2024 ANNUAL CCR RULE GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

COAL COMBUSTION BYPRODUCT LANDFILL

Harrison Power Station
Harrison County, West Virginia

Prepared for:

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-00069

January 2025

2024 ANNUAL CCR RULE GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

COAL COMBUSTION BYPRODUCT LANDFILL

HARRISON POWER STATION
HARRISON COUNTY, WEST VIRGINIA

Prepared for:

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-00069

January 2025

TABLE OF CONTENTS

TABLES

FIGURES

ATTACHMENTS

1.0 INTRODUCTION

This 2024 Annual Coal Combustion Residuals (CCR) Groundwater Monitoring and Corrective Action Report was prepared by Tetra Tech, Inc. (Tetra Tech) on behalf of FirstEnergy (FE), for the Coal Combustion Byproduct Landfill ("CCBL", "CCR unit", or "site") at the Harrison Power Station (hereinafter referred to as the "Station"). The CCR unit and Station are located in Harrison 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, 2024)	
Groundwater Monitoring Program in Effect as of January 1, 2024 - 257.90(e)(6)(i)	Assessment Monitoring (Sampling Event AM-12)
Groundwater Monitoring Program in Effect as of December 31, 2024 - 257.90(e)(6)(ii)	Assessment Monitoring (Sampling Event AM-14)
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 MW-20 (Same parameter and same well as Sampling Events AM-1 through AM-12) Lithium in MW-20 (Potential SSL) (Also seen in well MW-19 and/or MW-20 since Event 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 2024
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 facility's captive CCBL, which is located approximately 1.5 miles north of the Station. The landfill is an existing CCR unit that is regulated

under West Virginia Department of Environmental Protection (WVDEP) Solid Waste/National Pollutant Discharge Elimination System (NPDES) Water Pollution Control Permit No. WV0075795 and also under the CCR Rule. A WVDEP groundwater monitoring program for the landfill has been in effect since 1993 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. The WVDEP subsequently issued a draft renewal of Permit No. WV0075795 for FE and public review/comment on March 27, 2024, that recognized the groundwater monitoring network established for the CCBL under the CCR Rule as the sole groundwater monitoring program for the site. A revised draft permit renewal was issued by WVDEP on December 20, 2024, for FE and public review/comment, with the comment period running through February 18, 2025.

The permitted CCBL facility consists of three adjacent disposal areas; the Main Area (MA - approximately 150 acres), the Lower Area (LA - approximately 126 acres), and the Upper Area (UA - approximately 120 acres). Of this total combined area, approximately 310 acres are currently permitted for landfill operations. Historically, most landfilling operations were performed in the MA and LA disposal areas, with the UA disposal area more recently developed for use. The MA disposal area, which has both unlined and lined portions, received CCRs from the Station when the first generating units began operating in 1972, and was closed from 1979 (when disposal operations shifted over to the LA) until being reactivated in 2005. The LA disposal area is still active and also has both unlined (pre-1994) and lined portions, with the liner system consisting of a 24-inch thick engineered compacted clay liner underlain by a leachate detection zone and overlain with a leachate collection system. The MA and UA have been used for CCR disposal since 2005 and 2011, respectively, with MA disposal being an overlay of the materials originally placed there, and UA disposal being in new, lined areas that utilize one of three different liner systems. Pre-CCR Rule areas in the UA have a liner consisting of either 24-inches of compacted clay or a layer of “enhanced” FGD by-product (amended with excess lime) that are underlain by a leachate detection zone and overlain with a leachate collection system. Starting in 2018, post-CCR Rule areas in the UA have a composite liner system comprised of a geomembrane and geosynthetic clay liner underlain by a leachate detection zone and overlain by a leachate collection system. Stormwater runoff and leachate from the CCBL discharge to a lined sedimentation pond, referred to as Sedimentation Pond No. 1.

Groundwater in the CCBL area occurs primarily within fractured bedrock and flow is controlled by a combination of topography and the bedrock structure (i.e., dip). The Lower Sewickley

Sandstone has been identified as the uppermost aquifer for CCR Rule groundwater monitoring for the CCBL. This aquifer is situated approximately 60 to 70 feet above the Pittsburgh Coal which has been extensively deep mined across the site. In some localized areas, collapse of the abandoned mine workings is potentially resulting in overburden fracturing that could serve as a drain for groundwater in the Lower Sewickley Sandstone and other overlying rock units to migrate vertically into the abandoned mine workings, however, this is not believed to be significant on a large scale. Historic and recent groundwater level data indicate groundwater flow at the CCBL to be from west to east (approximating the dip of the Pittsburgh Coal), and that the flow exhibits little seasonal and temporal fluctuations. Water level data from the current reporting period (2024) 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 Table 4-1); 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 2024 for the CCBL and plans for the upcoming year. Section 3.0 presents Detection Monitoring (DM) results from groundwater sampling events completed in 2024. Section 4.0 presents Assessment Monitoring (AM) results from groundwater sampling events completed in 2024. Finally, Section 5.0 presents a summary of the Selection of Remedy (SoR) activities that were performed for the CCR unit during 2024, including additional Nature and Extent (N&E) of Release characterization activities performed using a new well installed at the site in 2021.

2.0 GENERAL INFORMATION

This section provides an overview of the status of the CCR groundwater monitoring program through 2024 and key activities planned for 2025.

2.1 STATUS OF THE CCR GROUNDWATER MONITORING AND CORRECTIVE ACTION PROGRAM

During calendar year 2024 (January 1st through December 31st), the following key actions were completed with regard to the CCR groundwater monitoring program for the CCBL.

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 one upgradient (background) well (MW-5), and four downgradient wells (MW-17, -18, -19, and -20). There is also one downgradient N&E of Release well (MW-23) that was installed in 2021 as part of ongoing SoR activities at the site. It was originally planned to add MW-23 to the certified CCR monitoring well network for either AM and/or Corrective Action Monitoring (CAM) once sufficient data had been collected to confirm its usefulness in better characterizing potential natural attenuation impacts on arsenic concentrations downgradient of the CCR unit. However, as detailed in Section 2.2 below, the viability of this well is currently being evaluated. All of the wells noted above are summarized in attached Table 2-1 and shown on attached Figures 2-1 and 2-2. No changes to the certified monitoring well network (i.e., new wells added or existing wells abandoned) occurred during 2024.

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 2024 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 2043.

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 Detection

Monitoring program in October 2017. No modifications to this background dataset occurred during 2024.

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 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 2024.

2.2 PROBLEMS ENCOUNTERED/RESOLVED

Insufficient recoverable volumes of groundwater from downgradient well MW-18 were encountered during AM-13 and AM-14 when MW-18 was unable to be sampled using its dedicated bladder pump. As such, two separate follow up mobilizations were performed on April 23 and December 16, 2024 to obtain samples by pulling the dedicated bladder pump and bailing the well. The water levels measured in MW-18 during the first (AM-13) and third (AM-14) quarters of 2024 are presented below and, when compared to the water levels measured during 2023, indicate that redevelopment of MW-18 may again become necessary as the water levels are exhibiting a downward trend:

Date	Depth to Water (ft)	Total Well Depth (ft)	Total Standing Water Depth (ft)
1/31/2024	259.00	266.80	7.80
7/31/2024	261.01	266.80	5.79

The water levels from MW-18 will continue to be monitored and should the well subsequently fail to provide sufficient water for sampling, FE will make a determination as to the viability of redeveloping the well once again (this was last performed in 2021) or replacing MW-18 with a new well at a position as close as practical to its existing location, or abandoning and permanently removing it from the monitoring network.

Consistent with previous sampling events, the standing water depths in MW-19 and MW-20 during AM-13 and AM-14 were too low to allow sampling using the wells' dedicated bladder pumps, so any sampling that was able to be completed was instead performed using a bailer. During AM-13, only MW-20 had a sufficient volume of water available to recover a sample, while during AM-

14 there were insufficient water volumes available to recover samples from both MW-19 and MW-20. For AM-13, the bailer sampling method resulted in elevated turbidity measurements for MW-20.

Lastly, during an attempt to complete N&E of Release sampling of MW-23 in April 2024 (discussed in Section 5.0 of this report), an insufficient volume of recoverable water was available to complete sampling of the well. Since shortly after its installation in 2021, MW-23 has not contained a sufficient volume of water to be sampled. The Sewickley Sandstone formation that this well monitors exhibits a very low hydraulic conductivity consistent with other deeper wells installed in this formation including MW-19, MW-20, and in wells and borings installed during past site characterization work performed under state permitting activities. FE will make a determination as to the viability of redeveloping MW-23 or potentially replacing it with a new well at a position as close as practical to its existing location or abandoning and permanently removing it from the N&E of Release network.

Other than the inability to sample MW-18 with a pump and the limited groundwater sampling volumes for MW-19 and MW-20 noted above, there were no other significant problems encountered during 2024 with regard to the CCR groundwater monitoring program.

2.3 TRANSITION BETWEEN MONITORING PROGRAMS

As documented in the 2018 AGMCA Report, the CCR unit 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 (Appendix IV ASD) was then undertaken but not all of the Appendix IV SSLs that were identified could be attributed to alternative sources. As such, initial N&E of Release Characterization activities and an Assessment of Corrective Measures (ACM) were completed and are also documented in the 2019 AGMCA Report. Since that time and throughout 2024, the CCR unit has remained in AM with ongoing SoR activities being performed as discussed in Section 5.0 of this report, which includes 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 2025:

- 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).
- Continue to monitor water levels at MW-18 to confirm the last redevelopment work (c. 2021) continues to be successful. Should MW-18 fail to provide sufficient water for sampling, a determination will be made as to the viability of again redeveloping the well or replacing it with a new well at a position as close as practical to its existing location or to abandon and permanently remove it from the monitoring network.
- Continue to monitor water levels at MW-19 and MW-20. Should these wells fail to provide sufficient water for sampling, a determination will be made as to the viability of redevelopment.
- Continue to monitor water levels at MW-23. Should this well fail to provide sufficient water for sampling, a determination will be made as to the viability of redevelopment and/or abandonment and replacement.
- 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 unit may be causing the new SSLs. Concurrent with undertaking an Appendix IV ASD, characterize the N&E of the new Appendix IV release and provide appropriate notification depending on the findings [per §§ 257.95(g)(1) and (2), respectively].
- An Appendix IV ASD [per § 257.95(g)(3)(ii)] will be completed for lithium to determine if a source other than the CCR unit may be causing the elevated lithium concentrations.
- 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 ACM 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 attempts to sample N&E of Release well MW-23; if samples are able to be recovered, evaluating the

chemistry data from MW-23 to determine if one or both of two proposed side-gradient wells positioned on FE-owned property (MW-21 and MW-22) may not need to be installed; installing, surveying, and sampling MW-21 and MW-22 if it is determined they are needed and if they can be positioned such that they will reliably yield sufficient quantities of groundwater for sampling; 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 2025, 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 40 CFR § 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 2024. 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 2024 Appendix III data to identify SSIs and determine if AM was necessary was precluded by the CCR unit already being in AM during all of 2024, so no statistical analysis of the data was necessary. The 2024 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 2024 consisted of two AM sampling events (AM-13 and AM-14). AM-13 sampling was performed between January 30 and 31, 2024 with follow up sampling on March 14, 2024 (MW-18 only), and for AM-14 between July 31 and August 1, 2024 with follow up sampling on December 17, 2024 (again, MW-18 only). For both AM events, all Appendix III and all Appendix IV constituents were analyzed for those wells with a sufficient volume of water available to sample, with the exception of combined radium 226/228 in MW-5, MW-17, and MW-20 in AM-13 (inadvertently excluded from the sampling event). MW-18 was analyzed for radium during both AM events. However, over the duration of the CCR program implemented at the site, combined radium 226/228 concentrations have either been below detectible limits or, when detected, measured at concentrations well below the associated GWPS in all of the wells that are part of the monitoring network. As such, the lack of radium data for some wells in both sampling events is not believed to have affected the 2024 AM program evaluations for the CCR unit. The analyses that were performed during AM-13 and AM-14 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 16, 2024 and January 20, 2025 for AM-13 and AM-14, respectively. Table 3-1 presents the validated analytical results for these events.

Statistical evaluations of AM data performed in January 2025 included sampling events AM-13 and AM-14. 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 unit 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-13 and AM-14 are presented in Table 4-1 and discussed below.

AM-13 and AM-14 data were generally consistent with the AM-1 to AM-12 data, with arsenic continuing to be the only parameter regularly found at confirmed SSLs above its GWPS in MW-

20. Arsenic was also originally identified at SSLs in MW-19 during AM-1 and AM-3 but was consistently below its GWPS from AM-4 through AM-10, a period of approximately 3-1/2 years. Arsenic again rose above then fell below its GWPS in MW-19 during AM-11 and AM-12, respectively, with the AM-11 outlier being attributed to sample turbidity issues as discussed below. No samples were collected from MW-19 during the AM-13 and AM-14 events due to insufficient volume of recoverable water, so the continued arsenic trends in that well could not be evaluated during the current reporting period. Molybdenum, which was identified in 2019 as a potential SSL in MW-20, also continued to trend below the GWPS, consistent with what was first observed in AM-3, a period of approximately 6 years. As documented in the 2020 AGMCA Report, during AM-6 a potential SSL for lead was also identified for MW-20 but was ultimately determined to be an outlier due to the sampling method employed and the associated turbidity of the sample. This determination was substantiated during 2022, 2023, and 2024 as lead was measured in MW-20 at concentrations below or near its UPL, consistent with the results from AM-1 through AM-5.

In addition to the arsenic outlier in MW-19 noted above, because MW-19 was unable to be sampled during 2024, previous potential SSLs for cobalt, lead, and lithium identified in 2023 at MW-19 were not able to be confirmed. In the 2023 AGMCA Report those results were evaluated against corresponding field-filtered samples and deemed to be directly related to the sampling method employed for both MW-19 and MW-20 (bailer) during AM-11 and AM-12, and the associated turbidity of the samples.

During AM-13, lithium was again measured in MW-20 (AM-13 only since a sample could not be obtained during AM-14 due to insufficient recoverable water) at a concentration of 0.05 mg/L, which is slightly above the associated GWPS of 0.04 mg/L. 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. This field adjustment was performed by using a bailer to sample AM-20 and splitting the recovered water to obtain both unfiltered and field-filtered samples for analysis. The table below presents the total and dissolved lithium concentrations in MW-20 for AM-10, -12, and-13 (there was insufficient water during AM-11 for sampling), along with the corresponding total to dissolved (T:D) concentration ratios for each event.

	MW-20		
	AM-10	AM-12	AM-13
Total Li	0.049855	0.043504	0.049017
Dissolved Li	0.049782	0.043198	0.047736
T:D Li Ratio	1.00	1.01	1.03

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

Looking at this data the T:D ratios for MW-20 are effectively 1.0 which indicates little to no turbidity effects on that well. In addition to turbidity effects, it is also noted that lithium occurs naturally at the site and from AM-1 through AM-14 has been measured in upgradient well MW-5 at concentrations between 0.012 and 0.020 mg/L, with the highest value in this range being measured during AM-9 and exceeding the MW-5 UPL of 0.019 mg/L. Lastly, the total lithium concentrations measured in downgradient wells MW-17 and MW-18 have historically averaged 0.015 mg/L which is significantly lower than the recent level measured in MW-20 during the current reporting period. As such, the measured lithium increase in MW-20 appears to be at least partly attributable to the upward trending of background lithium concentrations observed in MW-5.

Based on the information and data presented above and in previous AGMCA Reports, the increases in arsenic, cobalt, and lead concentrations measured in MW-19 during in 2023 are still considered to be outliers due primarily to the sampling method employed and the associated turbidities of the samples. However, additional data are needed to determine if the Lithium trends recently observed in MW-19 (during AM-11 and AM-12) and MW-20 during the current reporting period are attributable to sample methodology, are anomalous, reflect an increase in natural (background) concentrations, or are due to some combination of these factors. An ASD for lithium will therefore be prepared to better evaluate these factors as part of the 2025 AM program.

Taking into account the continued downward trend of molybdenum, the sampling method outliers noted above, and the data presented in Table 4-1, no other Appendix IV constituents other than those discussed herein were detected at SSLs above their GWPS under the CCR unit's AM program during the reporting period, and arsenic currently remains the only parameter that is the focus of ongoing SoR activities for the CCR unit 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 2024 the CCR unit remained in AM with ongoing SoR activities being performed. As detailed in the CCR unit's 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 unit, ranked highest among the evaluated options. Therefore, the 2024 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 A of this report, the following activities have been performed during the current reporting period to support final remedy selection at the site:

- No N&E of Release characterization sampling for MW-23 was able to be performed during the AM-13 and AM-14 events due to an insufficient volume of recoverable water. The results from the January 2022 N&E sampling event provided in the 2022 AGMCA Report indicated that the measured arsenic concentration was below the site's arsenic GWPS. However, MW-23 has not contained an adequate volume of water to sample since its initial N&E of Release characterization sampling in January 2022. As such and as noted in Section 2.4, a determination will be made as to the viability of redeveloping and/or replacing MW-23.
- 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 January and July 2024 groundwater flow patterns in the monitoring network area downgradient of the CCR unit and confirmed they were consistent with established flow patterns at the site. Water level data from MW-23 was not included in these

assessments because the well was determined to be dry during 2024 water level gauging activities.

- Completed statistical evaluations of the AM-13 and AM-14 analytical data to determine whether there were any detected Appendix IV parameters other than arsenic at SSLs above the CCR unit's established GWPS.

Ongoing and/or new SoR activities that are planned for 2025 have been included in Section 2.4 of this report.

TABLES

TABLE 2-1
CCR RULE GROUNDWATER MONITORING SYSTEM WELL SUMMARY
HARRISON CCB LANDFILL - 2024 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
Upgradient (Background)							
MW-5	1993	Lower Sewickley SS	1283.98	208.5	148.5 – 208.5	1075.52 – 1135.52	4" - Sch. 40 PVC
Downgradient							
MW-17	1997	Lower Sewickley SS	1070.64	60.6	20.6 – 60.6	1010.04 – 1050.04	2" - Sch. 40 PVC
MW-18	1997	Lower Sewickley SS	1265.91	264.8	224.8 – 264.8	1001.11 – 1041.11	4" - Sch. 40 PVC
MW-19	2016	Lower Sewickley SS	1462.87	513.9	503.9 – 513.9	948.99 – 958.99	2.5" - Sch. 80 PVC
MW-20	2016	Lower Sewickley SS	1414.28	364.0	349.0 – 364.0	1050.30 – 1065.30	2.5" - Sch. 80 PVC
Nature & Extent of Release Characterization							
MW-23*	2021	Lower Sewickley SS	1375.28	385.0	365.0 – 385.0	990.28 – 1010.28	4” – Sch. 80 PVC

Notes: SS = sandstone MSL = mean sea level bgs = below ground surface ID = inside diameter Sch = Schedule PVC = polyvinyl chloride
* = Used as Nature and Extent of Release well starting in 2022 but was dry during last two reporting periods; Well to remain in place and will continue to be monitored and sampled if available water volume recovers.

			APPENDIX III (all Chemical Constituents reported as TOTAL RECOVERABLE)[1]							APPENDIX IV (all Chemical Constituents reported as TOTAL RECOVERABLE)[1]														
SAMPLING EVENT NO.[2,5]	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
27 (AM-13)	MW-05	3/14/2024	0.2178 J	10.406	0.8841	1.8929	7.77	51.67	612	0.00282 U	0.0008 U	0.060143	0.0003 U	0.0002 U	0.0016 U	0.0002 U	0.00045 U	0.016782	0.000163 U	0.00055 U	0.00315 U	0.0001 U	NA	NA
29 (AM-14)	MW-05	7/31/2024	0.1145 U	7.55	0.9472	1.4283	8.47	51.81	528	0.00282 U	0.0008 U	0.055013	0.00015 U	0.0002 U	0.0016 U	0.0002 U	0.000225 U	0.017406	0.000163 U	0.00055 U	0.00315 U	0.0001 U	0.0544 U	0.0800 U
29 (AM-14)	MW-05(D)	7/31/2024	0.1145 U	7.68	0.92	1.3744	8.47	50.26	524	0.00282 U	0.0008 U	0.053165	0.00015 U	0.0002 U	0.0016 U	0.0002 U	0.000225 U	0.016928	0.000163 U	0.00055 U	0.00315 U	0.0001 U	0.062 U	0.119 U
27 (AM-13)	MW-17	1/31/2024	0.123 J	128	75.96	0.0484 J	6.94	101.1	632	0.00282 U	0.001175	0.087667	0.00015 U	0.0002 U	0.0016 U	0.000244 J	0.000225 U	0.018471	0.000163 U	0.00155 J	0.00315 U	0.0001 U	NA	NA
27 (AM-13)	MW-17(D)	1/31/2024	0.1145 U	129	75.28	0.049 J	6.94	100.8	628	0.00282 U	0.001187	0.096158	0.00015 U	0.0002 U	0.0016 U	0.000304	0.000225 U	0.020861	0.000163 U	0.005305	0.00315 U	0.0001 U	NA	NA
29 (AM-14)	MW-17	7/31/2024	0.1145 U	132	75.29	0.0629 J	6.72	101.9	616	0.00282 U	0.001142	0.147371	0.00015 U	0.0002 U	0.0016 U	0.000318	0.000509	0.020149	0.000163 U	0.00055 U	0.00315 U	0.0001 U	0.135	0.208 U
28 (AM-13)	MW-18	4/23/2024	1.14 U	18.276	34.28	0.482	6.17	36.15	1148	0.0113 U	0.0032 U	0.151194	0.0006 U	0.0008 U	0.00642 U	0.0008 U	0.001682	0.015249	0.000163 U	0.0022 U	0.0189 U	0.0004 U	0.677	0.987
28 (AM-13)	MW-18(D)	4/23/2024	1.14 U	18.106	30.33	0.365	6.17	33.44	1172	0.0113 U	0.0032 U	0.154158	0.0006 U	0.0008 U	0.00642 U	0.0008 U	0.00194	0.014843	0.000163 U	0.0022 U	0.0189 U	0.0004 U	0.523	0.354 U
30 (AM-14)	MW-18	12/17/2024	1.14 U	16.821	35.98	0.5037	6.79	17.84 J+	1200	0.0113 U	0.0032 U	0.120934	0.0006 U	0.0008 U	0.00642 U	0.0008 U	0.0009 U	0.014852	0.000163 U	0.0022 U	0.0126 UJ	0.0004 U	0.407 U	1.32 U
27 (AM-13)	MW-19[5]	3/14/2024	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
29 (AM-14)	MW-19[5]	7/31/2024	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
27 (AM-13)	MW-20	1/31/2024	1.14 U	85.323	816.1	1.8447	10.27	498.5	3920	0.00282 U	0.03851	0.144461	0.000305	0.000275	0.023636	0.001679	0.001223	0.049017	0.000163 U	0.032057	0.00315 U	0.0001 U	NA	NA
29 (AM-14)	MW-20[5]	7/31/2024	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

NOTES:

[1] Lab analyses were completed by Beta Lab and Eurofins Laboratories, Inc., both of which are accredited/certified laboratories: Beta Lab NSF/ISR ISO 9001:Cert. No. 83761-IS10 (Exp. 01-16-27) and Eurofins WVDEP Certificate No. 142, Expiration Date: 1-31-25.

[2] Event Nos. 27, 28, 29, and 30 correspond to Assessment Monitoring (AM) sampling events AM-13 (27 and 28) and AM-14 (29 and 30).

[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] There was an insufficient volume of recoverable water to collect a sample from MW-19 during event AM-13, and from MW-19 and MW-20 during event AM-14.

NA = Parameter was not analyzed.

NS = Not sampled.

DATA QUALIFIER 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.

Lower Sewickley Sandstone							Events 27 and 28 (AM-13) Downgradient Wells						Events 27 and 28 (AM-13) Upgradient Well MW-5	
Parameter	Units	Data Distribution for Upgradient Well MW-5	UPL Type	UPL Value[a,b]	Federal MCLs/RSLs	GWPS	MW-17	MW-18	MW-19[f]	MW-20				
Antimony	mg/L	Unknown	Poisson	0.00143	0.006	0.006	<0.00282	<0.0113	NS	<0.00282			<0.00282	U
Arsenic	mg/L	Unknown	Non-parametric	0.0005	0.01	0.01	0.001181	<0.0032	NS	0.03851			<0.0008	U
Barium	mg/L	Normal	Parametric	0.152477	2	2	0.0919125	0.151194	NS	0.144461			0.060143	
Beryllium	mg/L	Unknown	Poisson	0.00156	0.004	0.004	<0.00015	<0.0006	NS	0.000305			<0.0003	U
Cadmium	mg/L	Unknown	Poisson	0.00143	0.005	0.005	<0.0002	<0.0008	NS	0.000275			<0.0002	U
T. Chromium	mg/L	Unknown	Poisson	0.00758	0.1	0.1	<0.0016	<0.00642	NS	0.023636			<0.0016	U
Cobalt	mg/L	Unknown[c]	DQ[d]	NA	0.006	0.006	0.000274	<0.0008	NS	0.001679			<0.0002	U
Fluoride	mg/L	Normal	Parametric	2.251	4	4	0.0487	0.482	NS	1.8447			1.8929	
Lead	mg/L	Unknown	Poisson	0.00425	0.015	0.015	<0.000225	0.001682	NS	0.001223			<0.00045	U
Lithium	mg/L	Normal	Parametric	0.018835	0.04	0.04	0.019666	0.015249	NS	0.049017			0.016782	
Mercury	mg/L	Unknown	Poisson	0.00032	0.002	0.002	<0.000163	<0.000163	NS	<0.000163			<0.000163	U
Molybdenum	mg/L	Log Normal	Parametric	0.01496	0.1	0.1	0.0034275	<0.0022	NS	0.032057			<0.00055	U
Selenium	mg/L	Unknown[c]	DQ[d]	NA	0.05	0.05	<0.00315	<0.0189	NS	<0.00315			<0.00315	U
Thallium	mg/L	Unknown	Poisson	0.00143	0.002	0.002	<0.0001	<0.0004	NS	<0.0001			<0.0001	U
Sum Ra226+Ra228	pCi/L	Log Normal	Parametric	1.599	5	5	NA[e]	1.271	NS	NA[e]			NA[e]	U

[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
[f]Not sampled (NS) due to insufficient water.

#.#### = UPL > Result > MCL/RSL
= SSI < GWPS
= SSI > GWPS
= DQ Parameter with Verification Sampling Needed

Lower Sewickley Sandstone							Events 29 and 30 (AM-14) Downgradient Wells						Events 29 and 30 (AM-14) Upgradient Well MW-5	
Parameter	Units	Data Distribution for Upgradient Well MW-5	UPL Type	UPL Value[a,b]	Federal MCLs/RSLs	GWPS	MW-17	MW-18	MW-19[e]	MW-20[e]				
Antimony	mg/L	Unknown	Poisson	0.00143	0.006	0.006	<0.00282	<0.0113	NS	NS			<0.00282	U
Arsenic	mg/L	Unknown	Non-parametric	0.0005	0.01	0.01	0.001142	<0.0032	NS	NS			<0.0008	U
Barium	mg/L	Normal	Parametric	0.152477	2	2	0.147371	0.120934	NS	NS			0.054089	
Beryllium	mg/L	Unknown	Poisson	0.00156	0.004	0.004	<0.00015	<0.0006	NS	NS			<0.00015	U
Cadmium	mg/L	Unknown	Poisson	0.00143	0.005	0.005	<0.0002	<0.0008	NS	NS			<0.0002	U
T. Chromium	mg/L	Unknown	Poisson	0.00758	0.1	0.1	<0.0016	<0.00642	NS	NS			<0.0016	U
Cobalt	mg/L	Unknown[c]	DQ[d]	NA	0.006	0.006	0.000318	<0.0008	NS	NS			<0.0002	U
Fluoride	mg/L	Normal	Parametric	2.251	4	4	0.0629	0.5037	NS	NS			1.40135	
Lead	mg/L	Unknown	Poisson	0.00425	0.015	0.015	0.000509	<0.0009	NS	NS			<0.000225	U
Lithium	mg/L	Normal	Parametric	0.018835	0.04	0.04	0.020149	0.014852	NS	NS			0.017167	
Mercury	mg/L	Unknown	Poisson	0.00032	0.002	0.002	<0.000163	<0.000163	NS	NS			<0.000163	U
Molybdenum	mg/L	Log Normal	Parametric	0.01496	0.1	0.1	<0.00055	<0.0022	NS	NS			<0.00055	U
Selenium	mg/L	Unknown[c]	DQ[d]	NA	0.05	0.05	<0.00315	<0.0126	NS	NS			<0.00315	U
Thallium	mg/L	Unknown	Poisson	0.00143	0.002	0.002	<0.0001	<0.0004	NS	NS			<0.0001	U
Sum Ra226+Ra228	pCi/L	Log Normal	Parametric	1.599	5	5	<0.343	<1.727	NS	NS			<0.1577	U

[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 sampled (NS) due to insufficient water.

#.#### = UPL > Result > MCL/RSL
= SSI < GWPS
= SSI > GWPS
= DQ Parameter with Verification Sampling Needed

FIGURES

PGH \\EGSS706GISFS1\EGS\PITTSBURGH\GIS\GIS\FIRST_ENERGY\MAPDOCS\HARRISON\HARRISON_CCR_GWMONITORING_2024_01JAN.APRX 1/30/2025 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. Approximate Waste Boundary line was obtained from FirstEnergy Drawing No. C89506725, Rev. 1, dated 1/25/2011.
4. Monitoring well locations MW-5, MW-17, and MW-18 and the approximate Parcel Boundary line were obtained from FirstEnergy Drawing No. C8950199, Rev. B, dated 1/9/2003, and Drawing No. C8950153, Rev. 1, dated 3/27/2002.
5. Monitoring wells MW-19 and MW-20 were installed by Tetra Tech, Inc. in June 2016. As-built well locations were obtained by field survey performed by Tetra Tech, Inc. on 07/11/2016.
6. Monitoring well MW-23 was installed and field surveyed by Tetra Tech, Inc. in July 2021 and February 2022, respectively.

WELL NUMBER	NORTHING	EASTING
MW-5	330871.6	1731733.0
MW-17	328548.0	1736010.0
MW-18	329269.8	1736473.2
MW-19	330293.3	1736904.0
MW-20	331766.1	1735688.8
MW-23	330406.9	1738181.4

Coordinates are in NAD 1983 State Plane West Virginia North (feet)

N

MW-20 (1053.08)
MW-5 (1096.06)
MW-19 (950.67)
MW-18 (1009.42)
MW-17 (1037.72)
MW-23 (N&E Well - Not Part of 2024 CCR Monitoring Program)

Upper Area
Main Area
Lower Area

Sedimentation Pond No. 1

Fallen Timber Run
Lucas Rd
Prospect Valley
Mirkwood Dr
Brother of West Fork
Clark St
Hood St
Hood Ave
Robinson Run
West Fork River
S Pike St

1,000 0 1,000 Feet

Legend

- CCR/WVDEP Monitoring Well
- Approximate Waste Boundary
- Approximate Parcel Boundary
- Groundwater Elevation Contour (10-foot) (dashed where inferred)
- (1044.36) Groundwater Elevation January 2024
- Topographic Contour (10-foot)

TETRA TECH

CCR RULE GROUNDWATER MONITORING SYSTEM
INTERPRETED GROUNDWATER FLOW JANUARY 2024
HARRISON POWER STATION
CCB LANDFILL

FIRSTENERGY CORPORATION
GREENSBURG, PENNSYLVANIA

DRAWN BY: T. TEAFORD 01/30/2025
CHECKED BY: J. CLARA 01/30/2025
APPROVED BY: B. BAKER 01/30/2025

CONTRACT NUMBER: 212C-SW-00069

FIGURE NUMBER 2-1

REVISION 0

PGH \\EGSS706GISFS1\EGS\PITTSBURGH\GIS\GIS\FIRST_ENERGY\MAPDOCS\HARRISON\HARRISON_CCR_GWMONITORING_2024_07JUL.APRX 1/30/2025 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. Approximate Waste Boundary line was obtained from FirstEnergy Drawing No. C89506725, Rev. 1, dated 1/25/2011.
4. Monitoring well locations MW-5, MW-17, and MW-18 and the approximate Parcel Boundary line were obtained from FirstEnergy Drawing No. C8950199, Rev. B, dated 1/9/2003, and Drawing No. C8950153, Rev. 1, dated 3/27/2002.
5. Monitoring wells MW-19 and MW-20 were installed by Tetra Tech, Inc. in June 2016. As-built well locations were obtained by field survey performed by Tetra Tech, Inc. on 07/11/2016.
6. Monitoring well MW-23 was installed and field surveyed by Tetra Tech, Inc. in July 2021 and February 2022, respectively.

WELL NUMBER	NORTHING	EASTING
MW-5	330871.6	1731733.0
MW-17	328548.0	1736010.0
MW-18	329269.8	1736473.2
MW-19	330293.3	1736904.0
MW-20	331766.1	1735688.8
MW-23	330406.9	1738181.4

Coordinates are in NAD 1983 State Plane West Virginia North (feet)

N

MW-20 (1052.58)
MW-5 (1089.05)
MW-19 (950.87)
MW-18 (1007.41)
MW-17 (1033.22)
MW-23 (N&E Well - Not Part of 2024 CCR Monitoring Program)
Sedimentation Pond No. 1

Upper Area
Main Area
Lower Area

Vernon Creek
Lucas Rd
Prospect Valley
Mirkwood Dr
Brother of West Fork
Clark St
Hood St
Hood Ave
Robinson Run
West Fork River
S Pike St

1,000 0 1,000 Feet

Legend
- CCR/WVDEP Monitoring Well
- Approximate Waste Boundary
- Approximate Parcel Boundary
- Groundwater Elevation Contour (10-foot) (dashed where inferred)
- (1044.36) Groundwater Elevation July 2024
- Topographic Contour (10-foot)

TETRA TECH

CCR RULE GROUNDWATER MONITORING SYSTEM
INTERPRETED GROUNDWATER FLOW JULY 2024
HARRISON POWER STATION
CCB LANDFILL

FIRSTENERGY CORPORATION
GREENSBURG, PENNSYLVANIA

DRAWN BY: T. TEAFORD 01/30/2025
CHECKED BY: J. CLARA 01/30/2025
APPROVED BY: B. BAKER 01/30/2025

CONTRACT NUMBER: 212C-SW-00069

FIGURE NUMBER 2-2

REVISION 0

ATTACHMENT A

SEMI-ANNUAL SELECTION OF REMEDY (SoR) PROGRESS REPORT (Q1 AND Q2 2024)

COAL COMBUSTION BYPRODUCT LANDFILL

Harrison Power Station
Harrison County, West Virginia

Prepared for:

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-00069

July 2024

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 FirstEnergy Generation (FE) for the Coal Combustion Byproduct Landfill ("CCBL", "CCR unit", or "site") at the Harrison Power Station (hereinafter referred to as the "Station"). The CCBL and Station are located near the town of Shinnston in Harrison County, West Virginia. The period covered by this report includes the first two quarters (Q1 and Q2) of calendar year 2024 (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 unit 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 unit, hydrogeologic site conditions, and CCR monitoring results can be found in various other documents on the CCBL's publicly accessible website, the most recent of which being the 2023 Annual CCR Rule Groundwater Monitoring and Corrective Action Report (Harrison CCB Landfill 2023 Annual GWMCA Report). The following section provides background information as it relates to the SoR at the CCR unit.

1.1 Background

Groundwater Assessment Monitoring (AM) conducted at the site in accordance with the federal CCR Rule identified arsenic and molybdenum 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 unit or from a demonstrable alternative source(s). The Appendix IV ASD is included as Attachment A of the ACM Report prepared for the Site (Harrison CCB Landfill 2019 ACM Report) and determined that evidence existed that the CCR unit, combined with impacts from an unidentified alternate source (e.g., grout infiltration into the sand pack of the well), were likely the causes of elevated molybdenum concentrations observed in monitoring well MW-20, which was the only well to have a molybdenum SSL, and that the arsenic SSLs could not be attributed to sources

other than the CCR unit. 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 FE 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 unit, ranks highest among the evaluated options. In September 2019, pursuant to 40 CFR 257.96(d), the ACM Report was posted in the CCR unit's Operating Record, and then subsequently posted to the facility's publicly accessible website on October 16, 2019 (Harrison CCB Landfill 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:

- Continued AM with a sampling event in January 2024 (AM-13), which included sampling of the site's CCR monitoring well network with analyses for all Appendix III and Appendix IV parameters (with the exception of Radium 226/228) along with targeted general chemistry parameters to assist in evaluating potential natural attenuation impacts.
- Assessed the January 2024 groundwater flow patterns in the monitoring network area downgradient of the CCR unit and found they remained consistent with historical flow patterns at the site, although the measured water levels were lower site-wide. Water level data from MW-23 was not included in this assessment as the well continued to exhibit a continuing trend of post-development water level stabilization at near-dry conditions.

- During the AM-13 sampling event, downgradient monitoring well MW-18, which was redeveloped in late 2021 in an attempt to reestablish its yield, was again found to have a sufficient volume of water to allow for collection of a full sample set, however, the water level was too low to perform low-flow sampling using a bladder pump, so the well was sampled using a bailer instead.
- Continued to perform a site-wide evaluation of arsenic concentration trends. During AM-13 there was a sufficient volume of recoverable water in MW-20 (which has typically exhibited the highest arsenic concentrations at the site) to allow for sampling, unlike AM-11 when the well had an insufficient volume of recoverable water. However, MW-19 had an insufficient volume of recoverable water to allow for sampling during AM-13, which impacted the arsenic evaluation work.
- During AM-13 an attempt was made to sample N&E of Release monitoring well MW-23 for the fifth time. However, there was an insufficient volume of recoverable water in the well (less than one foot; the same water level that was found during attempted sampling in January and July 2023), so it could not be sampled. Even though this well was successfully sampled in January 2022, the continued low water level indicates this issue is not due to seasonal effects or to the well's water level still exhibiting post-development stabilization.
- 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 2024 AM sampling event at the site (AM-14), along with continued attempts to collect N&E/background samples from monitoring well MW-23. Should this well fail to provide sufficient water for sampling, a determination will be made as to the viability of redevelopment and/or replacing this well.
- Should MW-19 and/or MW-20 fail to provide sufficient water for sampling during AM-14, a determination will be made as to the viability of redevelopment of these wells.

- If MW-19, MW-20, and/or MW-23 will yield sufficient water for sampling, evaluate the chemistry data from them to reassess the need for installing one or both of the two proposed sidegradient monitoring wells (MW-21 and -22). If it is determined that these wells are needed to better characterize the nature and extent of arsenic in groundwater and if they can be positioned such that they will reliably yield sufficient quantities of groundwater for sampling, procure the services of a drilling firm and install, develop, and perform aquifer characterization testing for monitoring wells MW-21 and/or -22.
- Should MW-18 fail to provide sufficient water for sampling during AM-14, a determination will be made as to the viability of replacing it with a new well at a position as close as practical to its existing location or to abandon and permanently remove it from the CCR monitoring network.
- Conduct additional sampling and analysis for molybdenum to evaluate whether the downward trend in molybdenum concentrations measured in MW-20 over the last four years is statistically significant and remains below the associated GWPS of 100 ppb.
- 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), FE 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, FE 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), FE 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 unit not be selected during Q3 or Q4 2024, 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 2024)

COAL COMBUSTION BYPRODUCT LANDFILL

Harrison Power Station
Harrison County, West Virginia

Prepared for:

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-00069

January 2025

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 FirstEnergy Generation (FE) for the Coal Combustion Byproduct Landfill ("CCBL", "CCR unit", or "site") at the Harrison Power Station (hereinafter referred to as the "Station"). The CCBL and Station are located near the town of Shinnston in Harrison County, West Virginia. The period covered by this report includes the last two quarters (Q3 and Q4) of calendar year 2024 (July 1st through December 31st).

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 unit 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 unit, hydrogeologic site conditions, and CCR monitoring results can be found in various other documents on the CCBL's publicly accessible website, the most recent of which being the 2023 Annual CCR Rule Groundwater Monitoring and Corrective Action Report (Harrison CCB Landfill 2023 Annual GWMCA Report). The following section provides background information as it relates to the SoR at the CCR unit.

1.1 Background

Groundwater Assessment Monitoring (AM) conducted at the site in accordance with the federal CCR Rule identified arsenic and molybdenum 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 unit or from a demonstrable alternative source(s). The Appendix IV ASD is included as Attachment A of the ACM Report prepared for the Site (Harrison CCB Landfill 2019 ACM Report) and determined that evidence existed that the CCR unit, combined with impacts from an unidentified alternate source (e.g., grout infiltration into the sand pack of the well), were likely the causes of elevated molybdenum concentrations observed in monitoring well MW-20, which was the only well to have a molybdenum SSL, and that the arsenic SSLs could not be attributed to sources

other than the CCR unit. 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 FE 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 unit, ranks highest among the evaluated options. In September 2019, pursuant to 40 CFR 257.96(d), the ACM Report was posted in the CCR unit's Operating Record, and then subsequently posted to the facility's publicly accessible website on October 16, 2019 (Harrison CCB Landfill 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:

- Continued AM with a sampling event in July 2024 (AM-14), 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 July 2024 groundwater flow patterns in the monitoring network area downgradient of the CCR unit and found they remained consistent with historical flow patterns at the site, although the measured water levels were again lower site-wide. Water level data from MW-23 was not included in this assessment as the well continued to exhibit a continuing trend of post-development water level stabilization at near-dry conditions.
- During the AM-14 sampling event, downgradient monitoring well MW-18, which was redeveloped in late 2021 in an attempt to reestablish its yield, was again found

to have a sufficient volume of water to allow for collection of a full sample set, however, the water level was too low to perform low-flow sampling using a bladder pump, so the well was sampled using a bailer instead.

- Continued to perform a site-wide evaluation of arsenic concentration trends. However, during AM-14, both MW-19 and MW-20 had an insufficient volume of recoverable water to allow for sampling, unlike AM-13 when only MW-19 had an insufficient volume of recoverable water. These wells are historically the only downgradient wells to exhibit arsenic SSLs at the site, so the inability to sample them during AM-14 impacted the arsenic evaluation work.
- During AM-14 an attempt was made to sample N&E of Release monitoring well MW-23 for the sixth time. However, there was an insufficient volume of recoverable water in the well (less than one foot; the same water level that was found during attempted sampling in January 2024), so it could not be sampled. Even though this well was successfully sampled in January 2022, the continued low water level indicates this issue is not due to seasonal effects or to the well's water level still exhibiting post-development stabilization.
- 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 2025 AM sampling event at the site (AM-15), along with continued attempts to collect N&E/background samples from monitoring well MW-23. Should this well fail to provide sufficient water for sampling, a determination will be made as to the viability of redevelopment and/or replacing this well.
- Continue to monitor water levels at MW-19 and MW-20. Should MW-19 and/or MW-20 fail to provide sufficient water for sampling during AM-15, a determination will be made as to the viability of redevelopment of these wells.
- If MW-19, MW-20, and/or MW-23 will yield sufficient water for sampling, evaluate the chemistry data from them to reassess the need for installing one or both of the

two proposed sidegradient monitoring wells (MW-21 and -22). If it is determined that these wells are needed to better characterize the nature and extent of arsenic in groundwater and if they can be positioned such that they will reliably yield sufficient quantities of groundwater for sampling, procure the services of a drilling firm and install, develop, and perform aquifer characterization testing for monitoring wells MW-21 and/or -22.

- Should MW-18 fail to provide sufficient water for sampling during AM-15, a determination will be made as to the viability of replacing it with a new well at a position as close as practical to its existing location or to abandon and permanently remove it from the CCR monitoring network.
- Conduct additional sampling and analysis for molybdenum to evaluate whether the downward trend in molybdenum concentrations measured in MW-20 over the last four years is statistically significant and remains below the associated GWPS of 100 ppb.
- 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), FE 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, FE 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), FE 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 unit not be selected during Q1 or Q2 2025, then another Semi-Annual SoR Report will be prepared as required by 40 CFR 257.97(a).