

**2021 GROUNDWATER MONITORING &
CORRECTIVE ACTION REPORT**

**COAL ASH PONDS
ELMER SMITH STATION
DAVIESS COUNTY
OWENSBORO, KENTUCKY**

**Prepared For:
OWENSBORO MUNICIPAL UTILITIES
OWENSBORO, KENTUCKY**



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1.0 INTRODUCTION

The United States Environmental Protection Agency (USEPA) issued 40 C.F.R. §257, Subpart D, *Disposal of Coal Combustion Residuals from Electric Utilities* (CCR Rule) on April 17, 2015. The CCR Rule regulates disposal of coal combustion residuals (CCR) in new and active landfills and impoundments. Civil & Environmental Consultants, Inc. (CEC) has been engaged by Owensboro Municipal Utilities (OMU) to prepare the 2021 Groundwater Monitoring and Corrective Action Report for the Coal Ash Ponds (aka the Site) at the Elmer Smith Station (ESS) as required by the CCR Rule. This document summarizes the monitoring activity conducted during 2021, including sampling events and statistical analyses. It is intended that this document will be placed in the facility Operating Record as required by 40 C.F.R. §257.105(h)(1), and posted on the publicly-accessible website as required by 40 C.F.R. §257.107(h)(1).

2.0 SITE OVERVIEW

2.1 BACKGROUND

The Ash Pond area associated with the Site is less than 10 acres in size and consists of three separate unlined ash settling basins (Ponds 1, 2, and 3). A Site location map and a Site and vicinity aerial map showing the location of the Ash Ponds are provided as Figures 1 and 2, respectively. OMU historically operated two coal-fired power generating units at the Site. Power Generation Unit 1 was idled in June 2019, and Power Generation Unit 2 was idled in May 2020. The basins were not used for the disposal of CCR but for the temporary storage of CCR material prior to being excavated and transported off-site for disposal or beneficial re-use. Pond 1 was used for Unit 1 boiler slag; Pond 2 received other ash and water plant blowdown (lime softening sludge), and, Pond 3 received no ash directly and was used for final settling prior to discharge to the adjacent Ohio River under a National Pollutant Discharge Elimination System (NPDES) permit. Other plant discharges, including coal pile runoff, Flue Gas Desulfurization (FGD) blowdown, roof and floor drains, etc. were also conveyed through the ponds. Based on a review of aerial images, topographic contour data from the USGS National Map, Owensboro East Quadrangle, a Site map prepared by others labeled “Structural Fill Finish Grading” dated August 28, 1962¹, and visual observations made by OMU personnel during pond dredging activities, the Ash Ponds appear to be incised in the native soils to a depth of approximately 12 to 15 feet below ground surface (bgs).

CEC assisted OMU with the design and installation of a permanent Groundwater Monitoring System (GMS) to comply with the GMS performance standard contained within the Federal CCR Rule (Section 257.91), as documented in the GMS Certification Report dated October 17, 2017 (CEC, 2017 [1]) and Amended GMS Certification Reports dated March 2019 (CEC, 2019[2]) and October 2021 (CEC, 2021[1]). Prior to the installation of the GMS, groundwater monitoring had not been conducted at the Site.

¹ Drawing No. S-7 “Structural Finish Grading”, prepared by Black & Veatch, dated August 28, 1962.

2.2 HYDROGEOLOGIC SETTING

Subsurface conditions encountered at the Site, as evidenced by the soil borings advanced in association with a Preliminary Hydrogeologic Investigation and the permanent GMS wells, are consistent with Quaternary-aged alluvium, and buried outwash (Tazewell age) typically found within the Ohio River Valley². Variable thicknesses of fine-grained silt and clay lenses are interbedded with deposits of coarser-grained, poorly-graded sand beneath a thin veneer of topsoil, crushed stone fill, or other fill material. The near-surface fine-grained deposits are thicker near the Ohio River, and decrease in thickness away from the river towards the southeast, where sand becomes the predominant soil type. A low-permeability clay layer was encountered at depths ranging from 26 to 43 feet bgs, varying in thickness from approximately 1 foot to over 16 feet, with an increasing trend in layer thickness towards the south/southeast. The clay layer is underlain by saturated, coarse-grained deposits that comprise the uppermost aquifer at the Site. Aquifer saturated thickness in the vicinity of the Site ranges from approximately 60 to 100 feet². Based on the depth to groundwater, the depth of the Ash Ponds, and visual observations made during pond dredging activities, it does not appear that groundwater is in direct communication with the Ash Ponds. Refer to the GMS Certification Report (CEC, 2017[1]) for a geologic cross-section and boring logs for the Site.

2.2.1 Hydrogeologic Characteristics

Groundwater occurs within the coarse-grained deposits that constitute the uppermost aquifer at the Site. Depth to water measurements collected from the GMS monitoring well network during the 2021 sampling events ranged from 59.92 feet below top of casing (BTOC) at MW-7 to 43.94 feet BTOC at MW-1. Static groundwater elevations on-site during 2021 ranged from 358.37 feet above mean sea level (AMSL) at MW-8 to 362.56 feet AMSL at MW-7. The normal pool elevation of

² *Geohydrology and Simulation of Ground-Water Flow for the Ohio River Alluvial Aquifer near Owensboro, Northwestern Kentucky*. U.S. Geological Survey Water-Resources Investigation Report 96-4274. 1997. Figure 7.

the adjacent Ohio River in the vicinity of ESS is approximately 358 feet AMSL³. Potentiometric data are summarized on Table 1 and shown on Figures 3a through 3e.

Groundwater elevation measurements obtained during the May 13, 2020 groundwater monitoring event indicated that the groundwater flow direction was to the southeast at an approximate average hydraulic gradient of 0.002, which is consistent with previous findings. This flow direction is contrary to what is typically observed in this type of hydrogeologic setting, where groundwater flow is typically towards the adjacent surface water body, such that this trend of groundwater flow to the southeast was interpreted to be a result of the pumping influence from the 11 nearby water production wells (Figure 2) associated with municipal water production operations at OMU's Cavin Water Treatment Plant, which has a capacity of up to 30 million gallons per day.

Groundwater elevation measurements obtained during the December 2, 2020 groundwater monitoring event and during a confirmatory monitoring event conducted on February 11, 2021, indicated that the groundwater flow direction was to the southwest at an approximate average hydraulic gradient of 0.001. While the gradient appeared to be consistent with prior findings, the flow direction was not and was interpreted to be a result of OMU terminating the operation of the production wells in the vicinity of the Ash Ponds in October 2020. To account for this change in groundwater flow direction and for groundwater passing beneath the limits of the CCR impoundments, an additional GMS well was added in June 2021 to the west of the Ash Ponds (reference Section 3.0). OMU is now utilizing three new production wells located about 1 mile southwest and downstream of ESS to generate groundwater for treatment and distribution to its drinking water customers. Groundwater flow patterns continue to be consistently to the southwest as observed during the groundwater sampling events performed in June and December 2021.

Hydraulic conductivity of the uppermost aquifer was not evaluated as part of the GMS installation process; however, based on published scientific reports, the Site is located in an area where

³Ohio River Navigation Charts from Cairo, Illinois to Foster, Kentucky (June 2010). U.S. Army Corps of Engineers, Louisville District. Chart No. 53.

horizontal hydraulic conductivity values are estimated to range from approximately 126 to 157 feet per day⁴.

⁴*Geohydrology and Simulation of Ground-Water Flow for the Ohio River Alluvial Aquifer near Owensboro, Northwestern Kentucky*. U.S. Geological Survey Water-Resources Investigation Report 96-4274. 1997. Figure 11.

3.0 GROUNDWATER MONITORING SYSTEM

As noted above in Section 2.2.1, the groundwater pumping at the municipally-operated well field and proximity of the Ash Ponds to the Ohio River created a unique hydrogeologic setting where there was not an ideal location to establish background groundwater quality conditions (i.e., groundwater that does not have the potential to be affected by leakage from a CCR unit). Therefore, two monitoring wells (MW-2 and MW-7) were used to establish and monitor background groundwater conditions. While MW-2 has historically been hydraulically upgradient, this was interpreted to be an artificial condition created by the operation of the production wells proximate to the Ash Ponds. MW-7 was selected as a secondary location to represent background conditions based on its hydraulic position and distance from the Ash Ponds. MW-1 and MW-3 have been used to monitor groundwater elevation exclusively since May 2017. Monitoring wells MW-2, MW-4, MW-5, MW-6, MW-7, and MW-8 have been utilized to monitor both groundwater elevation and groundwater quality.

The remainder of the GMS wells were strategically located taking into account the possibility that production well operations may eventually terminate and cause a shift in the groundwater flow direction back towards the Ohio River. With groundwater flow direction being consistently observed to the southeast since 2016, MW-4, MW-5, and MW-6 have been used to monitor water quality of groundwater passing the boundary of the CCR unit. These wells were placed as close as possible to the CCR unit boundary to provide for detection of groundwater contamination in the uppermost aquifer. GMS wells MW-1, MW-2, and MW-3, which have been used as background/upgradient wells (MW-2) and to monitor groundwater elevation (MW-1 and MW-3) were also positioned for use as downgradient monitoring wells in the event that production well pumping operations were to cease for an extended period of time and the groundwater flow direction reverted back towards the Ohio River sometime in the future. Monitoring well MW-8 was installed in December 2018 after molybdenum was quantified at a statistically significant level (SSL) in downgradient monitoring wells MW-5 and MW-6 (reference Section 2.1) in an effort to characterize the nature and extent of the release, as required by §257.95(g)(1).

Monitoring well MW-9 was added in 2021 in response to the shifting groundwater flow direction and a detection of selenium at a SSL in MW-6 that was identified in December 2020.

With the recent detection of selenium at a statistically significant level (SSL) in MW-6 and, more notably, the changes in groundwater flow direction, OMU decided to reconfigure the GMS network. Moving forward, MW-8 will be utilized as a background monitoring well with MW-7. MW-2 will transition to become a downgradient GMS well along with MW-1, which will have groundwater quality monitoring activities reinstated. MW-3 will continue to be used for groundwater elevation monitoring only. An additional GMS well (MW-9) was installed in June 2021 to the west and downgradient of the Ash Ponds and subsequently developed and sampled in conjunction with the first 2021 semi-annual Assessment Monitoring sampling event. MW-9 serves to monitor both groundwater elevation and groundwater quality downgradient from the Ash Ponds. Refer to the GMS Certification Reports (CEC, 2017[1], 2019 [2], and 2021[1]) for lithologic descriptions and well construction diagrams.

OMU plans to continue to monitor the groundwater elevations over the next year and will evaluate re-classification of the GMS wells (i.e., upgradient versus downgradient) and/or the need for additional GMS wells on an ongoing basis. However, based on the consistency observed in the groundwater flow trends over the past year, OMU does not anticipate the need for additional GMS wells. A summary of the GMS wells is provided in the table below.

CCR RULE GROUNDWATER MONITORING SYSTEM				
Location	Relative Location	Well Diameter (in.)	Total Depth (ft.-bgs)	Screen Length (ft.)
MW 1	Downgradient	4	57	10
MW-2	Downgradient	4	57	10
MW-3	Upgradient	4	57	10
MW-4	Downgradient	4	59	10
MW-5	Downgradient	4	59	10
MW-6	Downgradient	4	59	10
MW-7	Background	4	72	10
MW-8	Background	4	63	15
MW-9	Downgradient	4	52	10

4.0 CCR RULE SAMPLING PROGRAM PROGRESSION

4.1 BASELINE DATA AND BACKGROUND VALUES

The baseline sampling at ESS was performed between February 2017 and September 2017. The Appendix III background concentration values were determined using an upper prediction limit (UPL) method in accordance with the statistical methodology described in the *Detection Monitoring Statistical Methods Certification* for the Site, dated October 17, 2017 (CEC, 2017[2]). Background UPL values were calculated for each parameter based on the initial eight baseline sampling events conducted at the two background wells to establish background UPL values. The final background UPL values are summarized in the table below:

CCR RULE APPENDIX III BACKGROUND VALUES		
Parameter	Units	UPL Value
Boron, Total	mg/L	0.33
Calcium, Total	mg/L	139.5
Chloride	mg/L	50
Fluoride	mg/L	NC
pH, laboratory	s.u.	8.01
Sulfate	mg/L	154.3
Total Dissolved Solids	mg/L	950.8

NC = not calculated because constituent was not quantified at concentrations exceeding laboratory detection limit.

Despite the change in direction of groundwater flow leading to one of the original upgradient wells becoming downgradient, the background values previously determined are still valid. This is because this data was determined to be representative of regional background/unimpacted groundwater quality when the CCR monitoring program began. MW-2 is no longer an appropriate location to continue to monitor regional background. MW-8 will eventually be substituted after sufficient data has been collected to determine whether the current and previously collected groundwater data at MW-8 constitute a single population. Until that determination is made, the original background determination inclusive of prior MW-2 data is still a valid representation of unimpacted groundwater quality.

4.2 SSI DETERMINATION

Statistically Significant Increases (SSIs) for Appendix III parameters were determined within the Detection Monitoring program based upon comparison of the results from the October 2017 Detection Monitoring event to the UPL of the mean concentration detected in the background wells from the eight rounds of baseline monitoring. Based upon the results, one or more SSIs were identified at MW-4, MW-5, and MW-6.

Each downgradient monitoring well location had at least one identified SSI. SSIs for boron, calcium, sulfate, and total dissolved solids (TDS) were the most common among the downgradient wells. Below is a tabular summary of the SSIs observed:

SUMMARY OF OBSERVED SSIs AT OMU ESS							
Monitoring Point	Appendix III Parameters						
	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids (TDS)
MW-4	X	X				X	X
MW-5	X					X	
MW-6	X	X				X	X

X – SSI Determined

4.3 TRANSITION TO ASSESSMENT MONITORING

As a result of the SSI determinations, the Assessment Monitoring Program was initiated in April 2018 for ESS consisting of sampling and analysis for Appendix IV constituents. A notification of the transition into the Assessment Monitoring Program was placed in the facility's Operating Record in accordance with §257.105(h) on January 19, 2018.

4.4 GROUNDWATER PROTECTION STANDARDS

The CCR Rule requires that two Assessment Monitoring events be performed and analytical results obtained before establishing Groundwater Protection Standards (GWPSs) for Appendix IV

constituents in accordance with Section §257.95(h) of the CCR Rule. The GWPSs are then compared to the downgradient Appendix IV concentrations to identify if downgradient concentrations exceed the GWPS at SSLs prompting an Assessment of Corrective Measures.

The GWPS is based on the higher of following three options: (1) the EPA maximum contaminant level (MCL) that has been established under U.S. EPA 40 C.F.R. §141.62 and §141.66 of this title, (2) the health-based value (HBV) outlined in §257.95(h)(2), or (3) the background as determined by either a tolerance interval or prediction interval approach with a 99 percent confidence level/99 percent coverage coefficient (99/99) in accordance with §257.95(h)(3).

Prior to 2021, the UPL was calculated for development of the GWPS. Based upon an external review of the stated statistical plan, it was concluded that a tolerance level approach was more appropriate for assessment monitoring. Utilizing the upper tolerance limit (UTL) for background concentrations identifies the upper threshold that is likely to be observed in the baseline dataset and is more appropriate for establishing background-based GWPS for assessment monitoring where long term exposure is of concern (consistent with the methodology for establishing the MCL or other health or risk-based levels as recommended in U.S. EPA's Unified Guidance [USEPA, 2009]). In addition, there are conceptual issues with using the UPL approach in that the GWPS is dependent not only on background, but also on the number of future means or medians, which may not be fixed or known.

In accordance with the option above, the background concentration for each parameter was determined from the UTL using the initial eight baseline sampling events from the two background wells. This data set may be augmented/updated in the future after eight rounds of data have been collected at MW-8 if this data is determined to be from the same population as the eight rounds of data collected at MW-2 and MW-7 in 2017. In addition, data collected from MW-7 after the baseline sampling events will be evaluated to determine whether they can be added to the baseline dataset to provide for a more robust determination of regional background. The calculated UTL was then compared to the MCL or the established Health-Based Value to determine the final GWPS.

GWPS values were established for the Site, consistent with §257.95(d)(2). The table below summarizes background concentrations, MCL values, and health-based values for detected constituents at the Site.

GWPS DETERMINATION FOR OMU ESS					
Appendix IV Constituent	Units	UTL	MCL	Health-based Value	Final GWPS
Total Metals					
Antimony, Total	mg/L	ND/NC	0.006	--	0.006
Arsenic, Total	mg/L	ND/NC	0.010	--	0.010
Barium, Total	mg/L	0.18	2	--	2
Beryllium, Total	mg/L	0.00091	0.004	--	0.004
Cadmium, Total	mg/L	ND/NC	0.005	--	0.005
Chromium, Total	mg/L	4.1	0.1	--	4.1
Cobalt, Total	mg/L	0.098	--	0.006	0.098
Lead, Total	mg/L	0.015	0.015	0.015	0.015
Lithium, Total	mg/L	ND/NC	--	0.040	0.040
Mercury, Total	mg/L	ND/NC	0.002	--	0.002
Molybdenum, Total	mg/L	ND/NC	--	0.100	0.100
Selenium, Total	mg/L	ND/NC	0.05	--	0.05
Thallium, Total	mg/L	ND/NC	0.002	--	0.002
Non-Metals					
Fluoride	mg/L	1.0	4	--	4
Combined Radium-226/228	pCi/L	9.32	5	--	9.32

Notes:

- ND/NC = constituent was not detected at concentrations exceeding laboratory reporting limits in the background monitoring wells, and therefore the UTPL was not calculated.
- = No Value Established

Despite the change from a prediction interval approach to a tolerance interval approach there was no change in the final GWPS for any parameters. The GWPS for three parameters (cadmium, cobalt and lead) were based upon background levels. These three datasets were determined to be non-parametric where the UPL or UTL is set equal to the highest observed value. Therefore, for these three parameters the UPL equals the UTL and the GWPS does not change. None of the other GWPS were based upon background.

Despite the change in direction of groundwater flow resulting in one of the original upgradient wells becoming downgradient, the background UTL values determined in 2017 are still valid. This is because the observed groundwater quality was determined to be representative of regional background/unimpacted groundwater quality when the CCR monitoring program was initiated. Even though MW-2 is no longer an appropriate location to continue monitoring regional background and MW-8 is being substituted (after sufficient data has been collected), the original determination is still valid. After sufficient data has been collected at MW-8 an Analysis of Variance (ANOVA) assessment will be performed to determine whether the new data at MW-8 can be combined with the historical background dataset from MW-2 and MW-7. If it is determined that they form a single population, the UTL determination will be revised to reflect the new data set. It is not anticipated that the change will be significant, but the new UTLs determined will be the result of a more robust statistical evaluation due to the availability of the larger dataset. It is anticipated that based upon the current semi-annual sampling schedule sufficient data will have been collected at MW-8 by the end of 2022 to allow for the ANOVA analysis to be performed. Pending acceptable results, the UTLs and associated GWPS can be updated as appropriate.

4.5 STATISTICALLY SIGNIFICANT LEVEL DETERMINATION

The initial SSL determination was based on whether or not an exceedance of GWPSs occurred for an Appendix IV constituent at a downgradient GMS location in both the initial (April 2018) and resample (June 2018) sampling events.

With the tolerance approach, the GWPS, once determined, should be compared to the lower confidence level (LCL) (99 percent confidence interval) of the mean (parametric distribution)/median (non-parametric distribution) of the downgradient groundwater results at a given location, and not a single point comparison as done in prior reports. By utilizing the LCL of the mean as a basis of comparison to the GWPS, variability in the dataset is accounted for and exceedances are unlikely to be caused by an individual abnormality in the dataset. This approach is consistent with the development of MCLs and HBV, which are based upon long-term exposure. The LCL of the mean will be updated after each sampling event to incorporate recent data. The

final SSL determination is based on whether or not the newly calculated LCL of the mean for the downgradient data at each location exceeds the GWPS.

In accordance with the U.S. EPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (2009, Unified Guidance), the LCL of the mean is determined based upon a minimum of either four consecutive events for a parametric distribution or three consecutive events for a non-parametric distribution. Ideally, the largest number of data points will be used to establish the LCL of the mean/median to maximize the robustness of the statistical determination. For comparison to standards applicable to long-term exposure, comparison of the LCL of the mean or median as determined above, to the UTL, is the preferred method from the U.S. EPA's Unified Guidance, rather than a single point comparison to the UPL (identical to Detection Monitoring). There were no changes in the SSL determination based upon the switch to comparison of the LCL of the mean to the GWPS.

Based on the analytical results, utilizing the original UPL, one constituent (molybdenum) was detected at a SSL at two locations (MW-5 and MW-6). Comparison of the LCL of the mean to the GWPS (utilizing the tolerance interval approach) did not change this determination. A summary of the constituents quantified at a SSL are summarized below:

Downgradient GMS Location	Appendix IV Parameters														
	Antimony, Total	Arsenic, Total	Barium, Total	Beryllium, Total	Cadmium, Total	Chromium, Total	Cobalt, Total	Lead, Total	Lithium, Total	Mercury, Total	Molybdenum, Total	Selenium, Total	Thallium, Total	Fluoride	Combined Radium
MW-5											X				
MW-6											X				

X – SSL Determined

In accordance with §257.105(h), a notification was placed into the facility's Operating Record on October 31, 2018 indicating that an SSL had been observed for molybdenum. The Site will remain

in Assessment Monitoring unless concentrations of constituents in Appendix IV are quantified at levels equal to or less than the GWPS.

The December 2018 SSL evaluation confirmed the SSL determinations from the April and June 2018 Assessment Monitoring events. As a result of the confirmation of the SSL for molybdenum, the facility was required to perform an Assessment of Corrective Measures (CEC, 2019 [4]) in addition to continuing with the Assessment Monitoring Program.

The source of the observed SSLs in the downgradient GMS wells was determined to be attributable to the Ash Ponds. A Release Characterization was initiated in December 2018, consisting of the installation of one monitoring well (MW-8) in the southwest corner of the ESS property to delineate the extent of the molybdenum impact in groundwater downgradient from the Ash Ponds (Figure 2). Molybdenum has not been quantified at concentrations exceeding laboratory reporting limits in groundwater samples collected from MW-8.

5.0 2021 GROUNDWATER SAMPLING SUMMARY

In accordance with §257.95(b), an annual Assessment Monitoring event was performed on June 30, 2021. Groundwater samples were collected from eight of the GMS sampling locations and submitted to ALS Environmental Laboratory (ALS) in Cincinnati, Ohio for analysis of Appendix III and Appendix IV parameters. The semi-annual Assessment Monitoring event was performed on December 14, 2021, in accordance with §257.95(d)(1), which included sampling of the same eight GMS locations and laboratory analysis for Appendix III parameters and the Appendix IV parameters that were quantified at concentrations exceeding their respective laboratory reporting limits during the May 2020 sampling event. An analytical summary for the Assessment Monitoring sampling events is provided in Table 2.

A summary of the 2021 sampling events is provided below. The Site remained in the Assessment Monitoring Program throughout 2021.

2021 CCR RULE GROUNDWATER SAMPLING EVENTS		
Location	June 2021 Event	December 2021 Event
<i>Downgradient Wells</i>		
MW-1	6/30/2021	12/14/2021
MW-2	6/30/2021	12/14/2021
MW-4	6/30/2021	12/14/2021
MW-5	6/30/2021	12/14/2021
MW-6	6/30/2021	12/14/2021
MW-9	6/30/2021	12/14/2021
<i>Background Wells</i>		
MW-7	6/30/2021	12/14/2021
MW-8	6/30/2021	12/14/2021

6.0 STATISTICALLY SIGNIFICANT LEVEL DETERMINATION

6.1 DECEMBER 2020 ANALYTICAL RESULTS

The 2020 Groundwater Monitoring and Corrective Action Report was issued prior to performing the SSL evaluation of the results from the December 2020 sampling event. The conclusions of that evaluation are discussed here.

As noted in Section 2.2.1, groundwater elevation measurements obtained during the December 2, 2020 groundwater monitoring event indicated that the groundwater flow direction was to the southwest at an approximate average hydraulic gradient of 0.001. While the gradient appeared to be consistent with prior findings, the flow direction was not and was interpreted to be a result of OMU terminating the operation of the production wells in the vicinity of the Ash Ponds in October 2020.

One constituent (molybdenum) was detected at a SSL in two of the downgradient GMS locations (MW-5 [0.67 mg/L] and MW-6 [2.1 mg/L]), which is consistent with the findings of the prior sampling events. While it was previously determined that the result (0.055 mg/L) for selenium exceeded the GWPS when utilizing the prediction interval approach, the LCL of the mean for selenium at MW-6 (0.048 mg/L) did not exceed the GWPS and therefore was not detected at a SSL. No other Appendix IV constituents were detected at SSLs. Pursuant to §257.105(h)(8), a notification was placed into the facility's Operating Record on June 8, 2021 indicating that an SSL had been observed for molybdenum.

The change in groundwater flow direction precipitated the need for installation of an additional GMS well (MW-9) to have adequate coverage downgradient from the CCR impoundments as noted in Section 3.0.

6.2 JUNE 2021 ANALYTICAL RESULTS

The analytical results from the June 2021 sampling event were consistent with prior events and reported detections of molybdenum at a SSL at MW-5 and MW-6. The molybdenum concentrations reported were similar to those detected in the December 2020 sampling event. Molybdenum was quantified in MW-9 (0.033 mg/L), but the concentration was less than the GWPS. No other Appendix IV constituents were detected at SSLs.

6.3 DECEMBER 2021 ANALYTICAL RESULTS

Statistical analysis of the laboratory data obtained from the December 2021 will be performed within 90 days of receiving the laboratory results to evaluate whether or not constituents are present at SSLs, consistent with §257.95(g).

7.0 REMEDY SELECTION

As noted in Section 4.5, due to the presence of constituents in groundwater at SSLs, OMU was required to conduct an Assessment of Corrective Measures pursuant to 40 CFR §257.96. CEC prepared the Assessment of Corrective Measures report, dated May 29, 2019 (CEC, 2019[4]), evaluating various corrective measures options, including: monitored natural attenuation, waste excavation and disposal, in-situ remediation, capping, operation of a pump and treat groundwater remediation system, and installation of a groundwater cut-off wall with respect to the requirements of §257.97(b)(1) through (5) and §257.97 (c)(1) through (4) and two primary corrective measures objectives:

1. Reduce leaching of CCR chemicals of concern (COCs) from the coal ash impoundments via infiltration of surface water and inundation of groundwater, which appears to be the primary source of the observed groundwater impacts; and,
2. Monitor performance of the selected corrective measure through continued sampling of the GMS wells to demonstrate compliance with the GWPS.

A copy of the Assessment of Corrective Measures report is available on the publicly-accessible website.

Due to the COVID-19 pandemic and the restrictions on public mass gatherings in Kentucky, a public meeting to discuss the remedy selection was unable to be held in 2020. Therefore, OMU prepared semi-annual progress reports pursuant to §257.105(h)(12) to document the progress in selecting the remedy. Copies of these reports are also available on the publicly-accessible website.

A public meeting was held on July 26, 2021, and after allowing for a 30-day period after the meeting for public comments and/or questions in accordance with §257.96(e), the final remedy was selected, and the Remedy Selection Report (CEC 2021 [2]) was placed into the facility Operating Record in October 2021. After evaluation of the available options, OMU decided to proceed with excavation and off-site disposition of the CCR within the Ash Ponds (clean closure) as the remedy. Monitored natural attenuation will also be conducted to evaluate the performance of the applied corrective measure. The preliminary approach for implementing this remedy was

originally outlined in the Initial and Post Closure Plan for the facility prepared by OMU and dated October 17, 2016 (revised October 19, 2017). This option provides protection of human health and the environment and a high level of confidence that further releases of COCs from the Ash Ponds will not occur. The monitored natural attenuation will serve to monitor the performance of the excavation remedy. An option for pumping and treatment of groundwater was also retained in a backup capacity in the event that the selected remedy does not perform as expected.

OMU completed CCR removal efforts within the Ash Ponds in December 2021. Progress was documented by both OMU and CEC after reaching key milestones in the implementation of the remedy. CCR was removed via excavation equipment and allowed to dry on-site prior to being transported off-site for disposal or beneficial re-use. A Clean Closure Certification documenting the CCR removal efforts will be prepared in 2022 summarizing the closure activities in accordance with §257.102(f).

8.0 PLANNED ACTIVITIES FOR 2022

This section discusses the groundwater monitoring and reporting activities anticipated for ESS in 2022. All dates are tentative and subject to change.

January 2022:

- Enter the *2021 Annual Groundwater Monitoring and Corrective Action Report* into the facility's Operating Record.

February 2022:

- Evaluate analytical data from the December 2021 Assessment Monitoring sampling event against GWPS.
- Enter the Clean Closure Certification report into the facility's Operating Record.

March 2022:

- Post the *2021 Annual Groundwater Monitoring and Corrective Action Report* and the Clean Closure Certification to the public internet site and notify KDEP.

May 2022:

- The first semi-annual groundwater monitoring event in 2022 will be conducted. Assessment Monitoring samples (i.e., Appendix III and IV) will be collected during the event.

August 2022:

- Appendix IV sample results collected in May 2022 will be evaluated for a SSL over background.

November 2022:

- The second semi-annual groundwater monitoring event in 2022 will be conducted. Assessment Monitoring samples (i.e., Appendix III and IV) will be collected during the event. Note SSLs for the November 2022 Assessment Monitoring event, if any, will be determined by January 2023.

December 2022:

- Preparation of the *2022 Annual Groundwater Monitoring and Corrective Action Report* will begin.

9.0 RECORDKEEPING REQUIREMENTS

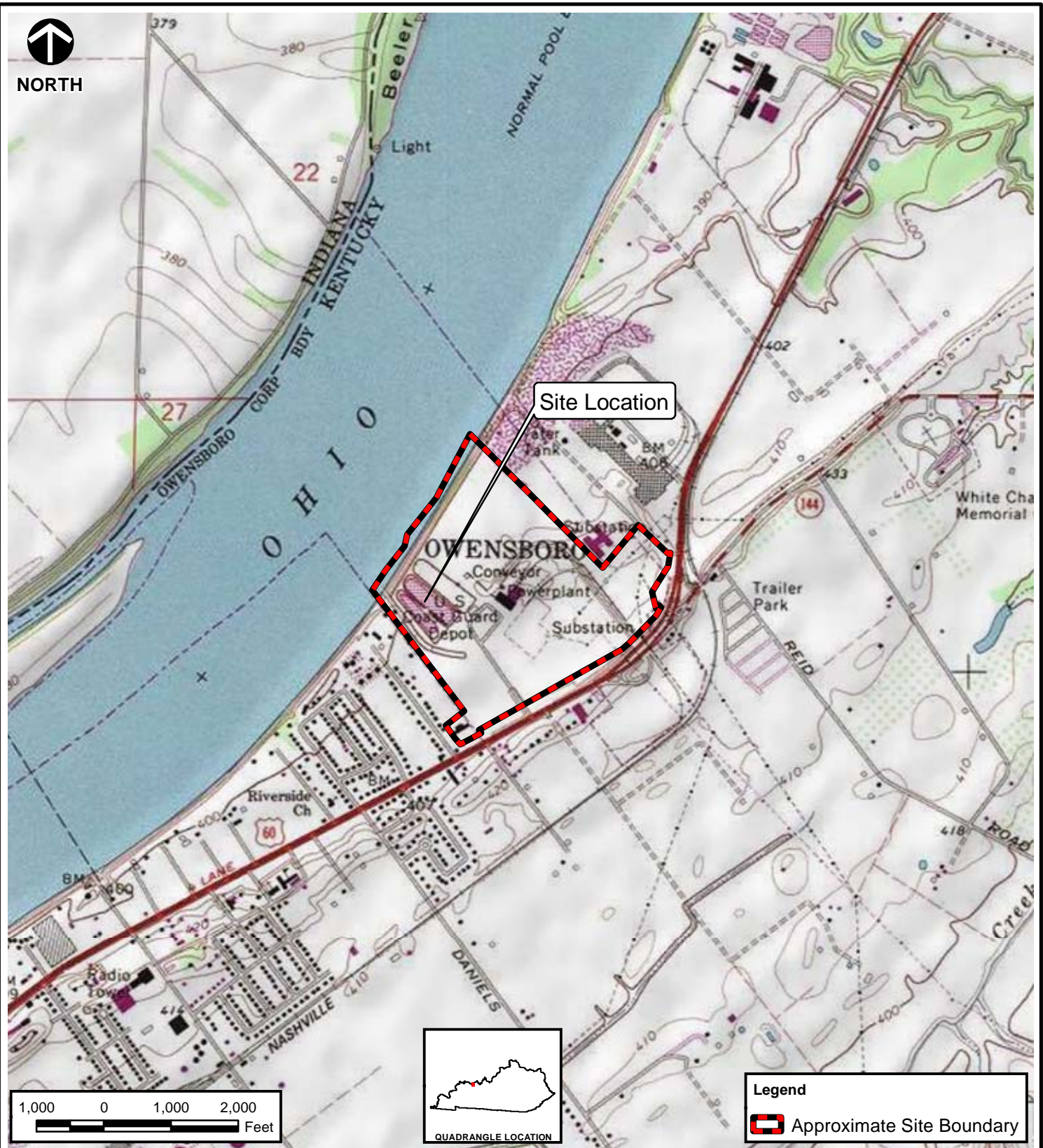
In accordance with §257.105(h) this document has been placed in OMU's Operating Record. A copy will also be placed on the publicly accessible website, and a notification will be submitted to the KDEP to comply with §257.107(h) and §257.106(h) of the CCR Rule.

10.0 REFERENCES

- CEC, 2017(1). CCR Rule Groundwater Monitoring Certification Coal Ash Ponds, Elmer Smith Station, Owensboro, Kentucky, Prepared For: Owensboro Municipal Utilities, Owensboro, Kentucky, Prepared by Civil & Environmental Consultants, Inc., Pittsburgh, Pennsylvania, CEC Project 164-014, October 2017.
- CEC, 2017(2). Detection Monitoring Statistical Methods Certification, Coal Ash Ponds, Elmer Smith Station, Owensboro, Kentucky, Prepared For: Owensboro Municipal Utilities, Owensboro, Kentucky, Prepared by Civil & Environmental Consultants, Inc., Pittsburgh, Pennsylvania, CEC Project 164-014, October 2017.
- CEC, 2019(1). 2018 Groundwater Monitoring and Corrective Action Report, Coal Ash Ponds, Elmer Smith Station, Owensboro, Kentucky, Prepared For: Owensboro Municipal Utilities, Owensboro, Kentucky, Prepared by Civil & Environmental Consultants, Inc., Pittsburgh, Pennsylvania, CEC Project 164-014, January 2019.
- CEC, 2019(2). CCR Rule Groundwater Monitoring Certification Amendment Coal Ash Ponds, Elmer Smith Station, Owensboro, Kentucky, Prepared For: Owensboro Municipal Utilities, Owensboro, Kentucky, Prepared by Civil & Environmental Consultants, Inc., Pittsburgh, Pennsylvania, CEC Project 164-014, March 2019.
- CEC, 2019(3). Amended Detection Monitoring Statistical Methods Certification, Coal Ash Ponds, Elmer Smith Station, Owensboro, Kentucky, Prepared For: Owensboro Municipal Utilities, Owensboro, Kentucky, Prepared by Civil & Environmental Consultants, Inc., Pittsburgh, Pennsylvania, CEC Project 164-014, March 2019.
- CEC, 2019(4). Assessment of Corrective Measures, Coal Ash Ponds, Elmer Smith Station, Owensboro, Kentucky, Prepared For: Owensboro Municipal Utilities, Owensboro, Kentucky, Prepared by Civil & Environmental Consultants, Inc., Pittsburgh, Pennsylvania, CEC Project 164-106, May 2019.
- CEC, 2021(1). CCR Rule Groundwater Monitoring Certification Amendment No. 2 Coal Ash Ponds, Elmer Smith Station, Owensboro, Kentucky, Prepared For: Owensboro Municipal Utilities, Owensboro, Kentucky, Prepared by Civil & Environmental Consultants, Inc., Pittsburgh, Pennsylvania, CEC Project 164-014, October 2021.
- CEC, 2021(2). Remedy Selection Report Coal Ash Ponds, Elmer Smith Station, Owensboro, Kentucky, Prepared For: Owensboro Municipal Utilities, Owensboro, Kentucky, Prepared by Civil & Environmental Consultants, Inc., Pittsburgh, Pennsylvania, CEC Project 164-014, October 27, 2021.
- USEPA, 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance. EPA 530-R-09-007. U.S. Environmental Protection Agency, Office of Resource Conservation and Recovery Program Implementation and Information Division. March 2009.

FIGURES

\\SVR-CINC\Projects\2016\164-014-GIS\Maps\Task 0028 - GWMCA Report 2020\FIG1 164014 EN28 SLM.mxd - 177/2021 - 10:52:32 AM (mnemecek)



SOURCE: PORTION OF THE USGS 7.5-MINUTE SERIES TOPOGRAPHIC QUADRANGLE MAP - OWENSBORO EAST, KY - 1983



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OWENSBORO MUNICIPAL UTILITIES
ELMER SMITH STATION ASH PONDS
OWENSBORO, DAVIESS COUNTY, KY

SITE LOCATION MAP

DRAWN BY:	MGN	CHECKED BY:	HTW	APPROVED BY:	HTW*	FIGURE NO:
DATE:	JANUARY 07, 2021	DWG SCALE:	1" = 2,000'	PROJECT NO:	164-014.0028	1

Signature on File *



SOURCE: CITY OF OWENSBORO GIS SERVER; IMAGE DATE: 2021.

Legend

Approximate Site Boundary

GMS Monitoring Well

OMU Municipal Production Well (Idle)

PROJECT LOCATION

2000400

Feet

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OWENSBORO MUNICIPAL UTILITIES
ELMER SMITH STATION ASH PONDS
OWENSBORO, DAVIESS COUNTY, KY

SITE & VICINITY AERIAL MAP
WITH GMS WELLS

DRAWN BY: MGN
DATE: JAN 21, 2022

CHECKED BY: MGN
SCALE: 1" = 400'

APPROVED BY: HTW*
PROJECT NO: 164-014

FIGURE NO:
2



Ohio River

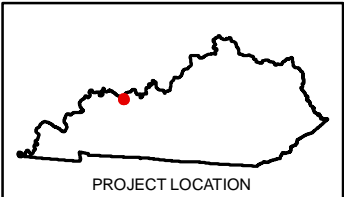


NOTE: THE WATER LEVELS PRESENTED HEREIN ARE APPLICABLE TO THE LOCATION AND TIME OF MEASUREMENT. WATER LEVELS MAY FLUCTUATE THROUGH TIME. POTENTIOMETRIC CONTOURS GENERATED FROM THIS DATA ARE CONSTRUCTED BY INTERPOLATION BETWEEN POINTS OF KNOWN STATIC WATER LEVEL ELEVATIONS AND USING KNOWLEDGE OF SPECIFIC SITE CONDITIONS. ACTUAL STATIC WATER LEVELS AT LOCATIONS BETWEEN THE MONITORING POINTS MAY DIFFER FROM THOSE DEPICTED.

SOURCE: CITY OF OWENSBORO GIS SERVER; IMAGE DATE: 2019

Legend

- Approximate Site Boundary
- OMU Municipal Production Well
- Equipotential Line
- GMS Monitoring Well
- Groundwater Elevation (feet above mean sea level)



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OWENSBORO MUNICIPAL UTILITIES
ELMER SMITH STATION ASH PONDS
OWENSBORO, DAVIESS COUNTY, KY

POTENTIOMETRIC SURFACE MAP
MAY 13, 2020

DRAWN BY: MGN	CHECKED BY: MGN	APPROVED BY: HTW*	FIGURE NO:
DATE: JAN 29, 2021	SCALE: 1" = 400'	PROJECT NO: 164-014	

3a

Signature on File *

\\SVR-CINC\Projects\2016\164-014-GIS\Maps\Task 0028 - GWMCA Report_2020\164014_EN25_PSM(05-13-20).mxd - 1/29/2021 - 4:03:47 PM (mmmecek)



Ohio River

Cooling Water
Discharge Canal
(channelized)

Cavin Water
Treatment Plant

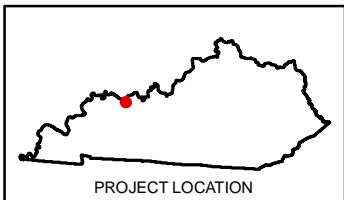
Inferred Groundwater
Flow Direction

NOTE: THE WATER LEVELS PRESENTED HEREIN ARE APPLICABLE TO THE LOCATION AND TIME OF MEASUREMENT. WATER LEVELS MAY FLUCTUATE THROUGH TIME. POTENTIOMETRIC CONTOURS GENERATED FROM THIS DATA ARE CONSTRUCTED BY INTERPOLATION BETWEEN POINTS OF KNOWN STATIC WATER LEVEL ELEVATIONS AND USING KNOWLEDGE OF SPECIFIC SITE CONDITIONS. ACTUAL STATIC WATER LEVELS AT LOCATIONS BETWEEN THE MONITORING POINTS MAY DIFFER FROM THOSE DEPICTED.

SOURCE: CITY OF OWENSBORO GIS SERVER; IMAGE DATE: 2019

Legend

- Approximate Site Boundary
- OMU Municipal Production Well
- Equipotential Line
- GMS Monitoring Well
- Groundwater Elevation (feet above mean sea level)



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OWENSBORO MUNICIPAL UTILITIES
ELMER SMITH STATION ASH PONDS
OWENSBORO, DAVIESS COUNTY, KY

POTENTIOMETRIC SURFACE MAP
DECEMBER 2, 2020

DRAWN BY: MGN	CHECKED BY: MGN	APPROVED BY: HTW*	FIGURE NO:
DATE: JAN 29, 2021	SCALE: 1" = 400'	PROJECT NO: 164-014	

3b

Signature on File *

\\SVR-CINC\Projects\2016\164-014-GIS\Maps\Task 0028 - GWMCA Report_2020\164014_EN25_PSM(12-02-20).mxd - 1/29/2021 - 4:04:56 PM (mmmecek)



SOURCE: CITY OF OWENSBORO GIS SERVER; IMAGE DATE: 2019

Legend

- Approximate Site Boundary
- OMU Municipal Production Well (Idle)
- GMS Monitoring Well
- Groundwater Elevation (feet above mean sea level)

PROJECT LOCATION

200 0 200 400 Feet

 Civil & Environmental Consultants, Inc. 333 Baldwin Road - Pittsburgh, PA 15205 412-429-2324 - 800-365-2324 www.cecinc.com		OWENSBORO MUNICIPAL UTILITIES ELMER SMITH STATION ASH PONDS OWENSBORO, DAVIESS COUNTY, KY	
DRAWN BY: MGN		CHECKED BY: MGN	
DATE: FEB 01, 2022		SCALE: 1" = 400'	
APPROVED BY: HTW*		FIGURE NO: 3c	
PROJECT NO: 164-014			



Ohio River

MW-3
359.7
MW-2
359.7
MW-1
359.37

MW-9
360.3
MW-5
360.17
MW-6
360.53
MW-4
361.01

Cooling Water
Discharge Canal
(channelized)

MW-8
359.72

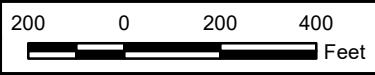
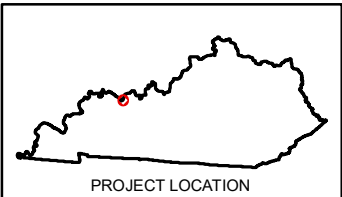
Inferred Groundwater
Flow Direction

Cavin Water
Treatment Plant

NOTE: THE WATER LEVELS PRESENTED HEREIN ARE APPLICABLE TO THE LOCATION AND TIME OF MEASUREMENT. WATER LEVELS MAY FLUCTUATE THROUGH TIME. POTENTIOMETRIC CONTOURS GENERATED FROM THIS DATA ARE CONSTRUCTED BY INTERPOLATION BETWEEN POINTS OF KNOWN STATIC WATER LEVEL ELEVATIONS AND USING KNOWLEDGE OF SPECIFIC SITE CONDITIONS. ACTUAL STATIC WATER LEVELS AT LOCATIONS BETWEEN THE MONITORING POINTS MAY DIFFER FROM THOSE DEPICTED.

Legend

- Approximate Site Boundary
- OMU Municipal Production Well (Idle)
- Equipotential Line
- GMS Monitoring Well
- Groundwater Elevation (feet above mean sea level)



SOURCE: CITY OF OWENSBORO GIS SERVER; IMAGE DATE: 2019



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OWENSBORO MUNICIPAL UTILITIES
ELMER SMITH STATION ASH PONDS
OWENSBORO, DAVIESS COUNTY, KY

POTENTIOMETRIC SURFACE MAP
JUNE 30, 2021

DRAWN BY: MGN CHECKED BY: MGN APPROVED BY: HTW*
DATE: FEB 01, 2022 SCALE: 1" = 400' PROJECT NO: 164-014

3d

Signature on File *



Ohio River

Cooling Water
Discharge Canal
(channelized)

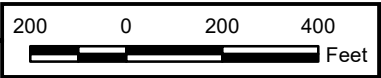
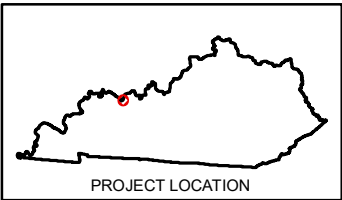
Cavin Water
Treatment Plant

SOURCE: CITY OF OWENSBORO GIS SERVER; IMAGE DATE: 2019

NOTE: THE WATER LEVELS PRESENTED HEREIN ARE APPLICABLE TO THE LOCATION AND TIME OF MEASUREMENT. WATER LEVELS MAY FLUCTUATE THROUGH TIME. POTENTIOMETRIC CONTOURS GENERATED FROM THIS DATA ARE CONSTRUCTED BY INTERPOLATION BETWEEN POINTS OF KNOWN STATIC WATER LEVEL ELEVATIONS AND USING KNOWLEDGE OF SPECIFIC SITE CONDITIONS. ACTUAL STATIC WATER LEVELS AT LOCATIONS BETWEEN THE MONITORING POINTS MAY DIFFER FROM THOSE DEPICTED.

Legend

- Approximate Site Boundary
- OMU Municipal Production Well (Idle)
- GMS Monitoring Well
- Groundwater Elevation (feet above mean sea level)



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OWENSBORO MUNICIPAL UTILITIES
ELMER SMITH STATION ASH PONDS
OWENSBORO, DAVIESS COUNTY, KY

POTENTIOMETRIC SURFACE MAP
DECEMBER 14, 2021

DRAWN BY: MGN	CHECKED BY: MGN	APPROVED BY: HTW*	FIGURE NO:
DATE: FEB 01, 2022	SCALE: 1" = 400'	PROJECT NO: 164-014	

3e

Signature on File *

TABLES

TABLE 1
Groundwater Elevation Summary
OMU Elmer Smith Station Ash Ponds
Owensboro, KY
(all measurements are in feet)

Well ID (AKGWA #)	Location Relative to Ash Ponds	Ground Surface Elevation (AMSL)	TOC Elevation (AMSL)	Measurement Date	Depth to Water Measurement (ft BTOC)	Groundwater Elevation (AMSL)
MW-1 (8006-9522)	Downgradient	402.00	404.53	12/8/2016	48.51	356.02
				12/13/2016	48.07	356.46
				2/8/2017	45.69	358.84
				3/8/2017	40.68	363.85
				4/6/2017	43.51	361.02
				5/3/2017	45.91	358.62
				5/15/2017	43.46	361.07
				6/16/2017	49.94	354.59
				6/29/2017	46.72	357.81
				7/13/2017	49.81	354.72
				7/27/2017	49.99	354.54
				8/9/2017	49.15	355.38
				8/23/2017	50.38	354.15
				9/6/2017	50.31	354.22
				9/20/2017	50.04	354.49
				10/10/2017	49.55	354.98
				4/5/2018	34.75	369.78
				6/5/2018	46.61	357.92
				12/12/2018	43.97	360.56
				12/27/2018	35.66	368.87
				5/23/2019	42.30	362.23
				11/7/2019	45.43	359.10
				5/13/2020	38.06	366.47
				12/2/2020	45.65	358.88
MW-2 (8006-9523)	Downgradient	402.75	405.55	2/11/2021	44.11	360.42
				6/30/2021	45.16	359.37
				12/14/2021	43.94	360.59
				12/8/2016	49.21	356.34
				12/13/2016	48.74	356.81
				2/8/2017	46.29	359.26
				3/8/2017	41.24	364.31
				4/6/2017	44.16	361.39
				5/3/2017	45.48	360.07
				5/15/2017	44.02	361.53
				6/16/2017	50.02	355.53
				6/29/2017	47.17	358.38
				7/13/2017	50.16	355.39
				7/27/2017	50.23	355.32
				8/9/2017	50.75	354.80
				8/23/2017	50.97	354.58
				9/6/2017	50.95	354.60
				9/20/2017	50.69	354.86
				10/10/2017	50.20	355.35
				4/5/2018	35.70	369.85
				6/5/2018	47.22	358.33
				12/12/2018	44.51	361.04
				12/27/2018	36.85	368.70
				5/23/2019	42.94	362.61
				11/7/2019	46.13	359.42
				5/13/2020	38.56	366.99
				12/2/2020	46.24	359.31
				2/11/2021	44.80	360.75
				6/30/2021	45.85	359.70
				12/14/2021	44.70	360.85

Notes: AMSL = Above Mean Sea Level
TOC = Top of Casing
Ft BTOC = Feet Below Top of Casing

TABLE 1
Groundwater Elevation Summary
OMU Elmer Smith Station Ash Ponds
Owensboro, KY
(all measurements are in feet)

Well ID (AKGWA #)	Location Relative to Ash Ponds	Ground Surface Elevation (AMSL)	TOC Elevation (AMSL)	Measurement Date	Depth to Water Measurement (ft BTOC)	Groundwater Elevation (AMSL)
MW-3 (8006-9524)	Upgradient	403.78	406.39	12/8/2016	49.88	356.51
				12/13/2016	49.43	356.96
				2/8/2017	46.95	359.44
				3/8/2017	41.64	364.75
				4/6/2017	44.56	361.83
				5/3/2017	45.90	360.49
				5/15/2017	44.51	361.88
				6/16/2017	50.06	356.33
				6/29/2017	47.29	359.10
				7/13/2017	50.64	355.75
				7/27/2017	50.69	355.70
				8/9/2017	51.35	355.04
				8/23/2017	51.65	354.74
				9/6/2017	51.43	354.96
				9/20/2017	51.25	355.14
				10/10/2017	50.82	355.57
				4/5/2018	36.10	370.29
				6/5/2018	47.84	358.55
				12/12/2018	45.16	361.23
				12/27/2018	37.61	368.78
				5/23/2019	43.51	362.88
				11/7/2019	46.59	359.80
				5/13/2020	39.32	367.07
				12/2/2020	46.98	359.41
				2/11/2021	45.62	360.77
				6/30/2021	46.68	359.71
				12/14/2021	45.46	360.93
MW-4 (8006-9525)	Downgradient	406.44	408.02	12/8/2016	54.44	353.58
				12/13/2016	54.06	353.96
				2/8/2017	51.22	356.80
				3/8/2017	52.97	355.05
				4/6/2017	54.99	353.03
				5/3/2017	55.75	352.27
				5/15/2017	53.95	354.07
				6/16/2017	58.65	349.37
				6/29/2017	57.60	350.42
				7/13/2017	58.20	349.82
				7/27/2017	58.73	349.29
				8/9/2017	58.97	349.05
				8/23/2017	59.48	348.54
				9/6/2017	58.73	349.29
				9/20/2017	57.75	350.27
				10/10/2017	57.15	350.87
				4/5/2018	48.85	359.17
				6/5/2018	51.97	356.05
				12/12/2018	50.92	357.10
				12/27/2018	48.87	359.15
				5/23/2019	45.72	362.30
				11/7/2019	49.83	358.19
				5/13/2020	42.30	365.72
				12/2/2020	48.46	359.56
				2/11/2021	46.52	361.50
				6/30/2021	47.01	361.01
				12/14/2021	47.82	360.20

Notes: AMSL = Above Mean Sea Level
TOC = Top of Casing
Ft BTOC = Feet Below Top of Casing

TABLE 1
Groundwater Elevation Summary
OMU Elmer Smith Station Ash Ponds
Owensboro, KY
(all measurements are in feet)

Well ID (AKGWA #)	Location Relative to Ash Ponds	Ground Surface Elevation (AMSL)	TOC Elevation (AMSL)	Measurement Date	Depth to Water Measurement (ft BTOC)	Groundwater Elevation (AMSL)
MW-5 (8005-9530)	Downgradient	403.56	406.16	6/16/2017	56.37	349.79
				6/29/2017	56.66	349.50
				7/13/2017	56.62	349.54
				7/27/2017	57.03	349.13
				8/9/2017	57.05	349.11
				8/23/2017	57.45	348.71
				9/6/2017	57.11	349.05
				9/20/2017	56.12	350.04
				10/10/2017	55.51	350.65
				4/5/2018	45.14	361.02
				6/5/2018	50.11	356.05
				12/12/2018	49.16	357.00
				12/27/2018	46.58	359.58
				5/23/2019	44.07	362.09
				11/7/2019	47.47	358.69
				5/13/2020	40.50	365.66
MW-6 (8006-9531)	Downgradient	405.23	407.35	12/2/2020	47.21	358.95
				2/11/2021	45.21	360.95
				6/30/2021	45.99	360.17
				12/14/2021	46.55	359.61
				6/16/2017	57.96	349.39
				6/29/2017	57.40	349.95
				7/13/2017	57.96	349.39
				7/27/2017	58.16	349.19
				8/9/2017	58.55	348.80
				8/23/2017	58.82	348.53
				9/6/2017	58.65	348.70
				9/20/2017	57.41	349.94
				10/10/2017	56.84	350.51
				4/5/2018	46.53	360.82
				6/5/2018	51.56	355.79
				12/12/2018	50.53	356.82
MW-7 (8006-9532)	Background	418.26	421.11	12/27/2018	48.35	359.00
				5/23/2019	45.30	362.05
				11/7/2019	48.77	358.58
				5/13/2020	41.76	365.59
				12/2/2020	48.07	359.28
				2/11/2021	46.23	361.12
				6/30/2021	46.82	360.53
				12/14/2021	47.56	359.79
				6/16/2017	72.90	348.21
				6/29/2017	73.25	347.86
				7/13/2017	72.87	348.24
				7/27/2017	73.81	347.30
				8/9/2017	74.31	346.80
				8/23/2017	74.31	346.80
				9/6/2017	73.71	347.40
				9/20/2017	73.79	347.32
MW-8 (8007-1801)	Background	402.97	405.82	10/10/2017	73.70	347.41
				4/5/2018	67.61	353.50
				6/5/2018	69.37	351.74
				12/12/2018	66.12	354.99
				12/27/2018	65.11	356.00
				5/23/2019	61.60	359.51
				11/7/2019	62.83	358.28
				5/13/2020	57.55	363.56
MW-9 (8007-1810)	Downgradient	401.78	405.16	12/2/2020	60.50	360.61
				2/11/2021	58.86	362.25
				6/30/2021	58.55	362.56
				12/14/2021	59.92	361.19
				12/27/2018	49.51	356.31
				5/23/2019	46.10	359.72
				11/7/2019	49.00	356.82
				5/13/2020	42.01	363.81
MW-9 (8007-1810)	Downgradient	401.78	405.16	12/2/2020	47.55	358.27
				2/11/2021	46.00	359.82
				6/30/2021	46.10	359.72
				12/14/2021	47.45	358.37
MW-9 (8007-1810)	Downgradient	401.78	405.16	6/30/2021	46.10	359.06
				12/14/2021	44.38	360.78

Notes: AMSL = Above Mean Sea Level
TOC = Top of Casing
Ft BTOC = Feet Below Top of Casing

TABLE 2
Groundwater Analytical Summary - CCR Rule Assessment Monitoring
OMU Elmer Smith Station
Owensboro, KY

		Baseline Monitoring Period (Upgradient)					Downgradient	Downgradient							
Sample ID		MW-1					MW-2								
Collection Date		02/08/17	3/8/2017	4/6/2017	5/3/2017	6/30/2021	4/5/18	6/5/18	12/12/18	12/12/18	5/23/19	11/7/19	5/13/20	12/2/20	6/30/21
Total Metals	Units														
Antimony	mg/L	<0.0060	<0.0060	<0.0060	<0.0060	<0.0050	<0.0060	NA	NA	NA	<0.0060	NA	<0.0050	NA	<0.0050
Arsenic	mg/L	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.010	NA	NA	NA	<0.010	NA	<0.0050	NA	<0.0050
Barium	mg/L	<0.10	<0.10	<0.10	<0.10	0.4	<0.10	<0.10	<0.10	<0.10	<0.10	0.062	0.019	0.067	0.041
Beryllium	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.0020	<0.00040	NA	NA	NA	<0.00040	NA	<0.0020	NA	<0.0020
Boron	mg/L	<0.10	<0.10	<0.10	<0.10	8.8	NA	<0.10	0.11	0.14	<0.10	17	0.36	17	7.0
Cadmium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0020	<0.0050	NA	NA	NA	<0.0050	NA	<0.0020	NA	<0.0020
Calcium	mg/L	56	63	58	61	180	NA	53	100	100	70	250	71	210	140
Chromium	mg/L	<0.020	<0.020	<0.020	<0.020	<0.0050	<0.020	<0.020	<0.020	<0.020	<0.020	<0.0050	<0.0050	NA	<0.0050
Cobalt	mg/L	<0.0040	<0.0040	<0.0040	<0.0040	<0.0050	<0.0040	NA	NA	NA	<0.0040	<0.0050	<0.0050	NA	<0.0050
Iron	mg/L	<0.20	0.76	<0.20	<0.20	<0.080	<0.20	<0.20	<0.20	<0.20	<0.20	NA	<0.080	<0.080	<0.080
Lead	mg/L	<0.015	<0.015	<0.015	<0.015	<0.0050	<0.015	NA	NA	NA	<0.015	NA	<0.0050	NA	<0.0050
Lithium	mg/L	<0.10	<0.10	<0.10	<0.10	<0.010	<0.10	NA	NA	NA	<0.010	<0.0050	<0.010	<0.010	<0.010
Mercury	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020	NA	NA	NA	<0.00020	NA	<0.00020	NA	<0.00020
Molybdenum	mg/L	<0.10	<0.10	<0.10	<0.10	<0.0050	<0.10	<0.10	<0.10	<0.10	<0.10	0.011	0.0077	0.0078	0.012
Selenium	mg/L	<0.030	<0.030	<0.030	<0.030	<0.0050	<0.030	NA	NA	NA	<0.030	0.017	<0.0050	0.057	0.048
Thallium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA	NA	<0.0020	NA	<0.0050	NA	<0.0050
Anions															
Chloride	mg/L	24	29	26	25	22	NA	18	18	18	16	45	15	45	14
Fluoride	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	0.30	<2.0	<2.0	<2.0	<0.20	<0.20	<2.0	<2.0
Sulfate	mg/L	44	21	25	25	450	NA	36	19	19	56	570	43	510	380
Radium															
Radium-226	pCi/L	0.24 (+/-0.13)	0.16 (+/-0.11)	0.34 (+/-0.19)	<0.17 (+/-0.11)	<0.85 (+/-0.5)	<0.25 (+/-0.13)	<0.193 (+/-0.098)	<0.28 (+/-0.17)	<0.25 (+/-0.15)	<0.34 (+/-0.18)	NA	0.31 (+/-0.23)	<0.38 (+/-0.22)	<0.66 (+/-0.32)
Radium-228	pCi/L	<0.94 (+/-0.38)	<0.63 (+/-0.29)	<0.98 (+/-0.44)	<0.98 (+/-0.44)	0.91 (+/-0.47)	<0.94 (+/-0.4)	NA	<0.84 (+/-0.42)	<0.81 (+/-0.41)	<0.79 (+/-0.36)	NA	<0.71 (+/-0.35)	0.98 (+/-0.44)	<1.01 (+/-0.47)
pH															
pH	s.u.	7.0	7.5	7.4	7.5	7.4	NA	7.7	7.6	6.1	7.8	6.9	7.6	7.6	7.6
Total Dissolved Solids															
Total Dissolved Solids	mg/L	320	310	480	320	1,100	NA	260	420	420	330	1,400	300	1,500	990
Turbidity															
Turbidity	n.t.u.	0.42	0.27	0.4	0.27	0.57	0.11	0.26	0.23	0.05	0.09	0.14	0.07	0.05	0.14

= Appendix III constituent (fluoride is included on both Appendix III & IV lists)
 = Appendix IV constituent (fluoride is included on both Appendix III & IV lists)
Bold indicates result detected above laboratory reporting limit

12/12/2018

 = Blind duplicate sample
NA = Not analyzed for this constituent

TABLE 2
Groundwater Analytical Summary - CCR Rule Assessment Monitoring
OMU Elmer Smith Station
Owensboro, KY

		Downgradient										Downgradient										
Sample ID		MW-4										MW-5										Groundwater
Collection Date		4/5/18	6/5/18	6/5/18	12/12/18	5/23/19	11/7/19	5/13/20	5/13/20	12/2/20	6/30/21	4/5/18	6/5/18	12/12/18	5/23/19	11/7/19	5/13/20	12/2/20	6/30/21	Protection Standard		
Total Metals	Units																					
Antimony	mg/L	<0.0060	NA	NA	NA	<0.0060	NA	<0.0050	<0.0050	NA	<0.0050	<0.0060	NA	NA	<0.0060	NA	<0.0050	NA	<0.0050	0.006		
Arsenic	mg/L	<0.010	NA	NA	NA	<0.010	NA	<0.0050	<0.0050	NA	<0.0050	<0.010	NA	NA	<0.010	NA	<0.0050	NA	<0.0050	0.010		
Barium	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.045	0.024	0.024	0.020	0.018	0.11	0.12	<0.10	<0.10	0.074	0.095	0.049	0.052	2		
Beryllium	mg/L	<0.00040	NA	NA	NA	<0.00040	NA	<0.0020	<0.0020	NA	<0.0020	<0.00040	NA	NA	<0.00040	NA	<0.0020	NA	<0.0020	0.004		
Boron	mg/L	NA	11	10	5.6	9.8	13	4.6	4.6	1.5	0.87	NA	12	10	12	13	11	8.2	6.9	0.330		
Cadmium	mg/L	<0.0050	NA	NA	NA	<0.0050	NA	<0.0020	<0.0020	NA	<0.0020	<0.0050	NA	NA	<0.0050	NA	<0.0020	NA	<0.0020	0.005		
Calcium	mg/L	NA	180	180	100	200	200	110	110	83	83	NA	150	120	130	130	220	110	120	139.35		
Chromium	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.0050	<0.0050	<0.0050	NA	<0.0050	<0.020	<0.020	<0.020	<0.020	<0.0050	<0.0050	NA	<0.0050	4.10		
Cobalt	mg/L	<0.0040	NA	NA	NA	<0.0040	<0.0050	<0.0050	<0.0050	NA	<0.0050	<0.0040	NA	NA	<0.0040	<0.0050	<0.0050	NA	<0.0050	0.098		
Iron	mg/L	0.24	0.75	0.76	<0.20	<0.20	NA	0.099	0.13	0.12	<0.080	<0.20	<0.20	<0.20	<0.20	NA	<0.080	<0.080	<0.080	NA		
Lead	mg/L	<0.015	NA	NA	NA	<0.015	NA	<0.0050	<0.0050	NA	<0.0050	<0.015	NA	NA	<0.015	NA	<0.0050	NA	<0.0050	0.015		
Lithium	mg/L	<0.10	NA	NA	NA	<0.010	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.10	NA	NA	0.019	0.02	0.019	0.019	0.013	0.040		
Mercury	mg/L	<0.00020	NA	NA	NA	<0.00020	NA	<0.00020	<0.00020	NA	<0.00020	<0.00020	NA	NA	<0.00020	NA	<0.00020	NA	<0.00020	0.002		
Molybdenum	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.0085	0.0093	0.0094	0.02	0.023	0.34	0.41	0.36	0.5	0.85	0.52	0.67	0.88	0.10		
Selenium	mg/L	<0.030	NA	NA	NA	<0.030	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.030	NA	NA	<0.030	0.019	0.031	0.025	0.033	0.050		
Thallium	mg/L	<0.0050	NA	NA	NA	<0.0020	NA	<0.0050	<0.0050	NA	<0.0050	<0.0050	NA	NA	<0.0020	NA	<0.0050	NA	<0.0050	0.002		
Anions																						
Chloride	mg/L	NA	37	37	27	200	44	35	35	19	12	NA	62	49	70	38	110	37	37	50.0		
Fluoride	mg/L	<2.0	<0.50	<0.50	<2.0	<2.0	<0.20	<0.20	<0.20	<2.0	<2.0	2.3	1.9	<2.0	2.2	2.2	2.2	2.1	2.2	4		
Sulfate	mg/L	NA	370	370	140	730	500	200	200	72	39	NA	390	260	330	340	600	260	310	154.26		
Radium																						
Radium-226	pCi/L	0.49 (+/-0.23)	0.32 (+/-0.18)	0.32 (+/-0.17)	<0.23 (+/-0.15)	<0.39 (+/-0.28)	NA	<0.27 (+/-0.15)	<0.3 (+/-0.24)	<0.44 (+/-0.29)	<0.75 (+/-0.39)	<0.13 (+/-0.11)	0.2 (+/-0.13)	<0.61 (+/-0.35)	<0.36 (+/-0.23)	NA	<0.41 (+/-0.22)	<0.24 (+/-0.17)	<0.50 (+/-0.29)	9.32		
Radium-228	pCi/L	<0.98 (+/-0.48)	NA	NA	<0.82 (+/-0.39)	<0.81 (+/- 0.4)	NA	<0.75 (+/-0.36)	<0.73 (+/-0.32)	<0.77 (+/-0.36)	<0.79 (+/-0.4)	<1.01 (+/-0.45)	NA	<0.76 (+/-0.36)	<0.78 (+/-0.38)	NA	<0.75 (+/-0.39)	<0.7 (+/-0.37)	<0.79 (+/-0.36)			
pH																						
pH	s.u.	NA	7.5	7.4	7.8	7.2	6.8	7.3	7.4	7.5	7.6	NA	7.5	8.0	7.6	7.9	7.4	7.6	7.6	8.01		
Total Dissolved Solids																						
Total Dissolved Solids	mg/L	NA	1,100	1,100	570	1,300	1,300	690	680	450	480	NA	1,200	840	1,100	940	1,600	840	880	950.8		
Turbidity																						
Turbidity	n.t.u.	2.2	11	11	0.96	0.4	1.2	1.9	1.9	0.9	0.39	0.38	1.1	0.8	0.06	0.15	0.18	0.29	0.18	NA		

= Appendix III constituent (fluoride is included on both Appendix III & IV lists)

= Appendix IV constituent (fluoride is included on both Appendix III & IV lists)

Bold

indicates result detected above laboratory reporting limit

1.8

= Appendix IV constituent quantified at Statistically Significant Level (exceeding Groundwater Protection Standard)

NA

= Not analyzed for this constituent

12/12/2018

= Blind duplicate sample

TABLE 2
Groundwater Analytical Summary - CCR Rule Assessment Monitoring
OMU Elmer Smith Station
Owensboro, KY

		Downgradient											
Sample ID		MW-6											Groundwater Protection Standard
Collection Date		4/5/18	4/5/18	6/5/18	12/12/18	5/23/19	5/23/19	11/7/19	11/7/19	5/13/20	12/2/20	6/30/21	
Total Metals	Units												
Antimony	mg/L	<0.0060	<0.0060	NA	NA	<0.0060	<0.0060	NA	NA	<0.0050	NA	<0.0050	0.006
Arsenic	mg/L	<0.010	<0.010	NA	NA	<0.010	<0.010	NA	NA	<0.0050	NA	<0.0050	0.010
Barium	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.05	0.05	0.032	0.048	0.042	2
Beryllium	mg/L	<0.00040	<0.00040	NA	NA	<0.00040	<0.00040	NA	NA	<0.0020	NA	<0.0020	0.004
Boron	mg/L	NA	NA	10	11	9.1	9.2	13	13	10	10	7.5	0.330
Cadmium	mg/L	<0.0050	<0.0050	NA	NA	<0.0050	<0.0050	NA	NA	<0.0020	NA	<0.0020	0.005
Calcium	mg/L	NA	NA	180	170	130	130	150	150	110	150	140	139.35
Chromium	mg/L	0.021	0.020	<0.020	<0.020	<0.020	<0.020	<0.0050	<0.0050	<0.0050	NA	<0.0050	4.10
Cobalt	mg/L	<0.0040	<0.0040	NA	NA	0.0063	0.006	<0.0050	<0.0050	<0.0050	NA	<0.0050	0.098
Iron	mg/L	<0.20	<0.20	0.76	<0.20	<0.20	<0.20	NA	NA	0.14	0.21	<0.080	NA
Lead	mg/L	<0.015	<0.015	NA	NA	<0.015	<0.015	NA	NA	<0.0050	NA	<0.0050	0.015
Lithium	mg/L	<0.10	<0.10	NA	NA	<0.010	<0.010	<0.0050	<0.0050	<0.010	<0.010	<0.010	0.040
Mercury	mg/L	<0.00020	<0.00020	NA	NA	<0.00020	<0.00020	NA	NA	<0.00020	NA	<0.00020	0.002
Molybdenum	mg/L	1.7	1.7	1.8	2.1	1.8	1.8	2	2	1.8	2.1	1.9	0.10
Selenium	mg/L	<0.030	<0.030	NA	NA	0.035	0.037	0.047	0.046	0.040	0.055	0.05	0.050
Thallium	mg/L	<0.0050	<0.0050	NA	NA	<0.0020	<0.0020	NA	NA	<0.0050	NA	<0.0050	0.002
Anions													
Chloride	mg/L	NA	NA	37	37	30	29	31	31	25	34	32	50.0
Fluoride	mg/L	<2.0	<2.0	<0.50	<2.0	<2.0	<2.0	0.93	0.91	1.1	<2.0	<2.0	4
Sulfate	mg/L	NA	NA	370	550	450	450	480	460	370	400	390	154.26
Radium													
Radium-226	pCi/L	<0.19 (+/-0.13)	0.25 (+/-0.16)	0.32 (+/-0.17)	<0.27 (+/-0.2)	<0.34 (+/-0.19)	<0.47 (+/-0.27)	NA	NA	<0.3 (+/-0.14)	<0.23 (+/-0.16)	<0.70 (+/-0.34)	9.32
Radium-228	pCi/L	<0.98 (+/-0.45)	<0.98 (+/-0.43)	NA	<0.72 (+/-0.34)	<0.78 (+/-0.38)	<0.78 (+/-0.41)	NA	NA	<0.71 (+/-0.36)	0.98 (+/-0.45)	<0.75 (+/-0.38)	
pH													
pH	s.u.	NA	NA	7.4	7.8	7.4	7.5	7.4	7.0	7.4	7.5	7.6	8.01
Total Dissolved Solids													
Total Dissolved Solids	mg/L	NA	NA	1,100	1,100	870	1,000	960	960	750	870	880	950.8
Turbidity													
Turbidity	n.t.u.	3.1	2.7	11	1.5	0.75	0.57	1.6	1.6	2.1	1.3	1	NA

= Appendix III constituent (fluoride is included on both Appendix III & IV lists)

= Appendix IV constituent (fluoride is included on both Appendix III & IV lists)

Bold indicates result detected above laboratory reporting limit

1.8

= Appendix IV constituent quantified at Statistically Significant Level (exceeding Groundwater Protection Standard)

NA = Not analyzed for this constituent

12/12/2018

= Blind duplicate sample

TABLE 2
Groundwater Analytical Summary - CCR Rule Assessment Monitoring
OMU Elmer Smith Station
Owensboro, KY

		Background								Background								Downgradient		Groundwater Protection Standard
Sample ID		MW-7								MW-8								MW-9		
Collection Date		4/5/18	6/5/18	12/12/18	5/23/19	11/7/19	5/13/20	12/2/20	6/30/21	12/27/18	5/23/19	11/7/19	5/13/20	12/2/20	12/2/20	6/30/21	6/30/21	6/30/21		
Total Metals	Units																			
Antimony	mg/L	<0.0060	NA	NA	<0.0060	NA	<0.0050	NA	<0.0050	<0.0060	<0.0060	NA	<0.0050	NA	NA	<0.0050	<0.0050	<0.0050	0.006	
Arsenic	mg/L	<0.010	NA	NA	<0.010	NA	<0.0050	NA	<0.0050	<0.010	<0.010	NA	<0.0050	NA	NA	<0.0050	<0.0050	<0.0050	0.010	
Barium	mg/L	0.13	0.12	0.13	0.10	0.10	0.089	0.090	0.084	0.13	0.12	0.17	0.094	0.095	0.094	0.091	0.092	0.024	2	
Beryllium	mg/L	<0.00040	NA	NA	<0.00040	NA	<0.0020	NA	<0.0020	<0.00040	<0.00040	NA	<0.0020	NA	NA	<0.0020	<0.0020	<0.0020	0.004	
Boron	mg/L	NA	<0.10	<0.10	<0.10	0.11	0.15	0.067	0.082	<0.10	<0.10	0.15	0.11	0.12	0.12	0.13	0.11	0.12	0.330	
Cadmium	mg/L	<0.0050	NA	NA	<0.0050	NA	<0.0020	NA	<0.0020	<0.0050	<0.0050	NA	<0.0020	NA	NA	<0.0020	<0.0020	<0.0020	0.005	
Calcium	mg/L	NA	100	99	100	97	95	99	98	84	98	100	88	88	88	86	87	97	139.35	
Chromium	mg/L	<0.020	0.22	<0.020	0.02	0.02	<0.0050	NA	<0.0050	<0.020	<0.020	<0.0050	<0.0050	NA	NA	<0.0050	<0.0050	<0.0050	4.10	
Cobalt	mg/L	<0.0040	NA	NA	<0.0040	<0.0050	<0.0050	NA	<0.0050	<0.0040	<0.0040	<0.0050	<0.0050	NA	NA	<0.0050	<0.0050	<0.0050	0.098	
Iron	mg/L	<0.20	1.8	<0.20	1.1	NA	0.21	0.21	0.091	1.0	3.3	NA	3.2	0.7	0.7	1.1	1.0	0.26	NA	
Lead	mg/L	<0.015	NA	NA	<0.015	NA	<0.0050	NA	<0.0050	<0.015	<0.015	NA	<0.0050	NA	NA	<0.0050	<0.0050	<0.0050	0.015	
Lithium	mg/L	<0.10	NA	NA	<0.010	<0.0050	<0.010	<0.010	<0.010	<0.10	<0.010	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.040	
Mercury	mg/L	<0.00020	NA	NA	<0.00020	NA	<0.00020	NA	<0.00020	<0.00020	<0.00020	NA	<0.00020	NA	NA	<0.00020	<0.00020	<0.00020	0.002	
Molybdenum	mg/L	<0.10	<0.10	<0.10	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.10	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.033	0.10	
Selenium	mg/L	<0.030	NA	NA	<0.030	<0.0050	<0.0050	<0.0050	<0.0050	<0.030	<0.030	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.050	
Thallium	mg/L	<0.0050	NA	NA	<0.0020	NA	<0.0050	NA	<0.0050	<0.0050	<0.0020	NA	<0.0050	NA	NA	<0.0050	<0.0050	<0.0050	0.002	
Anions																				
Chloride	mg/L	NA	21	19	15	14	16	19	28	24	31	36	31	31	30	31	31	6.2	50.0	
Fluoride	mg/L	<2.0	0.22	<2.0	<2.0	<0.20	<0.20	<2.0	<2.0	<2.0	<2.0	<0.20	<0.20	<2.0	<2.0	<2.0	<2.0	<2.0	4	
Sulfate	mg/L	NA	84	91	92	62	61	55	62	59	75	69	45	46	45	43	44	21	154.26	
Radium																				
Radium-226	pCi/L	0.21 (+/-0.16)	0.32 (+/-0.15)	<0.21 (+/-0.14)	<0.47 (+/-0.27)	NA	<0.25 (+/-0.18)	<0.28 (+/-0.20)	<0.71 (+/-0.39)	<0.28 (+/-0.2)	<0.47 (+/-0.26)	NA	<0.26 (+/-0.16)	<0.25 (+/-0.16)	<0.33 (+/-0.19)	<0.5 (+/-0.33)	<0.52 (+/-0.27)	<0.55(+/-0.36)	9.32	
Radium-228	pCi/L	<0.97 (+/-0.48)	NA	<0.73 (+/-0.36)	<0.80 (+/-0.41)	NA	<0.7 (+/-0.32)	<0.82 (+/-0.39)	<0.82 (+/-0.4)	<0.70 (+/-0.33)	<0.80 (+/-0.36)	NA	<0.78 (+/-0.37)	0.84 (+/-0.41)	1.14 (+/-0.47)	<0.74 (+/-0.39)	<1.02 (+/-0.51)	<0.77(+/-0.37)		
pH																				
pH	s.u.	NA	7.0	7.6	7.2	7.5	7.4	7.1	7.3	7.0	7.2	7.6	7.1	7.3	7.5	7.3	7.3	7.6	8.01	
Total Dissolved Solids																				
Total Dissolved Solids	mg/L	NA	570	490	500	500	470	370	530	420	510	510	420	410	460	480	460	380	950.8	
Turbidity																				
Turbidity	n.t.u.	1.6	10	0.98	8.9	5.2	1.7	0.82	0.71	6.7	31	180	20	2.4	2.2	6.7	5.0	6.1	NA	

= Appendix III constituent (fluoride is included on both Appendix III & IV lists)

= Appendix IV constituent (fluoride is included on both Appendix III & IV lists)

Bold indicates result detected above laboratory reporting limit

NA = Not analyzed for this constituent

12/12/2018

= Blind duplicate sample

TABLE 2
Groundwater Analytical Summary - CCR Rule Assessment Monitoring
OMU Elmer Smith Station
Owensboro, KY

Sample ID		Equipment Blank								Groundwater Protection Standard
Collection Date		4/5/18	6/5/18	12/12/18	5/23/19	11/7/19	5/13/20	12/2/20	6/30/21	
Total Metals	Units									
Antimony	mg/L	<0.0060	NA	NA	<0.0060	NA	<0.0050	NA	<0.0050	0.006
Arsenic	mg/L	<0.010	NA	NA	<0.010	NA	<0.0050	NA	<0.0050	0.010
Barium	mg/L	<0.10	<0.10	<0.10	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	2
Beryllium	mg/L	<0.00040	NA	NA	<0.00040	NA	<0.0020	NA	<0.0050	0.004
Boron	mg/L	NA	<0.10	<0.10	<0.10	0.1	<0.020	<0.020	<0.0050	0.330
Cadmium	mg/L	<0.0050	NA	NA	<0.0050	NA	<0.0020	NA	<0.0050	0.005
Calcium	mg/L	NA	<0.20	0.36	<0.20	<0.50	<0.50	<0.50	1.9	139.35
Chromium	mg/L	<0.020	<0.020	<0.020	<0.020	<0.0050	<0.0050	NA	<0.0050	4.10
Cobalt	mg/L	<0.0040	NA	NA	<0.0040	<0.0050	<0.0050	NA	<0.0050	0.098
Iron	mg/L	<0.20	<0.20	<0.20	<0.20	NA	<0.080	<0.080	<0.080	NA
Lead	mg/L	<0.015	NA	NA	<0.015	NA	<0.0050	NA	<0.0050	0.015
Lithium	mg/L	<0.10	NA	NA	<0.010	<0.0050	<0.010	<0.010	<0.010	0.040
Mercury	mg/L	<0.00020	NA	NA	<0.00020	NA	<0.00020	NA	<0.00020	0.002
Molybdenum	mg/L	<0.10	<0.10	<0.10	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	0.10
Selenium	mg/L	<0.030	NA	NA	<0.030	<0.0050	<0.0050	<0.0050	<0.0050	0.050
Thallium	mg/L	<0.0050	NA	NA	<0.0020	NA	<0.0050	NA	<0.0050	0.002
Anions										
Chloride	mg/L	NA	<1.0	<2.0	<2.0	<0.20	0.81	<2.0	<2.0	50.0
Fluoride	mg/L	<2.0	<0.10	<2.0	<2.0	<0.20	<0.20	<2.0	<2.0	4
Sulfate	mg/L	NA	<1.0	<5.0	<5.0	0.95	<0.50	<2.0	<2.0	154.26
Radium										
Radium-226	pCi/L	<0.18 (+/-0.11)	<0.16 (+/-0.12)	<0.38 (+/-0.16)	<0.38 (+/-0.21)	NA	<0.37 (+/-0.18)	<0.43 (+/-0.22)	<0.43 (+/-0.23)	9.32
Radium-228	pCi/L	<1.17 (+/-0.54)	NA	<0.7 (+/-0.31)	<0.82 (+/-0.37)	NA	<0.74 (+/-0.34)	<0.73 (+/-0.37)	<0.77 (+/-0.38)	
pH										
pH	s.u.	NA	6.6	7.4	7.0	5.5	5.6	5.8	6.6	8.01
Total Dissolved Solids										
Total Dissolved Solids	mg/L	NA	44	30	<20	26	<20	<10	28	950.8
Turbidity										
Turbidity	n.t.u.	0.02	0.04	0.30	< 0.010	0.07	0.02	0.01	0.16	NA

= Appendix III constituent (fluoride is included on both Appendix III & IV lists)

= Appendix IV constituent (fluoride is included on both Appendix III & IV lists)

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