitoring (AM) sampling events AM-9 and AM-10, respectively.

[3] Field duplicate samples that were taken for Quality Control purposes are noted with a (D).

[4] pH results reported are field sampling measurments as lab pH testing exceeded hold times.

[5] GW-22 was unable to be sampled during the March AM-9 event, so it was sampled during a separate mobilization in April with the results included as part of AM-9. The data reported herein for GW-22 has not been validated.

NA = Parameter was not analyzed.

NS = Not sampled.

DATA QUALIFER DEFINITIONS:

The following definitions provide brief explanations of the validation qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted method detection limit for sample and method.
J	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the reporting limit).
J+	The result is an estimated quantity, but the result may be biased high.
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 detection limit is approximate and may be inaccurate or imprecise.
R	The sample result (detected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in sample
UR	The sample result (nondetected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in sample.

Northern Boundary							Event 20 (AM-9) Downgradient Wells							
Parameter	Units	Data Distribution for Upgradient Well GW-7	UPL Type	UPL Value[a,b]	Federal MCLs/RSLs	GWPS	GW-9	GW-19	GW-20	GW-23	GW-24	GW-25	GW-26	Event 20 (AM-9) Upgradient Well GW-7
Antimony	mg/L	Unknown	Poisson	0.00133	0.006	0.006	<0.0012	<0.0012	<0.003	<0.006	<0.003	<0.003	<0.006	<0.003 U
Arsenic	mg/L	Unknown	Poisson	0.00682	0.01	0.01	0.000343	0.1291215	0.002379	0.030423	0.026492	0.043286	0.025553	<0.0008 U
Barium	mg/L	Log−Normal	Parametric	0.0934	2	2	0.059099	1.22939	0.227373	13.63499	14.7551	10.81588	2.032152	0.083022
Beryllium	mg/L	Unknown[c]	DQ[d]	NA	0.004	0.004	<0.000088	<0.000088	<0.00022	<0.00044	<0.00022	<0.00022	0.008361	<0.00022 U
Cadmium	mg/L	Unknown[c]	DQ[d]	NA	0.005	0.005	<0.0004	<0.0004	<0.001	<0.002	<0.001	<0.001	<0.002	<0.001 U
T. Chromium	mg/L	Unknown[c]	DQ[d]	NA	0.1	0.1	<0.0018	<0.0018	<0.0045	<0.009	<0.0045	<0.0045	0.097124	<0.0045 U
Cobalt	mg/L	Unknown[c]	DQ[d]	NA	0.006	0.006	<0.00019	<0.00019	<0.000475	0.002094	0.001707	0.001108	0.042818	<0.000475 U
Fluoride	mg/L	Normal	Parametric	9.291	4	9.291	0.23	1.579	*5.636*	<0.025	<0.025	<0.025	1.349	7.965 J-
Lead	mg/L	Unknown[c]	DQ[d]	NA	0.015	0.015	<0.00044	<0.00044	<0.0011	<0.0022	<0.0011	<0.0011	0.042134	<0.0011 U
Lithium	mg/L	Normal	Parametric	0.023374	0.04	0.04	0.017463	0.018916	0.018805	0.206372	0.081277	0.062561	0.103633	0.025294
Mercury	mg/L	Unknown	Poisson	0.00031	0.002	0.002	<0.000163	<0.000163	<0.000163	<0.000163	<0.000163	<0.000163	<0.00163	<0.000163 U
Molybdenum	mg/L	Log−Normal	Parametric	0.006805	0.1	0.1	<0.00126	<0.00126	0.103571	<0.0063	0.005154	0.01162	0.006596	<0.00315 U
Selenium	mg/L	Unknown[c]	DQ[d]	NA	0.5	0.5	<0.0017	<0.0017	0.021768	<0.0085	0.005937	<0.00425	0.012094	<0.00425 U
Thallium	mg/L	Unknown[c]	DQ[d]	NA	0.002	0.002	<0.00016	<0.00016	<0.0004	<0.0008	<0.0004	<0.0004	<0.0008	<0.0004 U
Sum Ra226+Ra228	pCi/L	Unknown	Poisson	0.58	5	5	NA[e]	NA[e]	NA[e]	NA[e]	NA[e]	NA[e]	NA[e]	NA[e]

[a]Prediction Limits calculated using 5% alpha.

[b]Upper Prediction Limit used for all parameters.

[c]Data distribution set to Unknown if all values non-detect in upgradient well.

[d]DQ is Double Quantification Rule. If two successive, independent detected values occur, that would be an SSI and also an SSL if > GWPS. However, if value was detected in upgradient well during the same sampling event, would use Poisson PL instead.

[e]Not Analyzed

#.#### = UPL > Result > MCL/RSL

= SSI < GWPS

= SSI > GWPS

= DQ Parameter with Verification Sampling Needed

Northern Boundary							Event 21 (AM-10) Downgradient Wells							
Parameter	Units	Data Distribution for Upgradient Well GW-7	UPL Type	UPL Value[a,b]	Federal MCLs/RSLs	GWPS	GW-9	GW-19	GW-20	GW-23	GW-24	GW-25	GW-26	Event 21 (AM-10) Upgradient Well GW-7
Antimony	mg/L	Unknown	Poisson	0.00133	0.006	0.006	<0.0012	<0.003	<0.0012	<0.0006	<0.006	<0.003	<0.0012	<0.0012 U
Arsenic	mg/L	Unknown	Poisson	0.00682	0.01	0.01	0.001211	0.146838	0.002229	0.032199	0.03999	0.037157	0.03871	0.000591 J
Barium	mg/L	Log−Normal	Parametric	0.0934	2	2	0.095696	1.29719	0.205708	16.17036	16.55133	10.66258	2.89946	0.07938
Beryllium	mg/L	Unknown[c]	DQ[d]	NA	0.004	0.004	<0.000088	<0.00022	<0.000088	0.002609	<0.00044	<0.00022	0.011734	<0.000088 U
Cadmium	mg/L	Unknown[c]	DQ[d]	NA	0.005	0.005	<0.0004	<0.001	<0.0004	<0.002	<0.002	<0.001	0.000587	<0.0004 U
T. Chromium	mg/L	Unknown[c]	DQ[d]	NA	0.1	0.1	<0.0018	<0.0045	<0.0018	<0.009	<0.009	<0.009	0.2327	<0.0018 U
Cobalt	mg/L	Unknown[c]	DQ[d]	NA	0.006	0.006	<0.00019	<0.000475	<0.00019	0.002975	0.002306	0.001391	0.096496	<0.00019 U
Fluoride	mg/L	Normal	Parametric	9.291	4	9.291	0.7558	1.8935	*5.8367*	<0.025	<0.025	<0.025	1.4553	8.2066
Lead	mg/L	Unknown[c]	DQ[d]	NA	0.015	0.015	<0.00044	<0.0011	<0.00044	0.002765	0.000551	<0.0011	0.078415	<0.00044 U
Lithium	mg/L	Normal	Parametric	0.023374	0.04	0.04	0.016572	0.018163	0.016757	0.197519	0.075334	0.061624	0.198692	0.022597
Mercury	mg/L	Unknown	Poisson	0.00031	0.002	0.002	<0.000163	<0.000163	<0.000163	<0.000163	<0.000163	<0.000163	<0.000163	<0.000163 U
Molybdenum	mg/L	Log−Normal	Parametric	0.006805	0.1	0.1	<0.00126	<0.00315	0.101729	<0.0063	0.007678	0.01281	0.007319	<0.00126 U
Selenium	mg/L	Unknown[c]	DQ[d]	NA	0.5	0.5	<0.0017	<0.00425	0.016431	<0.0085	<0.0085	0.004907	0.008533	<0.0017 U
Thallium	mg/L	Unknown[c]	DQ[d]	NA	0.002	0.002	<0.00016	<0.0004	<0.00016	<0.0008	<0.00016	<0.0004	0.000513	<0.00016 U
Sum Ra226+Ra228	pCi/L	Unknown	Poisson	0.58	5	5	1.304	2.81	1.048	111.4	65.6	41.7	40.31	1.7661

[a]Prediction Limits calculated using 5% alpha.

[b]Upper Prediction Limit used for all parameters.

[c]Data distribution set to Unknown if all values non-detect in upgradient well.

[d]DQ is Double Quantification Rule. If two successive, independent detected values occur, that would be an SSI and also an SSL if > GWPS. However, if value was detected in upgradient well during the same sampling event, would use Poisson PL instead.

#.#### = UPL > Result > MCL/RSL

= SSI < GWPS

= SSI > GWPS

= DQ Parameter with Verification Sampling Needed

TETRA TECH

Western Boundary							Event 20 (AM-9) Downgradient Wells								Event 20 (AM-9) Upgradient Well GW-7	
Parameter	Units	Data Distribution for Upgradient Well GW-7	UPL Type	UPL Value[a,b]	Federal MCLs/RSLs	GWPS	GW-27	GW-28	GW-29							
Antimony	mg/L	Unknown	Poisson	0.00133	0.006	0.006	<0.003	<0.003	<0.003						<0.003	U
Arsenic	mg/L	Unknown	Poisson	0.00682	0.01	0.01	<0.0008	0.00462	0.012906						<0.0008	U
Barium	mg/L	Log−Normal	Parametric	0.0934	2	2	1.01186	0.281235	1.26797						0.083022	
Beryllium	mg/L	Unknown[c]	DQ[d]	NA	0.004	0.004	<0.00022	<0.00022	<0.00022						<0.00022	U
Cadmium	mg/L	Unknown[c]	DQ[d]	NA	0.005	0.005	<0.001	<0.001	<0.001						<0.001	U
T. Chromium	mg/L	Unknown[c]	DQ[d]	NA	0.1	0.1	<0.0045	<0.0045	<0.0045						<0.0045	U
Cobalt	mg/L	Unknown[c]	DQ[d]	NA	0.006	0.006	<0.000475	<0.000475	<0.000475						<0.000475	U
Fluoride	mg/L	Normal	Parametric	9.291	4	9.291	0.293	2.004	1.225						7.965	J-
Lead	mg/L	Unknown[c]	DQ[d]	NA	0.015	0.015	<0.0011	<0.0011	<0.0011						<0.0011	U
Lithium	mg/L	Normal	Parametric	0.023374	0.04	0.04	0.015847	0.024233	0.04472						0.025294	
Mercury	mg/L	Unknown	Poisson	0.00031	0.002	0.002	<0.000163	<0.000163	<0.000163						<0.000163	U
Molybdenum	mg/L	Log−Normal	Parametric	0.006805	0.1	0.1	0.003268	0.036162	0.005797						<0.00315	U
Selenium	mg/L	Unknown[c]	DQ[d]	NA	0.5	0.5	<0.00425	<0.00425	<0.00425						<0.00425	U
Thallium	mg/L	Unknown[c]	DQ[d]	NA	0.002	0.002	<0.0004	<0.0004	<0.0004						<0.0004	U
Sum Ra226+Ra228	pCi/L	Unknown	Poisson	0.58	5	5	NA[e]	NA[e]	NA[e]						NA[e]	

[a]Prediction Limits calculated using 5% alpha.

[b]Upper Prediction Limit used for all parameters.

[c]Data distribution set to Unknown if all values non-detect in upgradient well.

[d]DQ is Double Quantification Rule. If two successive, independent detected values occur, that would be an SSI and also an SSL if > GWPS. However, if value was detected in upgradient well during the same sampling event, would use Poisson PL instead.

[e]Not Analyzed

#.#### = UPL > Result > MCL/RSL

= SSI < GWPS

= SSI > GWPS

= DQ Parameter with Verification Sampling Needed

Western Boundary							Event 21 (AM-10) Downgradient Wells								Event 21 (AM-10) Upgradient Well GW-7	
Parameter	Units	Data Distribution for Upgradient Well GW-7	UPL Type	UPL Value[a,b]	Federal MCLs/RSLs	GWPS	GW-27	GW-28	GW-29							
Antimony	mg/L	Unknown	Poisson	0.00133	0.006	0.006	<0.0012	<0.0012	<0.0012						<0.0012	U
Arsenic	mg/L	Unknown	Poisson	0.00682	0.01	0.01	<0.00032	0.004332	0.009188						0.000591	J
Barium	mg/L	Log−Normal	Parametric	0.0934	2	2	0.947187	0.284538	1.2627						0.07938	
Beryllium	mg/L	Unknown[c]	DQ[d]	NA	0.004	0.004	<0.000088	<0.000088	<0.000088						<0.000088	U
Cadmium	mg/L	Unknown[c]	DQ[d]	NA	0.005	0.005	<0.0004	<0.0004	<0.0004						<0.0004	U
T. Chromium	mg/L	Unknown[c]	DQ[d]	NA	0.1	0.1	<0.0018	<0.0018	<0.0018						<0.0018	U
Cobalt	mg/L	Unknown[c]	DQ[d]	NA	0.006	0.006	<0.00019	<0.00019	<0.00019						<0.00019	U
Fluoride	mg/L	Normal	Parametric	9.291	4	9.291	0.1919	2.1238	1.2319						8.2066	
Lead	mg/L	Unknown[c]	DQ[d]	NA	0.015	0.015	<0.00044	<0.00044	<0.00044						<0.00044	U
Lithium	mg/L	Normal	Parametric	0.023374	0.04	0.04	0.015461	0.025376	0.047222						0.022597	
Mercury	mg/L	Unknown	Poisson	0.00031	0.002	0.002	<0.000163	<0.000163	<0.000163						<0.000163	U
Molybdenum	mg/L	Log−Normal	Parametric	0.006805	0.1	0.1	0.0040895	0.039006	0.005758						<0.00126	U
Selenium	mg/L	Unknown[c]	DQ[d]	NA	0.5	0.5	<0.0017	<0.0017	<0.0017						<0.0017	U
Thallium	mg/L	Unknown[c]	DQ[d]	NA	0.002	0.002	<0.00016	<0.00016	<0.00016						<0.00016	U
Sum Ra226+Ra228	pCi/L	Unknown	Poisson	0.58	5	5	1.46975	<1.142	<0.307						1.7661	

[a]Prediction Limits calculated using 5% alpha.

[b]Upper Prediction Limit used for all parameters.

[c]Data distribution set to Unknown if all values non-detect in upgradient well.

[d]DQ is Double Quantification Rule. If two successive, independent detected values occur, that would be an SSI and also an SSL if > GWPS. However, if value was detected in upgradient well during the same sampling event, would use Poisson PL instead.

#.#### = UPL > Result > MCL/RSL

= SSI < GWPS

= SSI > GWPS

= DQ Parameter with Verification Sampling Needed

TETRA TECH

			APPENDIX III (all Chemical Constituents reported as TOTAL RECOVERABLE)[1]							APPENDIX IV (all Chemical Constituents reported as TOTAL RECOVERABLE)[1]														
SAMPLING EVENT NO.[2]	WELL ID[3]	SAMPLE DATE	BORON METALS MG/L	CALCIUM METALS MG/L	CHLORIDE MISC MG/L	FLUORIDE MISC MG/L	PH[4] MISC S.U.	SULFATE MISC MG/L	TDS MISC MG/L	ANTIMONY METALS MG/L	ARSENIC METALS MG/L	BARIUM METALS MG/L	BERYLLIUM METALS MG/L	CADMIUM METALS MG/L	CHROMIUM METALS MG/L	COBALT METALS MG/L	LEAD METALS MG/L	LITHIUM METALS MG/L	MERCURY METALS MG/L	MOLYBDENUM METALS MG/L	SELENIUM METALS MG/L	THALLIUM METALS MG/L	RADIUM-226 RADIOCHEM PCI/L	RADIUM-228 RADIOCHEM PCI/L
22 (NE-3)	GW-30[5]	12/28/2022	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
19 (NE-2)	GW-31	2/2/2022	0.2078	10.380	296 D	1.368	8.4	24.0	1355	0.003167 D	0.023757 D	0.284307 D	0.001116 D	<0.0004 UD	0.033449 D	0.002801 D	0.005919 D	0.012955 D	<0.000163 U	0.041159 D	<0.0017 UD	0.000333 D	0.253 U	1.41 G
19 (NE-2)	GW-32	2/3/2022	0.2259	507	9220 D	<0.025 U	7.49	0.2870	18660	<0.015 UD	0.012818 D	7.01795 D	<0.000088 UD	<0.005 UD	<0.0225 UD	<0.00238 UD	<0.00044 UD	0.193423 D	<0.000163 U	<0.0158 UD	<0.0017 UD	<0.00016 UD	20.7	42.0
19 (NE-2)	GW-32 (D)	2/3/2022	0.2276	521	8811 D	<0.025 U	7.49	<0.0385 U	17108	<0.0012 UD	0.013683 D	7.10585 D	<0.000088 UD	<0.0004 UD	<0.0225 UD	0.000599 JD	<0.00044 UD	0.202227 D	<0.000163 U	0.010301 D	<0.0017 UD	<0.00016 UD	19.4	41.5
19 (NE-2)	GW-33A	2/3/2022	0.2497	113	3917 D	<0.025 U	7.98	70.2	7930	<0.0012 UD	0.137891 D	1.10995 D	<0.000088 UD	<0.0004 UD	<0.009 UD	0.000818 JD	<0.00044 UD	0.076944 D	<0.000163 U	0.036425 D	<0.0017 UD	<0.00016 UD	4.83	7.09
19 (NE-2)	GW-34	2/1/2022	0.1318 J	30.252	782 D	2.064	8.62	128	2055	0.001531 JD	0.013918 D	0.117902 D	<0.000088 UD	<0.0004 UD	<0.0018 UD	0.000867 JD	0.001039 D	0.011050 D	<0.000163 U	0.061831 D	<0.0017 UD	<0.00016 UD	0.222 U	0.0690 U

NOTES:

[1] Lab analyses were completed by Beta Lab and Eurofins/TestAmerica Laboratories, Inc., both of which are accredited/certified laboratories: Beta Lab NSF/ISR ISO 9001:2015 Cert. No. 83761-IS8 (Exp. 01-16-24) and Eurofins/TestAmerica WVDEP Certificate No. 381, Expiration Date: 10-31-22.

[2] Event Nos. 19 and 22 correspond to Nature and Extent (N&E) sampling events NE-2 and NE-3, respectively.

[3] Field duplicate samples that were taken for Quality Control purposes are noted with a (D).

[4] pH results reported are field sampling measurments as lab pH testing exceeded hold times.

[5] GW-30 not sampled during NE-3 due to insufficient volume of recoverable water in well.

NA = Parameter was not analyzed.

NS = Not sampled.

DATA QUALIFER DEFINITIONS:

The following definitions provide brief explanations of the validation qualifiers assigned to results in the data review process.

D	Sample dilution performed.
JD	The analyte was positively identified, but the concentration is estimated and falls between the Method Detection Limit and Reporting Limit for a diluted sample.
UD	The analyte was analyzed for, but was not detected for a diluted sample.
G	The minimum detectable concentration of the sample is greater than the requested reporting limit.
U	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted method detection limit for sample and method.
J	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the reporting limit).
J+	The result is an estimated quantity, but the result may be biased high.
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 detection limit is approximate and may be inaccurate or imprecise.
R	The sample result (detected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in sample
UR	The sample result (nondetected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in sample.

FIGURES

PGH P:\GIS\FIRST_ENERGY\MAPDOCS\MCELROYS_RUN\MCELROYSRUN_GWMONITORING_2022_03MAR_20230116.MXD 1/27/2023 TIM.TEAFORD

References:
1. Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (©2021 ESRI and its data suppliers).
2. Contours obtained from the West Virginia GIS Technical Center.
3. Pre-CCR Rule monitoring well locations were obtained from "Groundwater Quality at the Pleasants and Willow Island Power Plants, Pleasants County, West Virginia"; EPRI Research Project: 9106; Site Investigation Report; dated April 1999.
4. Approximate Waste Boundary lines were obtained from FirstEnergy Drawing Nos. C7950106, Rev. A (Sheets 1 and 2) and C7950868, Rev. A.
5. Approximate Parcel Boundary obtained from FirstEnergy Drawing No. C7950064, Rev. A (Sheets 1 through 3), dated 2/14/1997; Moody Land Surveying, LLC, Legal Description and Plat (Grant District, Deed Book 246/679, Tax Map 3, Parcel 3 and Part of 4), dated 10/11/2021; and Moody Land Surveying, LLC, Legal Description and Plat (Grant District, Deed Book 294/310, Parts of Tax Maps 2-76, 3-1, and 3-2, Parts of Parcels 1, 2, and 76), dated 12/14/2021.
6. Monitoring wells GW-21 through GW-29 were installed by Tetra Tech, Inc. in July/August 2016. As-built well locations were obtained by field survey performed by Tetra Tech, Inc. on 8-12-2016.
7. Monitoring wells GW-30 through GW-34 were installed and field surveyed by Tetra Tech, Inc. in 2021 (August through December) and 2022 (March through April).

GW-30 (SoR/N&E Well - Not Part of 2022 CCR Monitoring Program)

GW-31 (SoR/N&E Well - Not Part of 2022 CCR Monitoring Program)

GW-32 (SoR/N&E Well - Not Part of 2022 CCR Monitoring Program)

GW-33A (SoR/N&E Well - Not Part of 2022 CCR Monitoring Program)

GW-34 (SoR/N&E Well - Not Part of 2022 CCR Monitoring Program)

Sedimentation Ponds

McElroy's Run Landfill

McElroy's Run Disposal Impoundment

GW-19 (715.99)
GW-26 (702.82)
GW-9 (688.25)
GW-3* (NM)
GW-25 (712.13)
GW-4* (829.85)
GW-16A (652.04)
GW-27 (666.68)
GW-17 (652.55)
MP-4 (646.70)
MP-3 (643.19)
GW-28 (677.64)
GW-24 (712.53)
GW-23 (672.01)
GW-8 (764.80)
GW-29 (787.58)
GW-20* (832.42)
GW-12 (668.44)
MP-1B* (864.29)
GW-5* (891.21)
GW-22 (738.77)
GW-7 (891.09)
GW-21 (807.25)

N

1,000 0 1,000 Feet

Legend

- Pre-CCR Rule Monitoring Well
- Post-CCR Rule Monitoring Well
- GW-# CCR Monitoring Well
- GW-#* Not Used For Contouring Due To Different Groundwater Flow Zone Being Monitored
- Approximate Waste Boundary
- Approximate Parcel Boundary
- Groundwater Elevation Contour (50-foot)
- (790.17) Groundwater Elevation March 2022 (NM = Not Monitored)
- Grafton Sandstone Outcrop
- Interpreted Groundwater Flow Direction
- Topographic Contour (10-foot)

Geologic Unit Groupings
- Lower Connellsville SS/ Lower Clarksburg RB
- Morgantown SS/Birmingham RB
- Birmingham RB/Grafton SS/ Ames LS
- Grafton SS
- Ames LS/Jane Lew SS/ Pittsburgh RB
- Saltsburg SS/Alluvium

TETRA TECH

CCR RULE GROUNDWATER MONITORING SYSTEM
INTERPRETED GROUNDWATER FLOW MARCH 2022
PLEASANTS POWER STATION
McELROY'S RUN CCB DISPOSAL FACILITY

ALLEGHENY ENERGY SUPPLY COMPANY
GREENSBURG, PENNSYLVANIA

DRAWN BY: T. TEAFORD 01/27/2023
CHECKED BY: D. MOORE 01/27/2023
APPROVED BY: B. BAKER 01/27/2023

CONTRACT NUMBER: 212C-SW-00070

FIGURE NUMBER 2-1

REVISION 0

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References:
1. Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (©2021 ESRI and its data suppliers).
2. Contours obtained from the West Virginia GIS Technical Center.
3. Pre-CCR Rule monitoring well locations were obtained from "Groundwater Quality at the Pleasants and Willow Island Power Plants, Pleasants County, West Virginia"; EPRI Research Project: 9106; Site Investigation Report; dated April 1999.
4. Approximate Waste Boundary lines were obtained from FirstEnergy Drawing Nos. C7950106, Rev. A (Sheets 1 and 2) and C7950868, Rev. A.
5. Approximate Parcel Boundary obtained from FirstEnergy Drawing No. C7950064, Rev. A (Sheets 1 through 3), dated 2/14/1997; Moody Land Surveying, LLC, Legal Description and Plat (Grant District, Deed Book 246/679, Tax Map 3, Parcel 3 and Part of 4), dated 10/11/2021; and Moody Land Surveying, LLC, Legal Description and Plat (Grant District, Deed Book 294/310, Parts of Tax Maps 2-76, 3-1, and 3-2, Parts of Parcels 1, 2, and 76), dated 12/14/2021.
6. Monitoring wells GW-21 through GW-29 were installed by Tetra Tech, Inc. in July/August 2016. As-built well locations were obtained by field survey performed by Tetra Tech, Inc. on 8-12-2016.
7. Monitoring wells GW-30 through GW-34 were installed and field surveyed by Tetra Tech, Inc. in 2021 (August through December) and 2022 (March through April).

GW-30 (SoR/N&E Well - Not Part of 2022 CCR Monitoring Program)

GW-31 (SoR/N&E Well - Not Part of 2022 CCR Monitoring Program)

GW-32 (SoR/N&E Well - Not Part of 2022 CCR Monitoring Program)

GW-33A (SoR/N&E Well - Not Part of 2022 CCR Monitoring Program)

GW-34 (SoR/N&E Well - Not Part of 2022 CCR Monitoring Program)

Sedimentation Ponds

McElroy's Run Landfill

McElroy's Run Disposal Impoundment

GW-19 (715.96)
GW-26 (701.00)
GW-9 (665.65)
GW-3* (NM)
GW-25 (711.33)
GW-4* (NM)
GW-16A (NM)
GW-27 (666.21)
MP-4 (NM)
GW-17 (NM)
MP-3 (NM)
GW-28 (677.76)
GW-24 (713.76)
GW-23 (676.41)
GW-8 (NM)
GW-29 (787.20)
GW-20* (833.82)
GW-12 (NM)
MP-1B* (NM)
GW-5* (NM)
GW-22 (719.99)
GW-7 (890.12)
GW-21 (806.98)

1,000 0 1,000 Feet

N

Legend

- Pre-CCR Rule Monitoring Well
- Post-CCR Rule Monitoring Well
- GW-# CCR Monitoring Well
- GW-#* Not Used For Contouring Due To Different Groundwater Flow Zone Being Monitored
- Approximate Waste Boundary
- Approximate Parcel Boundary
- Groundwater Elevation Contour (50-foot) (dashed where inferred)
- (790.17) Groundwater Elevation August 2022 (NM = Not Monitored)
- Grafton Sandstone Outcrop
- Interpreted Groundwater Flow Direction
- Topographic Contour (10-foot)

Geologic Unit Groupings
- Lower Connellsville SS/ Lower Clarksburg RB
- Morgantown SS/Birmingham RB
- Birmingham RB/Grafton SS/ Ames LS
- Grafton SS
- Ames LS/Jane Lew SS/ Pittsburgh RB
- Saltsburg SS/Alluvium

TETRA TECH

CCR RULE GROUNDWATER MONITORING SYSTEM
INTERPRETED GROUNDWATER FLOW AUGUST 2022
PLEASANTS POWER STATION
McELROY'S RUN CCB DISPOSAL FACILITY

ALLEGHENY ENERGY SUPPLY COMPANY
GREENSBURG, PENNSYLVANIA

DRAWN BY: T. TEAFORD 01/27/2023
CHECKED BY: D. MOORE 01/27/2023
APPROVED BY: B. BAKER 01/27/2023

CONTRACT NUMBER: 212C-SW-00070

FIGURE NUMBER 2-2

REVISION 0

ATTACHMENT A

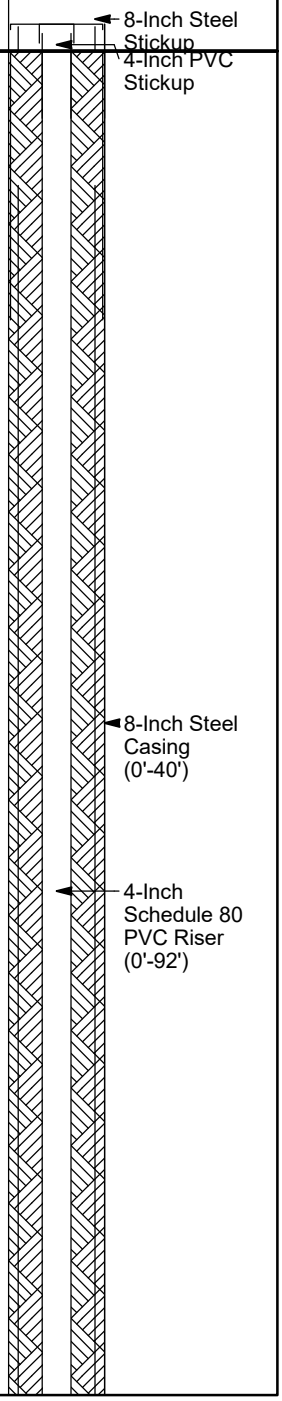
Tetra Tech, Inc.
661 Andersen Drive, Suite 2
Pittsburgh, PA 15220
Telephone: 412-921-7096

WELL NUMBER GW-30

CLIENT FirstEnergy
PROJECT NAME McElroy's Run CCB Disposal Facility
PROJECT NUMBER 212C-SW-00070
PROJECT LOCATION Pleasants County, WV
DATE STARTED 3/15/22 **COMPLETED** 3/16/22
GROUND ELEVATION 733.8 ft **HOLE SIZE** 10" OB / 6" BR
DRILLING CONTRACTOR Eichelberger's
GROUND WATER LEVELS:
DRILLING METHOD Air Rotary
AT TIME OF DRILLING ---
LOGGED BY J. Clara **CHECKED BY** T. Higby
AT END OF DRILLING 116.00 ft / Elev 617.80 ft
NOTES 8-Inch Steel casing (0-40' bgs) grouted in place
24hrs AFTER DRILLING 114.45 ft / Elev 619.35 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	Environmental Data
0			0.5 TOP SOIL, soft, wet, low plasticity, black. 733.3	
			CLAY w/ weathered SANDSTONE, stiff, wet, fat, dark brown.	
			3.0 730.8	
5			SANDSTONE, weathered, soft, fine grained to medium grained, damp, micaceous, tan.	
			8.0 725.8	
10			CLAYSTONE, soft, damp, very fine grained, limey, light brown.	
			13.0 720.8	
15			SILTY SANDSTONE, soft, damp, fine grained to medium grained, green.	
20			22.0 711.8	
			CLAYSTONE, soft, damp to wet, clay formation started to clog borehole, lost cuttings @ 25', added drill water.	
25			25.0 708.8	
			No returns, soft material, very little hammering.	
30				
35				
			38.0 695.8	
40			CLAYSTONE, soft, wet, red. 40.0 693.8	

WELL DIAGRAM



(Continued Next Page)

Tetra Tech, Inc.
661 Andersen Drive, Suite 2
Pittsburgh, PA 15220
Telephone: 412-921-7096

WELL NUMBER GW-30

CLIENT FirstEnergy **PROJECT NAME** McElroy's Run CCB Disposal Facility

PROJECT NUMBER 212C-SW-00070 **PROJECT LOCATION** Pleasants County, WV

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	Environmental Data	WELL DIAGRAM
40			LIMEY CLAYSTONE, soft to medium hard, very fine grained, dry, more competent, gray moderate HCL reaction.		Cement Bentonite Grout (0'-81')
45					
50			50.0 683.8		
			LIMEY SANDSTONE, soft to medium hard, very fine grained to fine grained, green gray, moderate HCL reaction, methane odor @ 55.0'.		
55				PID = 55	
				PID = 30.6	
60				PID = 17.3	
			63.0 670.8	PID = 12.5	
			LIMEY CLAYSTONE, soft to medium hard, very fine grained, gray, moderate HCL reaction.		
65				PID = 0	
70			70.0 663.8		
			SILTY SHALE, soft, light red to dark red, no HCL reaction.	PID = 0	
75			75.0 658.8		
			LIMEY CLAYSTONE, soft to medium hard, very fine grained, gray, moderate HCL reaction.	PID = 3.6	
80			80.0 653.8		
			SILTY SANDSTONE, medium hard, fine grained to medium grained, green gray, limey, micaceous @ 82.0'.		
			becoming shaley @ 86'0.	PID = 0.5	Bentonite Seal (81'-86')
85					

(Continued Next Page)

Tetra Tech, Inc.
661 Andersen Drive, Suite 2
Pittsburgh, PA 15220
Telephone: 412-921-7096

WELL NUMBER GW-30

CLIENT FirstEnergy **PROJECT NAME** McElroy's Run CCB Disposal Facility

PROJECT NUMBER 212C-SW-00070 **PROJECT LOCATION** Pleasants County, WV

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	Environmental Data	WELL DIAGRAM
90			88.0 645.8 SHALEY SILTSTONE, medium hard, very fine grained to fine grained, fissile, green to gray.	PID = 1.3 PID = 2.6 PID = 0	20-40 Silica Sand Filter Pack 86'-116') 0.010 Screened Interval (94'-114')
95					
100					
105					
110					
115			114.5 619.3 SHALE, medium hard, very fine grained, high organics, limey water, black. 116.0 617.8		

Bottom of borehole at 116.1 feet.

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: GW-30
Site: McElroys Run
Date Installed: 3-16-22
Date Developed: 3-17-22
Dev. Method: Surge/Purge
Pump Type: Submersible 2"

Depth to Bottom (ft.): 115.56
Static Water Level Before (ft.): 115.45
Static Water Level After (ft.): DRY
Screen Length (ft.): 20
Specific Capacity: —
Casing ID (in.): 4"

Responsible Personnel: J. CLARA
Drilling Co.: Eichelbergers
Project Name: McElroys Run CCR Well Install
Project Number: 712C-SW-0070

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ~~mS/cm~~)	Turbidity (NTU)	Remarks (odor, color, etc.)
1003	NA	—	NA	14.38	5.87	0.721	275	Added 40 gal to well
1006		5		14.01	6.46	0.672	306	Pumps 5 gal ~ 3 mins Silty
1009		10		13.98	6.76	0.673	18.1	Surged well
1012		15		14.54	7.09	0.698	846.0	
1015		20		14.39	7.24	0.690	45.1	
1018		25		14.63	7.28	0.690	428.0	Surged well
1021		30		14.78	7.28	0.695	67.3	
1024		35		15.03	7.30	0.693	53.1	Surged well
1027		40		15.25	7.33	0.698	106.0	
1030		45		15.36	7.35	0.699	39.6	Surged well
1033		50		15.52	7.36	0.704	67.4	
1036		55		15.72	7.36	0.702	25.9	
1039		60		15.72	7.38	0.707	35.9	Surged well
1042		65		15.69	7.38	0.708	17.4	
1045		70		15.67	7.37	0.712	8.7	
1048		75		15.65	7.39	0.715	5.4	Surged well
1051		80		15.60	7.37	0.718	2.3	
1054		~ 83	DRY	15.67	7.41	0.720	4.5	END

ATTACHMENT B

SEMI-ANNUAL SELECTION OF REMEDY (SoR) PROGRESS REPORT (Q1 and Q2 2022)

McELROY'S RUN COAL COMBUSTION BYPRODUCT DISPOSAL FACILITY

Pleasants Power Station
Pleasants County, West Virginia

Prepared for:

Allegheny Energy Supply Company
A Wholly Owned Subsidiary of FirstEnergy

800 Cabin Hill Drive
Greensburg, PA 15601

Prepared by:

Tetra Tech, Inc.

400 Penn Center Boulevard, Suite 200
Pittsburgh, PA 15235
Phone: (412) 829-3600
Fax: (412) 829-3260

Tetra Tech Project No. 212C-SW-00070

July 2022

TABLE OF CONTENTS

1.0 INTRODUCTION

This Semi-Annual Selection of Remedy (SoR) Progress Report was prepared by Tetra Tech, Inc. (Tetra Tech) on behalf of Allegheny Energy Supply Company (AESC) for the Coal Combustion Byproduct Disposal Facility ("CCBDF", "CCR units", or "site") associated with the Pleasants Power Station (hereinafter referred to as the "Station"). The CCR units and Station are located near the town of Belmont in Pleasants County, West Virginia. The period covered by this report includes the first two quarters (Q1 and Q2) of calendar year 2022 (January 1st through June 30th).

As per 40 CFR 257.97(a), once a Coal Combustion Residual (CCR) unit has completed an Assessment of Corrective Measures (ACM) and transitions to SoR, "The owner or operator must prepare a semiannual report describing the progress in selecting and designing the remedy." Accordingly, this report summarizes the progress during the current reporting period in selecting and designing the remedy for addressing arsenic concentrations in groundwater downgradient of the CCR units and also includes a summary of anticipated SoR activities which will be conducted over the next SoR reporting period.

Detailed background information on the CCR units, hydrogeologic site conditions, and CCR monitoring results can be found in various other documents on the CCBDF's publicly accessible website, the most recent of which being the 2021 Annual CCR Rule Groundwater Monitoring and Corrective Action Report (McElroy's Run CCB Disposal Facility 2021 Annual GWMCA Report). The following section provides background information as it relates to the SoR at the CCR units.

1.1 Background

Groundwater Assessment Monitoring (AM) conducted at the site in accordance with the federal CCR Rule identified arsenic, barium, lithium, and radium concentrations in certain downgradient CCR monitoring wells which were at Statistically Significant Levels (SSLs) above their corresponding Groundwater Protection Standards (GWPS). Pursuant to 40 CFR 257.95(g)(3)(ii), Tetra Tech performed an Alternative Source Demonstration (ASD) to assess if the Appendix IV SSLs determined for sampling events AM-1, -2, and -3 were attributable to a release from the CCR units or from a demonstrable alternative source(s). The Appendix IV ASD is included as Attachment A of the ACM Report prepared for the Site (McElroy's Run CCB Disposal Facility 2019 ACM Report) and determined that the barium and radium SSLs could be attributed to historical and current oil and gas exploration and production activities that have occurred at the site; that the source of the lithium SSLs was indeterminate but there is a high potential they are also attributable to oil and gas impacts at the site; and that the arsenic SSLs could not be attributed to

sources other than the CCR units. As such, a transition to Nature and Extent (N&E) of release characterization and ACM for arsenic per 40 CFR 257.96 of the CCR Rule were implemented.

As required by 40 CFR 257.96(c), the ACM conducted by Tetra Tech on behalf of AESC included an analysis of the effectiveness of potential corrective measures in meeting the remedy requirements and objectives as described under 40 CFR 257.97. The ACM Report evaluated the following corrective measures against the criteria referenced in 40 CFR 257.96(c): Source Control, Groundwater Extraction and Treatment, In-Situ Technologies, and Monitored Natural Attenuation (MNA).

Based on the evaluation of viable remediation technologies, MNA, combined with source control by the eventual installation of a final cover system on the CCR units, ranks highest among the evaluated options. In September 2019, pursuant to 40 CFR 257.96(d), the ACM Report was posted in the CCR units' Operating Record, and then subsequently posted to the facility's publicly accessible website on October 16, 2019 (McElroy's Run CCB Disposal Facility 2019 ACM Report).

1.2 SoR Regulatory Basis

SoR activities must be completed in compliance with 40 CFR 257.97(a), which states that as soon as feasible after completion of the ACM, a remedy must be selected that, at a minimum, meets the performance standards listed in 40 CFR 257.97(b), and considers the evaluation factors listed in 40 CFR 257.97(c).

2.0 CURRENT STATUS OF THE SELECTION OF REMEDY PROGRAM

The following activities have been performed during the current reporting period as part of selecting the remedy at the site:

- In January, a purchase agreement was finalized for the parcel of land where the one remaining new off-site monitoring location (GW-30) was proposed. Acquisition of this land avoided the need to obtain access rights and a lease agreement and now reclassifies GW-30 as an on-site monitoring well. In addition, an assessment of alternative drilling methods to prevent borehole collapse and to control the release of natural oil and gas for GW-33B was performed. It was determined that installation of this well at or near its originally targeted location could not be performed safely, so it was removed from the 2022 work plan which instead focused on the installation of GW-30.
- In February, the new N&E/SoR monitoring wells (GW-31, -32, -33A, and -34) installed in 2021 to better characterize the extent of arsenic in groundwater across the site and to evaluate potential natural attenuation impacts on arsenic concentrations downgradient of the CCR unit, were sampled for the first time. The

total measured arsenic concentrations for this sampling event were 23.8, 12.8. 137.9, and 13.9 parts per billion (ppb), respectively, which are above the site's arsenic Groundwater Protection Standard (GWPS) of 10 ppb. In addition to arsenic, analyses were performed for all other CCR Rule Appendix III and Appendix IV parameters in order to begin building a background dataset for use when the wells are eventually incorporated into the AM and/or Corrective Action Monitoring (CAM) network.

- In March, new downgradient monitoring well GW-30 was installed and developed. This new well will be used to better characterize the extent of arsenic in groundwater and to evaluate potential natural attenuation impacts on arsenic concentrations downgradient of the CCR units. The new well was left to stabilize hydraulically and geochemically for the remainder of the spring and initial sampling will be attempted during the AM event scheduled for the third quarter of 2022.
- Immediately after GW-30 was installed and developed, aquifer characterization testing consisting of rising and falling head slug tests were performed in monitoring well GW-34 (installed in the fall of 2021) to determine the hydraulic conductivity of the targeted monitoring zone in the new well and to correlate the results to historical hydraulic conductivity measurements at the site.
- Continued AM with a sampling event in March 2022, which included sampling of the site's CCR monitoring well network with analyses for all Appendix III and Appendix IV parameters along with targeted general chemistry parameters to assist in evaluating potential natural attenuation impacts.
- Assessed the March 2022 groundwater flow patterns in the monitoring network areas downgradient of the CCR units and found they remained consistent with established flow patterns at the site.
- Continued development of a Natural Attenuation Evaluation Work Plan that includes evaluating historic concentrations of parameters which can affect the natural attenuation of arsenic (e.g., iron, pH, ORP, etc.) as well as planning the sampling and analysis program that would be associated with future MNA activities.
- Continued reviewing candidate technologies with regard to their potential to meet the performance standards listed in 40 CFR 257.97(b) and the evaluation factors listed in 40 CFR 257.97(c).

3.0 PLANNED SOR ACTIVITIES

The following activities are planned as part of the ongoing SoR process:

- Complete the second scheduled 2022 AM sampling event at the site along with continued N&E/background sampling of monitoring wells GW-30, -31, -32, -33A, and -34.
- Evaluate the need for installing additional monitoring wells to characterize the nature and extent of arsenic in groundwater in accordance with 40 CFR 257.95(g)(1)(i-iv). Install the appropriate number of monitoring wells needed to define the arsenic plume and support an accurate assessment of the selected remedy.
- Continue development of the Arsenic Natural Attenuation Evaluation Work Plan, including a review of the historic groundwater monitoring data set for relationships between key parameters affecting arsenic natural attenuation and arsenic concentrations in groundwater.
- Continue evaluating the candidate technologies identified in the ACM against the performance standards listed in 40 CFR 257.97(b) and the evaluation factors listed in 40 CFR 257.97(c).
- As required by 40 CFR 257.96(e), AESC will discuss the results of the corrective measures assessment at least 30 days prior to the final selection of remedy, in a public meeting.
- Upon completion of all required SoR activities, AESC will prepare a final report describing the selected remedy and how it, at a minimum, meets the performance standards listed in 40 CFR 257.97(b) and considers the evaluation factors listed in 40 CFR 257.97(c).
- As required by 40 CFR 257.97(d), AESC will specify, as part of the selected arsenic remedy, a schedule(s) for implementing and completing remedial activities.

Should the final remedy for the CCR units not be selected during Q3 or Q4 2022, then another Semi-Annual SoR Report will be prepared as required by 40 CFR 257.97(a).

SEMI-ANNUAL SELECTION OF REMEDY (SoR) PROGRESS REPORT (Q3 and Q4 2022)

McELROY'S RUN COAL COMBUSTION BYPRODUCT DISPOSAL FACILITY

Pleasants Power Station
Pleasants County, West Virginia

Prepared for:

Allegheny Energy Supply Company
A Wholly Owned Subsidiary of FirstEnergy

800 Cabin Hill Drive
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Prepared by:

Tetra Tech, Inc.

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Tetra Tech Project No. 212C-SW-00070

January 2023

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2.0 CURRENT STATUS OF THE SELECTION OF REMEDY PROGRAM

The following activities have been performed during the current reporting period as part of selecting the remedy at the site:

- Continued AM with a sampling event in August 2022 (AM-10), which included sampling of the site's CCR monitoring well network with analyses for all Appendix III and Appendix IV parameters along with targeted general chemistry parameters to assist in evaluating potential natural attenuation impacts.
- Assessed the August 2022 groundwater flow patterns in the monitoring network areas downgradient of the CCR units and found they remained consistent with established flow patterns at the site.
- In December, SoR/N&E of Release monitoring wells GW-30, -31, -32, -33A, and -34 were sampled. As of the issuance date of this report the laboratory data have not yet been received and the results will be discussed in the next semi-annual progress report. In addition to arsenic, analyses were performed for all other CCR Rule Appendix III and Appendix IV parameters in order to continue building a background dataset for use when

the wells are eventually incorporated into the AM and/or Corrective Action Monitoring (CAM) network.

- Continued development of a Natural Attenuation Evaluation Work Plan that includes evaluating historic concentrations of parameters which can affect the natural attenuation of arsenic (e.g., iron, pH, ORP, etc.) as well as planning the sampling and analysis program that would be associated with future MNA activities.
- Continued reviewing candidate technologies with regard to their potential to meet the performance standards listed in 40 CFR 257.97(b) and the evaluation factors listed in 40 CFR 257.97(c).

3.0 PLANNED SOR ACTIVITIES

The following activities are planned as part of the ongoing SoR process:

- Complete the first scheduled 2023 AM sampling event at the site (AM-11), along with continued N&E/background sampling of monitoring wells GW-30, -31, -32, -33A, and -34.
- Evaluate the need for installing additional monitoring wells to characterize the nature and extent of arsenic in groundwater in accordance with 40 CFR 257.95(g)(1)(i-iv), including GW-33B which was unsuccessfully attempted in the fall of 2021 due to recurring formation instability issues at depth and the return of significant volumes of natural oil and gas with the borehole cuttings. Install the appropriate number of monitoring wells needed to define the arsenic plume and support an accurate assessment of the selected remedy.
- Continue development of the Arsenic Natural Attenuation Evaluation Work Plan, including a review of the historic groundwater monitoring data set for relationships between key parameters affecting arsenic natural attenuation and arsenic concentrations in groundwater.
- Continue evaluating the candidate technologies identified in the ACM against the performance standards listed in 40 CFR 257.97(b) and the evaluation factors listed in 40 CFR 257.97(c).
- As required by 40 CFR 257.96(e), AESC will discuss the results of the corrective measures assessment at least 30 days prior to the final selection of remedy, in a public meeting.
- Upon completion of all required SoR activities, AESC will prepare a final report describing the selected remedy and how it, at a minimum, meets the performance

standards listed in 40 CFR 257.97(b) and considers the evaluation factors listed in 40 CFR 257.97(c).

- As required by 40 CFR 257.97(d), AESC will specify, as part of the selected arsenic remedy, a schedule(s) for implementing and completing remedial activities.

Should the final remedy for the CCR units not be selected during Q1 or Q2 2023, then another Semi-Annual SoR Report will be prepared as required by 40 CFR 257.97(a).