

2020 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 2021

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- A Semi-Annual Selection of Remedy Progress Reports

1.0 INTRODUCTION

This 2020 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 through 5 of this report:

Status Summary for Reporting Period (January 1 to December 31, 2020)	
Groundwater Monitoring Program in Effect as of January 1, 2020 - 257.90(e)(6)(i)	Assessment Monitoring (Sampling Event AM-4)
Groundwater Monitoring Program in Effect as of December 31, 2020 - 257.90(e)(6)(ii)	Assessment Monitoring (Sampling Events AM-5 and -6)
Appendix III SSL'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-3)
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 2020
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 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 has been in effect since 2017. The 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 (2020)

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 must prepare an initial Annual Groundwater Monitoring and Corrective Action Report ("AGWMCA 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

- (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 2020 for the CCBL and plans for the upcoming year. Section 3.0 presents Detection Monitoring (DM) results from groundwater sampling events completed in 2020. Section 4.0 presents Assessment Monitoring (AM) results from groundwater sampling events completed in 2019 and 2020. Finally, Section 5.0 presents a summary of the Selection of Remedy (SoR) activities that were performed for the CCR unit during 2020.

2.0 GENERAL INFORMATION

This section provides an overview of the status of the CCR groundwater monitoring program through 2020 and key activities planned for 2021.

2.1 STATUS OF THE CCR GROUNDWATER MONITORING AND CORRECTIVE ACTION PROGRAM

During calendar year 2020 (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 AGWMCA Reports (accessible at <http://ccrdocs.firstenergycorp.com/>), the certified CCR monitoring well network consists of one upgradient (background) well (MW-5), and four downgradient wells (MW-17, -18, -19, and -20), as summarized in attached Table 2-1 and shown on attached Figures 2-1 and 2-2. No changes to the monitoring well network (i.e., new wells added or existing wells abandoned) occurred during 2020.

2.1.2 Groundwater Monitoring Plan

Consistent with the work performed and summarized in previous AGWMCA Reports, the CCR unit's Groundwater Monitoring Plan (GWMP) was followed during all 2020 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 2020.

2.1.3 Background Groundwater Sampling

As documented in the 2017 and 2018 AGWMCA 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 2020.

2.1.4 Statistical Methods

As documented in the 2017 and 2018 AGWMCA 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 2020.

2.2 PROBLEMS ENCOUNTERED/RESOLVED

Consistent with past sampling events, having sufficient recoverable volumes of groundwater from downgradient well MW-18 continued to be a problem during 2020 with no groundwater samples being collected from MW-18 during AM-5 or AM-6. This well has been part of the WVDEP groundwater monitoring program for several years and had historically been able to yield sufficient water, although it did require redevelopment in 2015 when its sampling volume yield decreased. The lack of sufficient recoverable water in MW-18 was first believed to be from overstressing the well due to the large number of background samples that had to be obtained prior to the required CCR groundwater DM startup date of October 2017. However, since October 2017, MW-18 has not recovered to its historical water levels or yields. Since the remaining CCR monitoring network still met the minimum required number of downgradient wells, an activity planned for 2020 that was listed in the 2019 AGWMCA Report was redeveloping the well in an attempt to make it viable for sampling once again. However, due to a variety of factors including COVID-19 restrictions that limited field activities, redevelopment of MW-18 did not occur, but water levels were measured in MW-18 during the first and third quarters of 2020 and are presented below:

Date	Depth to Water (ft)	Total Well Depth (ft)	Total Standing Water Depth (ft)
2/19/2020	265.55	266.80	1.25
8/12/2020	265.50	266.80	1.30

Based on the MW-18 water level measurements above and on previous water level measurements, it was confirmed that redevelopment of the well remains necessary. Given the well's casing diameter (4-inches) and screen length (40 feet), redevelopment requires a large volume of source water and a mid-sized pump, both of which would need to be transported to and staged at the well location which is not readily accessible. In consideration of these factors and with the need for installation of additional wells at the site as part of ongoing Selection of Remedy (SoR) activities (discussed in Section 5.0 of this report), it was decided to include redevelopment of MW-18 as part of the planned 2021 SoR activities. Should redevelopment fail to provide sufficient water for sampling, FE will make a determination as to the viability of relocating MW-18 to a position as close as practical to its existing location.

In addition to MW-18, there was insufficient water available in MW-20 during AM-6 to allow sampling with a bladder pump, so samples were collected with a bailer. Additionally, even with using a bailer, there was not enough volume in MW-20 to collect dedicated samples for radium analysis during the AM-6 event, so that parameter was not measured.

Other than the available groundwater sampling volumes for downgradient wells MW-18 and MW-20 as noted above, there were no other significant problems encountered during 2020 with regard to the CCR groundwater monitoring program.

2.3 TRANSITION BETWEEN MONITORING PROGRAMS

As documented in the 2018 AGWMCA Report, the CCR unit transitioned from Detection Monitoring to Assessment Monitoring 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. The CCR unit has remained in Assessment Monitoring since that time, with two additional AM sampling events (AM-3 and AM-4) completed and statistical evaluations of the AM-1, -2, and -3 sampling events being performed and documented in the 2019 AGWMCA Report. As discussed in the 2019 AGWMCA Report, statistical evaluations of the AM-1, -2, and -3 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, Nature and Extent (N&E) of Release Characterization activities and an Assessment of Corrective Measures (ACM) were completed and are also documented in the 2019 AGWMCA Report. Since that time and throughout 2020, the CCR unit has remained in AM with ongoing SoR activities being performed as discussed in Section 5 of this report.

2.4 KEY ACTIVITIES PLANNED FOR THE UPCOMING YEAR

The following are the key CCR groundwater compliance activities planned for 2021:

- Continue with Assessment Monitoring by conducting the annual and semi-annual rounds of sampling and analysis for applicable 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).
- 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 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 finalizing right-of-access and lease agreements to install an additional monitoring well on a potentially affected downgradient property; installing additional monitoring wells downgradient of the facility boundary, both on and off FE-owned property; 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.
- Redevelop downgradient monitoring well MW-18 in early 2021 as part of the planned SoR well installation work. Should redevelopment fail to provide sufficient water for sampling, a determination will be made as to the viability of relocating MW-18 to a position as close as practical to its existing location.
- 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 2021, 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 Assessment Monitoring was performed throughout 2020. As part of the AM program, all DM (Appendix III) parameters were also analyzed during each AM sampling event.

The need to statistically analyze the 2020 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 2020, so no statistical analysis of the data was necessary. The 2020 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 2020 consisted of two AM sampling events (AM-5 and AM-6) performed between February 19 and 24, 2020 and between August 12 and 17, 2020, respectively. For both AM events, all Appendix III and all Appendix IV constituents were analyzed with the exception of combined radium 226/228 in MW-20 during AM-6 (due to insufficient recoverable water volume, as discussed in Section 2.2). This exceeds the requirements of § 257.95 which only stipulate analyzing for all Appendix IV parameters once per year. Laboratory analysis and validation of the sample data were completed on April 22, 2020 and November 2, 2020 for AM-5 and AM-6, respectively. Table 3-1 presents the validated analytical results for these events.

Statistical evaluations of AM data performed in 2019 included sampling events AM-1, AM-2, and AM-3. As noted in the 2019 AGWMCA Report, evaluation of data from sampling event AM-4 ended up being completed in January 2020 since receipt of outstanding validated results occurred late in the fourth quarter of that year, and a 90-day period is allowed by the CCR Rule for statistical evaluation, which fell in the first quarter of 2020. As such, a discussion of the AM-4 data is included in this year's report. 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 AGWMCA 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 don't 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-4, AM-5, and AM-6 are presented in Table 4-1 and discussed below.

AM-4 data were consistent with results of the AM-1 to AM-3 data, with arsenic being the only parameter found at SSLs above its GWPS, with the exception that arsenic was no longer identified at SSLs in both MW-19 and MW-20 as in the previous AM events, but only for MW-20. Molybdenum, which was initially identified in 2019 as a potential SSL in MW-20, also continued its downward trend below the GWPS, consistent with what was first observed in AM-3.

Results from statistical analysis of AM-5 and AM-6 were consistent with the AM-4 results, with only an SSL for arsenic in MW-20 and a continued downward trend of molybdenum in MW-20 during both events. However, during AM-6, an SSL for lead was also identified for MW-20. This finding was immediately deemed anomalous as lead had never been measured at concentrations above its UPL in any downgradient wells at the site, and the AM-6 lead result in MW-20 is almost an order of magnitude higher than the average lead concentration measured in MW-20 during the AM-1 to AM-5 events. A review of field records indicated that the limited volume of available water in the well required sampling to be performed using a bailer with no purging completed, which resulted in a turbid sample. Supplemental laboratory testing of a filtered sample fraction for MW-20 found that the dissolved lead concentration was non-detect at a limit of 0.00052 mg/L. Based on these findings, the anomalous AM-6 SSL for lead in MW-20 is considered to be an outlier due to sampling method and turbidity of the sample.

Taking into account the continued downward trend of molybdenum 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 the their GWPS under the CCR unit's AM program during the reporting period, and arsenic remains the only parameter that is the focus of ongoing SoR activities for the CCR unit as discussed in Section 5 of this report.

5.0 SELECTION OF REMEDY

As previously noted in Section 2.3 of this report, throughout 2020 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 units, ranked highest among the evaluated options. Therefore, the 2020 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:

- 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, three new downgradient monitoring wells, including one off-site location, were identified, the current off-site landowner was contacted, and all of the proposed well locations were field staked.
- Negotiations commenced with the off-site landowner to establish right-of-access and lease agreements to install and sample the new well. As of December 31, 2020, those negotiations remain in-progress.
- Technical specifications and a Request for Proposal (RFP) were prepared for installing, developing, and performing aquifer characterization testing of all the new wells (on-site and off-site). The RFPs were issued to multiple drilling firms and bids were received in December 2020, with work planned to commence in early 2021 once the off-site landowner agreements are finalized.
- Initiated 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.

- Initiated 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 February and August 2020 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.

Ongoing and/or new SoR activities that are planned for 2021 have been included in Section 2.4 of this report.

TABLES

TABLE 2-1
CCR RULE GROUNDWATER MONITORING SYSTEM WELL SUMMARY
HARRISON CCB LANDFILL- 2020 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

Notes: SS = sandstone MSL = mean sea level bgs = below ground surface ID = inside diameter PVC = polyvinyl chloride

* = only used for water level measurements

**TABLE 3-1
CCR RULE GROUNDWATER ASSESSMENT MONITORING ANALYTICAL RESULTS SUMMARY
HARRISON CCB LANDFILL - 2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT**

SAMPLING EVENT NO. ²	WELL ID ³	SAMPLE DATE	APPENDIX III (all Chemical Constituents reported as TOTAL RECOVERABLE) ¹							APPENDIX IV (all Chemical Constituents reported as TOTAL RECOVERABLE) ¹														
			BORON METALS MG/L	CALCIUM METALS MG/L	CHLORIDE MISC MG/L	FLUORIDE MISC MG/L	PH MISC S.U.	SULFATE MISC MG/L	TDS MISC MG/L	ANTIMONY METALS MG/L	ARSENIC METALS MG/L	BARIIUM 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
			16 (AM-5)	MW-5	2/24/2020	0.1825 J	5.33	0.947	1.66 J-	8.51 J	46.6 J-	624	0.00107 U	0.00035 U	0.05026	0.00022 U	0.00067 U	0.00145 U	0.00047 U	0.00052 U	0.01398	0.00016 U	0.00113 U	0.0034 U
17 (AM-6)	MW-5	8/17/2020	0.0888 J	24.323	1.1	0.77	7.71 J	50.7	456	0.00107 U	0.00016 U	0.10623	0.00022 U	0.00067 U	0.00145 U	0.00047 U	0.00052 U	0.01564	0.00016 U	0.00113 U	0.0034 U	0.00017 U	0.301	0.0891 U
16 (AM-5)	MW-17	2/19/2020	0.0411 J	134	84	0.044 J	7.17 J	99.1	584	0.00107 U	0.00173	0.07275	0.00044 U	0.00067 U	0.00145 U	0.00095 U	0.00052 U	0.01908	0.00016 U	0.00113 U	0.0034 U	0.00017 U	0.149	-0.0161 U
16 (AM-5)	MW-17 (D)	2/19/2020	0.0401 J	132	84	0.045 J	7.32 J	99.1	596	0.00107 U	0.00178	0.07142	0.00044 U	0.00067 U	0.00145 U	0.00095 U	0.00052 U	0.01876	0.00016 U	0.00113 U	0.0034 U	0.00017 U	0.0805 U	0.271 U
17 (AM-6)	MW-17	8/13/2020	0.0476 J	130	87	0.051 J	7.07 J	103	656	0.00107 U	0.00031 U	0.08033	0.00022 U	0.00067 U	0.00145 U	0.00047 U	0.00052 U	0.01619	0.00016 U	0.00113 U	0.0034 U	0.00017 U	0.0823 U	-0.131 U
17 (AM-6)	MW-17 (D)	8/13/2020	0.0441 J	128	87.8	0.052 J	7.06 J	103	660	0.00107 U	0.00052	0.08032	0.00022 U	0.00067 U	0.00145 U	0.00047 U	0.00052 U	0.01636	0.00016 U	0.00113 U	0.0034 U	0.00017 U	0.0391 U	0.419 U
16 (AM-5)	MW-18 ⁴	2/20/2020	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
17 (AM-6)	MW-18 ⁴	8/13/2020	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
16 (AM-5)	MW-19	2/20/2020	0.162 J	3.29	148	1.92	8.29	139	1345	0.00107 U	0.00623	0.05192	0.00022 U	0.00067 U	0.00235	0.00066 J	0.00095	0.01116	0.00016 U	0.03237	0.0034 U	0.00017 U	0.111 U	0.335 U
17 (AM-6)	MW-19	8/12/2020	0.1897 J	3.49	160	1.62	8.23	142	1535	0.00107 U	0.00517	0.06804	0.00022 U	0.00067 U	0.00307	0.00056 J	0.00083	0.01651	0.00016 U	0.02512	0.0034 U	0.00017 U	0.152	1.04
16 (AM-5)	MW-20	2/19/2020	0.5399	48.651	659	0.625	11.3	1060	21000	0.00107 U	0.05327	0.21806	0.00132 U	0.00067 U	0.01348	0.00285 U	0.00361	0.02362	0.00016 U	0.05995	0.0034 U	0.00017 U	0.325	0.579 U
17 (AM-6)	MW-20	8/13/2020	0.5242	202	739	2.28	11.66	930	11400	0.00107 U	0.05835	0.90847	0.0022 U	0.00067 U	0.03545	0.00475 U	0.01687	0.02897	0.00016 U	0.04074	0.00321 U	0.00017 U	NS ⁴	NS ⁴

NOTES:

¹ Lab analyses were completed by Beta Lab and TestAmerica Laboratories, Inc., both of which are accredited/certified laboratories: Beta Lab ISO/IEC 17025 Cert No. 2489.01 (Exp. 11-30-20) and ISO/IEC 9001 Cert. No. 83761-IS7 (Exp. 01-16-21) and TestAmerica NELAP Identification Number: 68-00340, EPA Region: 3, Expiration Date: 08-31-20.

² Event Nos. 16 and 17 correspond to Assessment Monitoring (AM) sampling events AM-5 and AM-6, respectively.

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

⁴ NS = not sampled. For MW-18 this occurred due to an insufficient volume of recoverable water in the well during both AM events. For MW-20 there was an insufficient volume of recoverable water to collect dedicated radium samples during AM-6.

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.

TABLE 4-1
CCR RULE INTERWELL COMPARISON OF SAMPLING EVENTS AM-4, -5, AND -6 APPENDIX IV DATA

Lower Sewickley Sandstone							Event 15 (AM-4)					Event 15 (AM-4) Upgradient Well MW-5
Parameter	Units	Data Distribution for Upgradient Well MW-5	UPL Type	UPL Value ^{a,b}	Federal MCLs/RSLS	GWPS	Downgradient Wells					
							MW-17	MW-18 ^e	MW-19	MW-20		
Antimony	mg/L	Unknown	Poisson	0.00143	0.006	0.006	<0.00107	NS	<0.00107	0.00191		<0.00107 U
Arsenic	mg/L	Unknown	Non-parametric	0.0005	0.01	0.01	0.00096	NS	0.00694	0.03906		0.0004 U
Barium	mg/L	Normal	Parametric	0.152477	2	2	0.07564	NS	0.05464	0.09199		0.11117 U
Beryllium	mg/L	Unknown	Poisson	0.00156	0.004	0.004	<0.00022	NS	<0.00022	<0.00044		<0.00022 U
Cadmium	mg/L	Unknown	Poisson	0.00143	0.005	0.005	<0.00067	NS	<0.00067	<0.00067		<0.00067 U
T. Chromium	mg/L	Unknown	Poisson	0.00758	0.1	0.1	<0.00145	NS	0.00312	0.01192		<0.00145 U
Cobalt	mg/L	Unknown ^c	DQ ^d	NA	0.006	0.006	<0.00047	NS	0.0013	<0.00095		<0.00047 U
Fluoride	mg/L	Normal	Parametric	2.251	4	4	0.042	NS	1.75	0.758		1.16 U
Lead	mg/L	Unknown	Poisson	0.00425	0.015	0.015	<0.00052	NS	0.0011	0.00094		<0.00052 U
Lithium	mg/L	Normal	Parametric	0.018835	0.04	0.04	0.01433	NS	0.01056	0.01637		0.01636 U
Mercury	mg/L	Unknown	Poisson	0.00032	0.002	0.002	<0.00016	NS	<0.00016	<0.00016		<0.00016 U
Molybdenum	mg/L	Log Normal	Parametric	0.01496	0.1	0.1	<0.00113	NS	0.03657	0.0663		<0.00113 U
Selenium	mg/L	Unknown ^c	DQ ^d	NA	0.5	0.5	<0.0034	NS	<0.0034	0.00373		<0.0034 UJ
Thallium	mg/L	Unknown	Poisson	0.00143	0.002	0.002	<0.00017	NS	<0.00017	<0.00017		<0.00017 U
Sum Ra226+Ra228 ^f	pCi/L	Log Normal	Parametric	1.599	5	5	NA	NS	NA	NA		NA U




^aPrediction Limits calculated using 5% alpha.

^bUpper Prediction Limit used for all parameters.

^cData distribution set to Unknown if all values non-detect in upgradient well.

^dDQ 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,f}MW-18 not sampled (NS) due to insufficient water; Radium not analyzed (NA) during Event 15.

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

Lower Sewickley Sandstone							Event 16 (AM-5)					Event 16 (AM-5) Upgradient Well MW-5
Parameter	Units	Data Distribution for Upgradient Well MW-5	UPL Type	UPL Value ^{a,b}	Federal MCLs/RSLS	GWPS	Downgradient Wells					
							MW-17	MW-18 ^e	MW-19	MW-20		
Antimony	mg/L	Unknown	Poisson	0.00143	0.006	0.006	<0.00107	NS	<0.00107	<0.00107		<0.00107 U
Arsenic	mg/L	Unknown	Non-parametric	0.0005	0.01	0.01	0.00176	NS	0.00623	0.05327		<0.00035 U
Barium	mg/L	Normal	Parametric	0.152477	2	2	0.11117	NS	0.05192	0.21806		0.05026 U
Beryllium	mg/L	Unknown	Poisson	0.00156	0.004	0.004	<0.00044	NS	<0.00022	<0.00132		<0.00022 U
Cadmium	mg/L	Unknown	Poisson	0.00143	0.005	0.005	<0.00067	NS	<0.00067	<0.00067		<0.00067 U
T. Chromium	mg/L	Unknown	Poisson	0.00758	0.1	0.1	<0.00145	NS	0.00235	0.01348		<0.00145 U
Cobalt	mg/L	Unknown ^c	DQ ^d	NA	0.006	0.006	<0.00095	NS	0.00066	<0.00285		<0.00047 U
Fluoride	mg/L	Normal	Parametric	2.251	4	4	0.0445	NS	1.92	0.625		1.66 U
Lead	mg/L	Unknown	Poisson	0.00425	0.015	0.015	<0.00052	NS	0.00095	0.00361		<0.00052 U
Lithium	mg/L	Normal	Parametric	0.018835	0.04	0.04	0.01892	NS	0.01116	0.02362		0.01398 U
Mercury	mg/L	Unknown	Poisson	0.00032	0.002	0.002	<0.00016	NS	<0.00016	<0.00016		<0.00016 U
Molybdenum	mg/L	Log Normal	Parametric	0.01496	0.1	0.1	<0.00113	NS	0.03237	0.05995		<0.00113 U
Selenium	mg/L	Unknown ^c	DQ ^d	NA	0.5	0.5	<0.0034	NS	<0.0034	<0.0034		<0.0034 U
Thallium	mg/L	Unknown	Poisson	0.00143	0.002	0.002	<0.00017	NS	<0.00017	<0.00017		<0.00017 U
Sum Ra226+Ra228	pCi/L	Log Normal	Parametric	1.599	5	5	<0.2422	NS	<0.446	0.6145		<0.05935 U

^aPrediction Limits calculated using 5% alpha.

^bUpper Prediction Limit used for all parameters.

^cData distribution set to Unknown if all values non-detect in upgradient well.

^dDQ 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.

^eMW-18 not sampled (NS) due to insufficient water.




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

TABLE 4-1
CCR RULE INTERWELL COMPARISON OF SAMPLING EVENTS AM-4, -5, AND -6 APPENDIX IV DATA

Lower Sewickley Sandstone							Event 17 (AM-6)					Event 17 (AM-6) Upgradient Well MW-5
Parameter	Units	Data Distribution for Upgradient Well MW-5	UPL Type	UPL Value ^{a,b}	Federal MCLs/RSLS	GWPS	Downgradient Wells					
							MW-17	MW-18 ^e	MW-19	MW-20 ^f		
Antimony	mg/L	Unknown	Poisson	0.00143	0.006	0.006	<0.00107	NS	<0.00107	<0.00107		<0.00016 U
Arsenic	mg/L	Unknown	Non-parametric	0.0005	0.01	0.01	0.00042	NS	0.00517	0.05835		<0.00107 U
Barium	mg/L	Normal	Parametric	0.152477	2	2	0.08033	NS	0.06804	0.90847		0.10623
Beryllium	mg/L	Unknown	Poisson	0.00156	0.004	0.004	<0.00022	NS	<0.00022	<0.0022		<0.00022 U
Cadmium	mg/L	Unknown	Poisson	0.00143	0.005	0.005	<0.00067	NS	<0.00067	<0.00067		<0.00067 U
T. Chromium	mg/L	Unknown	Poisson	0.00758	0.1	0.1	<0.00145	NS	0.00235	0.03545		<0.00145 U
Cobalt	mg/L	Unknown ^c	DQ ^d	NA	0.006	0.006	<0.00047	NS	0.00056	<0.00475		<0.00047 U
Fluoride	mg/L	Normal	Parametric	2.251	4	4	0.0515	NS	1.62	2.28		0.77
Lead	mg/L	Unknown	Poisson	0.00425	0.015	0.015	<0.00052	NS	0.00083	0.01687		<0.00052 U
Lithium	mg/L	Normal	Parametric	0.018835	0.04	0.04	0.01628	NS	0.01651	0.02897		0.01564
Mercury	mg/L	Unknown	Poisson	0.00032	0.002	0.002	<0.00016	NS	<0.00016	<0.00016		<0.00016 U
Molybdenum	mg/L	Log Normal	Parametric	0.01496	0.1	0.1	<0.00113	NS	0.02512	0.04074		<0.00113 U
Selenium	mg/L	Unknown ^c	DQ ^d	NA	0.5	0.5	<0.0034	NS	<0.0034	<0.00321		<0.0034 U
Thallium	mg/L	Unknown	Poisson	0.00143	0.002	0.002	<0.00017	NS	<0.00017	<0.00017		<0.00017 U
Sum Ra226+Ra228	pCi/L	Log Normal	Parametric	1.599	5	5	<0.2702	NS	1.192	NA		0.34555

^aPrediction Limits calculated using 5% alpha.




^bUpper Prediction Limit used for all parameters.

^cData distribution set to Unknown if all values non-detect in upgradient well.

^dDQ 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.

^eMW-18 not sampled (NS) due to insufficient water.

^fRadium not analyzed (NA) during Event 17.

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

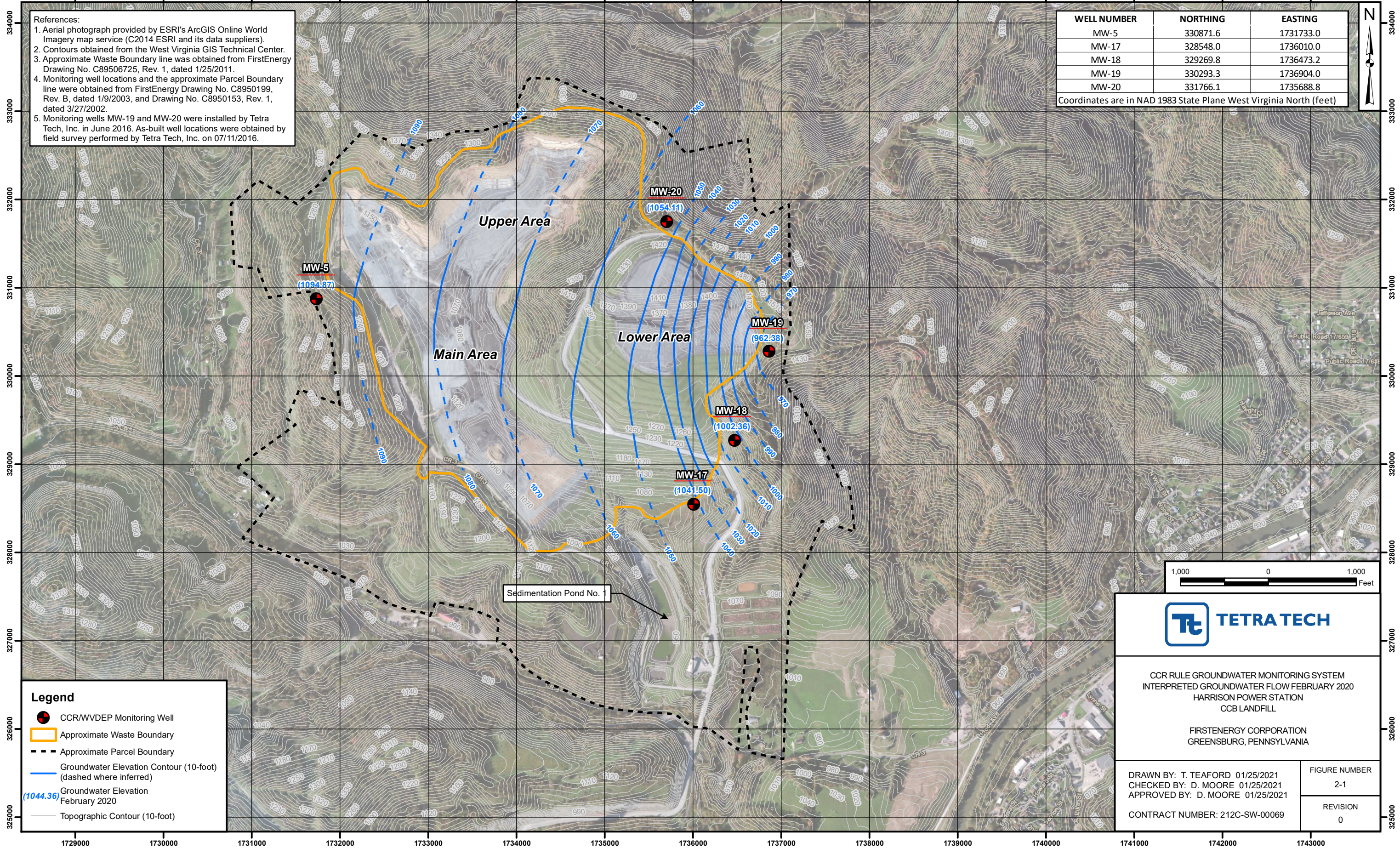
FIGURES

1729000 1730000 1731000 1732000 1733000 1734000 1735000 1736000 1737000 1738000 1739000 1740000 1741000 1742000 1743000

- References:
1. Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (©2014 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 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.

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

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



- Legend**
- CCR/WVDEP Monitoring Well
 - Approximate Waste Boundary
 - - - Approximate Parcel Boundary
 - Groundwater Elevation Contour (10-foot) (dashed where inferred)
 - Groundwater Elevation February 2020
 - Topographic Contour (10-foot)



CCR RULE GROUNDWATER MONITORING SYSTEM
 INTERPRETED GROUNDWATER FLOW FEBRUARY 2020
 HARRISON POWER STATION
 CCB LANDFILL

FIRSTENERGY CORPORATION
 GREENSBURG, PENNSYLVANIA

DRAWN BY: T. TEAFORD 01/25/2021 CHECKED BY: D. MOORE 01/25/2021 APPROVED BY: D. MOORE 01/25/2021	FIGURE NUMBER 2-1
CONTRACT NUMBER: 212C-SW-00069	REVISION 0

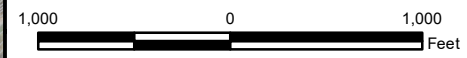
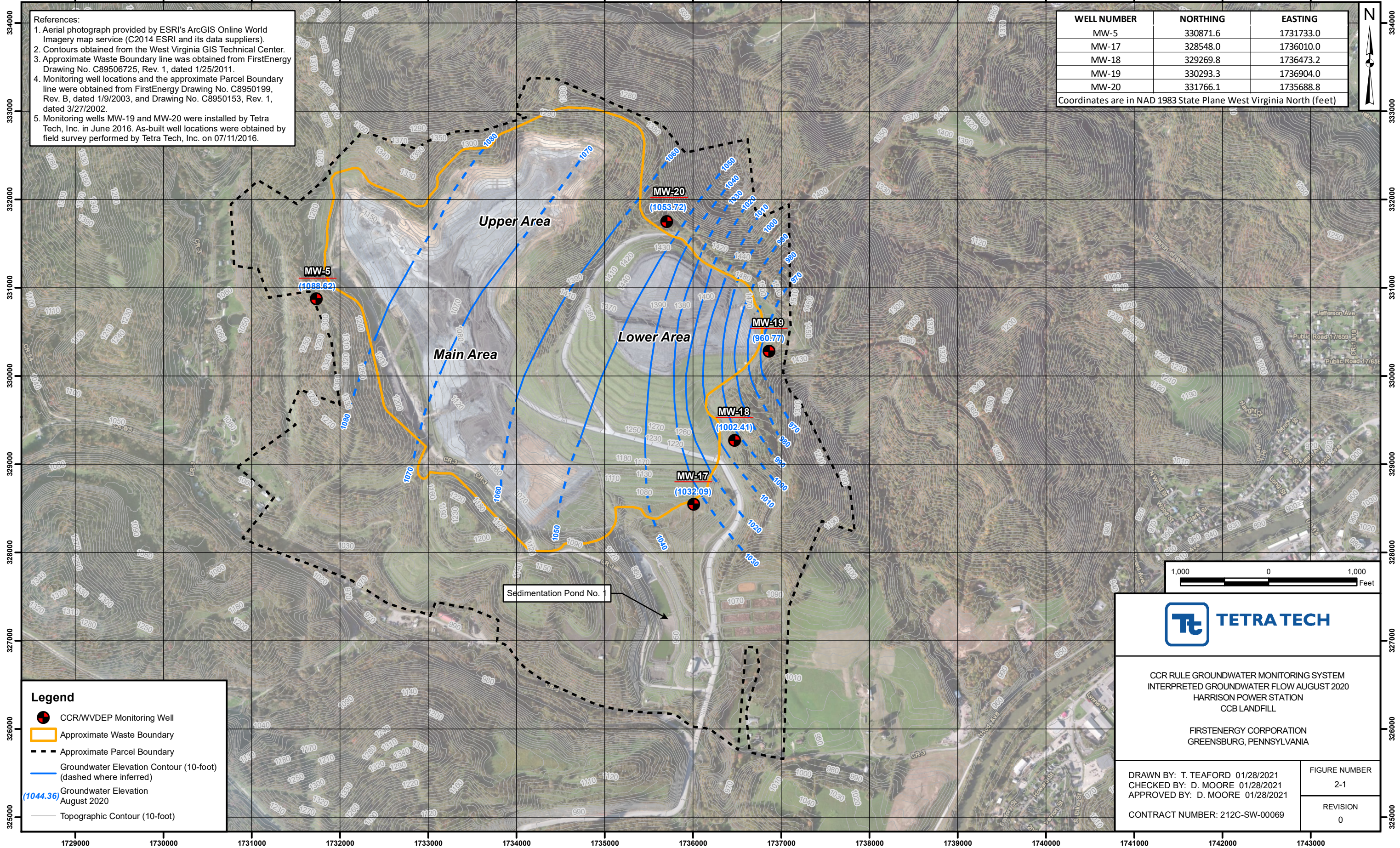
1729000 1730000 1731000 1732000 1733000 1734000 1735000 1736000 1737000 1738000 1739000 1740000 1741000 1742000 1743000

1729000 1730000 1731000 1732000 1733000 1734000 1735000 1736000 1737000 1738000 1739000 1740000 1741000 1742000 1743000

- References:
1. Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (©2014 ESRI and its data suppliers).
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MW-17	328548.0	1736010.0
MW-18	329269.8	1736473.2
MW-19	330293.3	1736904.0
MW-20	331766.1	1735688.8

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



- Legend**
- CCR/WVDEP Monitoring Well
 - ▭ Approximate Waste Boundary
 - - - Approximate Parcel Boundary
 - Groundwater Elevation Contour (10-foot) (dashed where inferred)
 - Groundwater Elevation August 2020
 - Topographic Contour (10-foot)



CCR RULE GROUNDWATER MONITORING SYSTEM
 INTERPRETED GROUNDWATER FLOW AUGUST 2020
 HARRISON POWER STATION
 CCB LANDFILL

FIRSTENERGY CORPORATION
 GREENSBURG, PENNSYLVANIA

DRAWN BY: T. TEAFORD 01/28/2021
 CHECKED BY: D. MOORE 01/28/2021
 APPROVED BY: D. MOORE 01/28/2021

CONTRACT NUMBER: 212C-SW-00069

FIGURE NUMBER
2-1

REVISION
0

1729000 1730000 1731000 1732000 1733000 1734000 1735000 1736000 1737000 1738000 1739000 1740000 1741000 1742000 1743000

ATTACHMENT A

**SEMI-ANNUAL
SELECTION OF REMEDY (SoR)
PROGRESS REPORT
(Q1 AND Q2 2020)**

**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

August 2020

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2.0 STATUS OF THE SELECTION OF REMEDY PROGRAM	2
3.0 PLANNED SOR ACTIVITIES	3

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 Station and CCBL are located in Harrison County, West Virginia. The period covered by this report is the first two quarters (Q1 and Q2) of calendar year 2020 (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 to date 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 2019 Annual CCR Rule Groundwater Monitoring and Corrective Action Report ([Harrison CCB Landfill 2019 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 exists that the CCR unit, combined with impacts from an as-yet unidentified alternate source (e.g., grout infiltration into the sand pack of the well), are 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, 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:

- 40 CFR 257.95(g)(1)(i) requires that the extent of groundwater impacts be defined by installing additional monitoring wells as necessary. In order to fulfill this requirement, three new downgradient monitoring well locations, including one off-site location, have been identified and field staked. These new monitoring wells will serve to better characterize the extent of arsenic in groundwater and to evaluate potential natural attenuation impacts on arsenic concentrations downgradient of the CCR unit. For the proposed off-site well location, FE is currently negotiating a right-of-access and lease agreement with the landowner so the new well can be installed.
- Initiating 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.

- Initiated a review of 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).
- Continued AM with a sampling event in February 2020, which included sampling of the site's four CCR monitoring wells with analyses for all Appendix III and Appendix IV parameters along with targeted general chemistry parameters to assist in evaluating potential natural attenuation impacts.
- Determined February 2020 groundwater flow patterns in the monitoring network area downgradient of the CCR unit and found they were consistent with historical flow patterns at the Site.

3.0 PLANNED SoR ACTIVITIES

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

- Continue evaluation of the historic groundwater monitoring data set for relationships between key parameters affecting arsenic natural attenuation and arsenic concentrations in groundwater.
- Complete development of the Arsenic Natural Attenuation Evaluation Work Plan.
- Install, develop, and sample the three additional downgradient groundwater monitoring wells for arsenic and natural attenuation parameters.
- Conduct additional sampling and analysis for molybdenum to evaluate whether the downward trend in molybdenum concentrations measured over the last two years in MW-20 is statistically significant.
- 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.
- Complete the second scheduled 2020 AM sampling event at the Site.

Should the final remedy for the CCR unit not be selected during Q3 or Q4 2020, 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 2020)**

**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 2021

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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 is the second two quarters (Q3 and Q4) of calendar year 2020 (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 2019 Annual CCR Rule Groundwater Monitoring and Corrective Action Report ([Harrison CCB Landfill 2019 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 exists that the CCR unit, combined with impacts from an as-yet unidentified alternate source (e.g., grout infiltration into the sand pack of the well), are 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:

- 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 unit, three new downgradient monitoring well locations, including one off-site location, were identified, the current off-site landowner was contacted, and all of the proposed well locations were field staked during Q2 and Q3 2020. . For the proposed off-site well location, FE also commenced negotiations with the off-site landowner to establish a right-of-access and lease agreement with the landowner to install and sample the proposed new well. These negotiations continued throughout Q3 and Q4 and remain in-progress.
- Technical specifications and a Request for Proposal (RFP) were prepared for installing, developing, and performing aquifer characterization testing of all the proposed new monitoring wells (on-site and off-site). The RFPs were issued to multiple drilling firms and bids were received in December 2020, with work planned to commence in early 2021 once the off-site landowner agreements are finalized.

- 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).
- Continued AM with a sampling event in August 2020, 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 2020 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.

3.0 PLANNED SoR ACTIVITIES

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

- Continue evaluation of the historic groundwater monitoring data set for relationships between key parameters affecting arsenic natural attenuation and arsenic concentrations in groundwater.
- Complete development of the Arsenic Natural Attenuation Evaluation Work Plan.
- Finalize the right-of-access and lease agreements for the proposed new off-site monitoring locations and install, develop, and sample the three additional downgradient groundwater monitoring wells for arsenic and natural attenuation parameters.
- Conduct additional sampling and analysis for molybdenum to evaluate whether the downward trend in molybdenum concentrations measured over the last two and a half years in MW-20 is statistically significant.
- 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.
- Complete the scheduled 2021 AM sampling events at the Site.

Should the final remedy for the CCR unit not be selected during Q1 or Q2 2021, then another Semi-Annual SoR Report will be prepared as required by 40 CFR 257.97(a).