Final Groundwater and Non-Groundwater Corrective Action Remedy Selection Report

Green Landfill
Sebree Station
Webster County, Kentucky

Prepared for:

Big Rivers Electric Corporation
Sebree Generating Station
9000 Highway 2096
Robards, KY 42452

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AECOM PN 60626688

November 18, 2020

Certification Statement 40 CFR § 257.97(a) – Selection of a Remedy for the Corrective Action Program for Green Station CCR Landfill

Big Rivers Electric Corporation Sebree Generating Station, Green CCR Landfill

AECOM ("Consultant") has been retained by Big Rivers Electric Corporation to certify whether the selected groundwater remedy presented herein for the Green Station coal combustion residuals (CCR) landfill meets the requirements of Chapter 40 of the Code of Federal Regulations (CFR) §257.97.

LIMITATIONS

The signature of Consultant's authorized representative on this document represents that to the best of Consultant's knowledge, information, and belief in the exercise of its professional judgment, it is Consultant's professional opinion that the aforementioned information is accurate as of the date of such signature. Any opinion or decisions by Consultant are made on the basis of Consultant's experience, qualifications, and professional judgment and are not to be construed as warranties or guaranties. In addition, opinions relating to environmental, geologic, and geotechnical conditions or other estimates are based on available data, and actual conditions may vary from those encountered at the times and locations where data are obtained, despite the use of due care.

CERTIFICATION

I, Brian Cole, being a Registered Professional Engineer in the State of Kentucky, certify to the best of my knowledge, information, and belief, that the remedy selected by Big Rivers Electric Corporation for the Green Station CCR Landfill meets the requirements of 40 CFR § 257.97, and that this certification is true and correct and has been prepared in accordance with generally accepted good engineering practices.

M. Brian Cole

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Printed Name

11/18/2020

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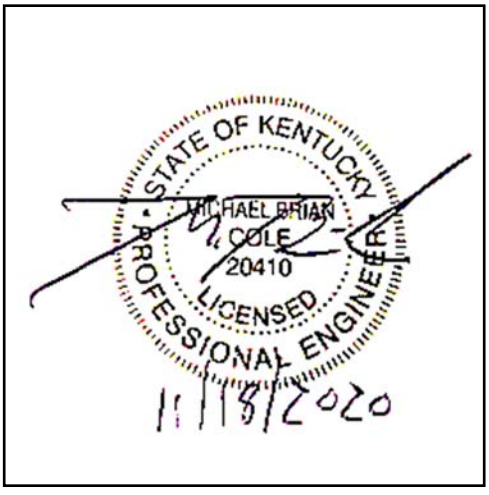
Date



Quality information

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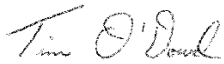		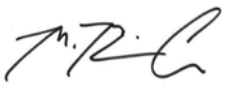	
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Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	6-18-20				
2	8-18-20				
Final	10-5-20				
Amended Final	11-18-20				

Distribution List

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	1	Big Rivers Electric Corporation

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1. Introduction

In accordance with provisions of the United States Environmental Protection Agency's (USEPA) coal combustion residual (CCR) rule, Title 40 of the Code of Federal Regulations (CFR) Part 257.97, Big Rivers Electric Corperation (BREC) is required to select a remedy to address groundwater impacts identified at the Green Station CCR Landfill (the Unit) at the Sebree Generating Station located in Webster County, Robards, Kentucky **(Figure 1)**. Previous monitoring results indicate the presence of lithium at a Statistically Significant Level (SSL) above the Ground Water Protection Standard (GWPS) in four monitoring wells (MW-3A, MW-4, MW-5, and MW-6) at the Unit. In June 2019, BREC performed an Assessment of Corrective Measures (ACM) for the Unit to identify remedial alternatives to address groundwater impacts. A public meeting was held on July 16, 2020 in Henderson, Kentucky to dicuss the results of the ACM. No public input was received at this meeting. Additional technical assessment has been utilized by BREC to select the final remedy for the Unit in accordance with 40 CFR Part 257.97, which is presented in this report.

On December 16, 2019, an Agreed Order was filed with the Kentucky Office of Administrative Hearings between BREC and the Commonwealth of Kentucky, Energy and Environment Cabinet, Division of Waste Management (KDWM) to address Notices of Violation (NOVs) received in regard to unpermitted discharges and seepage emanating form the Unit (see Section 1.2). Within the AGREED ORDER are requirements for remedy selection reporting, including a timeline for review by the KDWM. These requirements are discussed in Paragraphs 18 and 23 of the Agreed Order and listed in Exhibit 4 to the Agreed Order. This report has been prepared to address these requirements in the Agreed Order and Exhibit 4 to the Agreed Order, in addition to the Federal CCR Rule requirements.

In parallel with addressing groundwater impacts, BREC performed an ACM for non-groundwater release surface seeps at the Unit in June 2019. In September and October 2019, BREC initiated interim corrective measures (ICMs) to address non-groundwater releases at the Unit. The ICMs are currently being evalauted through performance monitoring and are expected to benefit corrective action as a whole for the Unit. As a result, no separate remedy selection report is currently being developed for non-groundwater releases. BREC intendes for this report to address the remedy selection requirements for both groundwater and non-groundwater impacts under 40 CFR Part 257.

1.1 Regulatory Background

Kentucky Revised Statue (KRS) Chapter 224.50-760 governs the disposal of special waste, including utility wastes. The Commonwealth of Kentucky, Energy and Environment Cabinet (The Cabinet) promulgated regulations under Title 401 of the Kentucky Administrative Regulations (KAR) Chapters 45 and 46 to regulate the disposal of special wastes The Unit is a Kentucky permitted landfill (Permit No. SW11700007) subject to permitting requirements for special wastes established under 401 KAR Chapter 45.

In 2015 the USEPA promulgated 40 CFR Parts 257.50 through 257.107 which established national standards to govern the location, design, construction, and operation of landfills and surface impoundments utilized to manage CCR. In 2017, the Cabinet promulgated 401 KAR 46:110 which incorporates the federal CCR standards by reference into Kentucky regulations. As noted in the Agreed Order, the Unit is an existing CCR landfill under the Federal CCR rule and therefore subject to the operating criteria and corrective action standards of 401 KAR 46:110.

Corrective actions at the Unit are being performed to address both the federal requirements in 40 CFR Part 257 and state requirements in 401 KAR Chapter 46 as described below.

1.1.1 Federal CCR Background

In response to SSL exceedances in groundwater at the Unit, BREC evaluated the nature and extent of groundwater impacts as required by Title 40 CFR Part 257.95(g) for characterization monitoring.

Following chracterization monitoring, BREC performed an ACM, to identify potential corrective measures to address lithium impacts in groundwater pursuant to Title 40 CFR Part 257.96. A notice of ACM initiation dated January 14, 2019 was posted to BREC's publicly-accessible CCR reporting website. A report summarizing the results of the groundwater ACM (AECOM, June 2019) was posted to BREC's publicly-accessible CCR reporting website on June 14, 2019.

On March 15, 2018, the USEPA proposed a modification to the federal CCR regualtions to address four provisions within 40 CFR Section 257 that were remanded back to the USEPA on June 14, 2016 by the United States Court of Appeals for the District of Columbia Circuit. The proposed modifications to 40 CFR 257 (also known as the Remand Rule) also included provisions for owners and operators of CCR units in states that have approved CCR permit programs. Title 40 CFR Part 257.99 established procedures for owners and operators of CCR units to perforrm corrective action for eligible non-groundwater releases at a CCR unit. In alignment with corrective actions being performed to address the NOVs received from the KDWM for unpermitted discharges and seepage emanating from the Unit, BREC perfomed an ACM for non-groundwater releases in addition to the ACM for groundwater impacts. A report summarizing the results of the groundwater ACM (AECOM, June 2019) was posted to BREC's publicly-accessible CCR reporting website on June 28, 2019. In 2019, pursuant to 40 CFR Parts 257.90(d) and 257.84(b)(5), BREC initiated design of ICMs (i.e., containment systems) intended to reduce and prevent non-groundwater releases from reaching the Green River. In September and October 2019, BREC intiated construction of ICMs to address non-groundwater releases at the Unit (which are referred to herein as river seeps), including:

- Construction of a collection trench along the east side of the Green Landfill (refered to as the Deep Seep Collection Trench) to address seeps adjacent to the Green River; and

- Construction of a series of collection trenchs along the north side of the Green Landfill (refered to as the Northwest Seep Collection Trench) to address seeps near the northwest corner of the landfill discharging toward an east-flowing unnamed tributary to the Green River.

Construction of the ICMs was functionally completed in Janaury 2020, within the 180 day required timeframe required under proposed 40 CFR Part 257.99, although piping, pumping, and control system installation, and installation of supplemental collector systems were not completed until later in 2020. The ICMs completed to address non-groundwater releases under 40 CFR Part 257 and the Agreed Order are expected to benefit groundwater corrective action and are discussed collectively within this report (see Section 2.4).

Title 40 CFR Section 257.97(a) requires that progress reports be prepared on a semi-annual basis describing progress made in selecting and designing a remedy. The first Remedy Selection Progress Report was finalized on December 9, 2019 and posted to BREC's publicly-accessible CCR reporting website on December 12, 2019.

BREC held a public meeting on July 16, 2020 in Henderson, Kentucky to discuss the results of the Groundwater ACM in accordance with 40 CFR Part 257.96(e). No public input influencing the remedy for the Unit was received during the meeting. BREC has selected the remedy for groundwater and non-groundwater impacts at the Unit in accordance with 40 CFR Part 257.97 as detailed within this report.

1.1.2 Kentucky Division of Waste Management Background

On December 6, 2019, BREC signed Agreed Order #18-3-0138 with the KDWM to address NOVs received regarding unpermitted discharges and seepage emanating from the Unit. The Agreed Order was filed on December 16, 2019. Under the Agreed Order the following actions were required:

- Development of Standard Operating Procedures (SOPs) to characterize and mitigate leachate and seep releases to the surface (Exhibit 1);

- Development of construction and post-construction plans for implementing the Northwestern Seep Collection Trench Remedy (Exhibit 2);

- Development of construction and post-construction plans for implementing the Eastern “Deep Seep” Collection Trench Remedy (Exhibit 3); and
- Establishment of the process to complete the evaluation of groundwater corrective action remedies at the Unit pursuant to 401 KAR 46:110 (Exhibit 4).

Within Exhibit 4 of the Agreed Order, the following milestones for groundwater corrective action were identified:

1) Within 180 days of the entry of the Agreed Order, BREC shall conduct a public meeting as required by 40 CFR 257.96(e) and 401 KAR 46:110.
2) Within 90 days of the public meeting, BREC shall submit a draft groundwater remedy selection report for submittal to KDWM for a 30-day review and comment period.
3) As soon as possible, following receipt of KDWM comments on the draft groundwater remedy selection report, select the final groundwater corrective action remedy.
4) Posting of the Final *Groundwater and Non-Groundwater Corrective Action Remedy Selection Report* to BREC’s CCR Rule compliance website in accordance with 40 CFR 257.97 and 257.107 (no timeline specified).

Although the milestone schedule has been adjusted due to the COVID-19 pandemic, which prevented BREC from holding the public meeting at an earlier date, BREC has moved forward with the activities required in the Agreed Order as documented in this report. A revised schedule for corrective action implementation is discussed in Section 5.0.

2. Site Background

2.1 Site Description

BREC owns and operates Sebree Station, which is a coal-fired power generating facility located on the Green River northeast of Sebree, Kentucky. Sebree Station is composed of Green Station and Reid/Henderson Municipal Power & Light (HMP&L) Station. The Sebree Station is bounded by Interstate-69 to the west and the Green River to the east (see **Figure 1**). Reid Unit 1 (65 Megawatts [MW]) began commercial operation in 1966 and is scheduled to be retired in 2020 pending regulatory approval from the Kentucky Public Service Commission and Rural Utilities Service. The Reid Combustion Turbine (65 MW) was commercialized in 1976. HMP&L Station 2, Units 1 (167 MW) and 2 (168 MW) began commercial operation in 1973 and 1974 respectively. Both HMP&L units were retired as of February 1, 2019. Green Station Units 1 (250 MW) and 2 (242 MW) began commercial operation in 1979 and 1981, respectively.

The location of the Green Landfill is illustrated on **Figure 1**. The Green Landfill is located directly south of Sebree Station, situated south of the Green Station CCR Surface Impoundment. The Green Landfill is a Kentucky permitted landfill (Permit No. SW11700007) that receives special wastes generated by burning coal (CCRs) from Green and Reid/HMP&L Stations. The landfill began receiving CCR wastes in 1980. The current Green Landfill footprint is approximately 170 acres.

As stated in the published CCR monitoring well network certification, available on the BREC website (http://www.bigrivers.com/), the original ground surface within the landfill footprint was irregular and the dominant features were small stream valleys draining towards the Green River, which is located just east of the landfill; and towards Groves Creek, which is located just south of the landfill. There was also historic oil and gas production at and in the immediate vicinity of the Green Landfill. A review of the records from the Kentucky Geological Survey (KGS) showed that at or immediately adjacent to the Site, there were a number of dry exploratory oil/gas exploration holes, oil production wells, one gas production well, and one secondary recovery injection well. There were also former brine ponds at the Site. Most of these wells were abandoned in accordance with applicable regulations by BREC in 1997 and 1998. The last existing oil well was decommissioned in 2019.

2.2 Groundwater Investigation Summary

Monitoring wells were installed at the Unit beginning in November 1996 prior to the implementation of the CCR Rule. However, the existing wells meet the requirements of Title 40 CFR Section 257.90 of the CCR Rule for installation of a groundwater monitoring system. These regulations require that monitoring wells adequately represent the quality of background groundwater and groundwater representing the downgradient waste boundary. The existing wells are located along the perimeter of the landfill footprint. One upgradient monitoring well (MW-1) and five downgradient monitoring wells (MW-2, MW-3A, MW-4, MW-5 and MW-6) were installed at the Unit to determine the general direction of groundwater movement and to monitor groundwater impacts. One additional characterization monitoring well (MW-104) was installed downgradient of the Unit in 2018. All monitoring wells were installed in the uppermost saturated portion of the sandstone bedrock aquifer. A map illustrating the location of all program monitoring wells is presented as **Figure 2**.

Nine rounds of Baseline groundwater sampling for Appendix III constituents were conducted between March 2016 and October 2017. Statistical evaluation for Detection monitoring indicated that statistically significant increases (SSIs) over background had occurred, and therefore, Assessment monitoring was triggered. Detection monitoring activities and data are presented in the annual reports that have been prepared to date, (AECOM 2018, 2019, and 2020).

As part of Assessment monitoring, upgradient and downgradient wells for the Unit were sampled for Appendix IV constituents in June, July, and September 2018. GWPSs were established for the Appendix IV constituents occurring at SSIs (lithium only), and statistical evaluation of the lithium concentrations indicated exceedances of GWPSs at SSLs, as detailed in **Table 1** below.

Table 1. Green Landfill Constituents of Concern

Monitoring Well (Date)	Parameter Lithium GWPS 0.04 (mg/L)
MW-3A (Jun 2018)	**0.699**
MW-3A (Jul 2018)	**0.790**
MW-3A (Sep 2018)	**0.766**
MW-4 (Jun 2018)	**1.81**
MW-4 (Jul 2018)	**1.91**
MW-4(Sep 2018)	**1.81**
MW-5(Jun 2018)	**0.459**
MW-5 (Jul 2018)	**0.481**
MW-5 (Sep 2018)	**0.425**
MW-6 (Jun 2018)	**0.0650**
MW-6 (Jul 2018)	**0.0590**
MW-6 (Sep 2018)	**0.0558**

GWPSs are the greater of the site-specific background concentrations, the USEPA primary drinking water standard maximum contaminant limits (MCL), or GWPS provided in 40 CFR 257.95(3)(h)(2)

An additional characterization well, MW-104, was subsequently installed to estimate the downgradient extent of impacted groundwater. Sample collection from MW-104 for Appendix III and IV parameters took place in March and April 2019. The analytical results for lithium were below the GWPS. The additional characterization data are summarized in **Table 2** below.

Table 2. Green Landfill -2019 Characterization Sample Results

Monitoring Well (Date)	Parameter
	Lithium GWPS 0.04 [a] (mg/L)
MW-104 (March 2019)	0.0281
MW-104 (April 2019)	0.0288

a The Upper Prediction Limit for lithium was calculated as 0.008 mg/L.

The results from both characterization sampling events helped to confirm the downgradient (southwestern) extent of constituent of concern (COC) impacts above GWPS at the Unit.

Semi-annual Assessment monitoring continued at the Unit in 2019 and 2020 in accordance with 40 CFR 257.95.

2.3 Conceptual Site Model

Development and refinement of a Conceptual Site Model (CSM) is necessary to support remedy selection for the Unit. A CSM is based on a set of working hypotheses regarding how contaminants of concern (COCs) entered the environment at a site, how they were and continue to be transported to various media, what the potential routes of exposure are, and who may be exposed, including both human and ecological receptors. As such, the CSM is a "living" model. As new data become available or site conditions change, a CSM should be evaluated and updated as necessary.

The CSM for the Unit was first provided in the June 2019 ACM for the Unit (AECOM 2019). The CSM presents the physical setting of the Unit (adjacent to the Green River), the unconsolidated and bedrock geologic strata underling the Unit, the occurrence and movement of groundwater, the distribution of COCs in groundwater, and the potential receptors (or lack thereof) for impacted groundwater. These elements are described in detail below and have been updated with new information for this report as appropriate.

2.3.1 Physical Setting

The Unit is located within the Interior Low Plateaus physiographic province. The province is part of the Interior Plains division of the United States. Characteristic features of the province include unglaciated rolling limestone plains with alluvial valleys and entrenched rivers and streams. Several large rivers are in the region, including the Green, Ohio, Kentucky, Tennessee, and the Cumberland Rivers. The geology underlying the Unit consists of unconsolidated materials, including loess and alluvial deposits, underlain by Upper to Middle Pennsylvanian-age clastic and carbonate bedrock consisting primarily of sandstone and shale. The unconsolidated materials also include fill, silty and clayey residuum, and minor amounts of sandy, clayey channel fill alluvium.

The Unit is located on an upland adjacent to the west bank of the Green River at an elevation of approximately 436 feet, above mean sea level [ft., amsl] (at the north end of the landfill) and 397 ft., amsl (at the south end of the landfill), with a maximum elevation of 608 ft., amsl at the landfill crest. Precipitation falling within the Green Landfill is directed to ponds on the north and south sides of the Unit and then to the river under Kentucky Pollution Discharge and Elimination System (KPDES) permit No. KY0001929. Underlying preconstruction soils consisted of Loring-Grenada, Loring-Zanesville-Wellston (Henderson County) and Loring-Wellston-Zanesville (Webster County) soil associations which are generally characterized as well drained to moderately well drained soils on nearly level to sloping uplands (Associated Engineers 2016, Hydrologic and Hydraulic Capacity Assessment and Initial Inflow Design Flood Control System Plan).

2.3.2 Geology

The Unit lies in the Western Kentucky Coalfields section, characterized by rolling uplands underlain by coal-bearing bedrock of the Pennsylvanian Period. Near the Unit, maximum topographic relief is on the order of 80 feet. The geologic quadrangle (Geologic map of the Robards quadrangle, Henderson and Webster Counties, Kentucky, 1973) for the area published by the Kentucky Geologic Survey (KGS) shows the surficial material in portions of the western half of the Unit to be unconsolidated loess representing the Pleistocene geologic epoch. The loess consists of sandy and clayey silt. Underlying the loess deposits and exposed at the surface on the eastern half of the Unit are broadly distributed Pleistocene and Holocene alluvium deposits consisting of intermixed and interlensing clay, silt, sand, and gravel. In close proximity to the Unit, the alluvium is generally a low permeability unit that forms terraces along the Green River at elevations of roughly 380 and 395 ft., amsl. The unconsolidated surficial materials range from approximately 10 feet (MW-5) to 52 feet (MW-104) in thickness surrounding the Unit. **Figure 3** provides an excerpt from the geologic quadrangle for the immediate area surrounding the Unit.

The unconsolidated materials are underlain by bedrock of the Upper Pennsylvanian Shelburn Formation [formerly identified as the Lisman Formation (Fairer, 1973)] and the Middle Pennsylvanian Carbondale Formation. At the base of the Shelburn Formation is the Providence Limestone Member, consisting of two distinct limestone beds separated by a sandy shale. The member is exposed in a streambed near the northwest corner of the Unit but is absent beneath much of the Unit footprint due to erosional channeling.

The underlying Carbondale Formation consists of cyclic sequences of sandstones, shales, siltstones and coals. The Carbondale sediments were deposited in a fluvial-deltaic system. As a result of this depositional environment, the lithologic units of the Carbondale tend to be lenticular bodies rather than continuous sheet-like strata. Gradational and abrupt horizontal changes in lithology are often encountered.

Cross-sections have been developed to support the CSM and are presented as **Figures 4, 5, 6** and **7**. Cross-section locations are shown on **Figure 2**. These sections illustrate the sequence of geologic materials present under the Unit as interpreted using the currently available data.

2.3.3 Groundwater Hydrogeology

For purposes of compliance with the CCR Rule groundwater monitoring requirements, the interbedded sandstone and shale of the Carbondale Formation is considered the uppermost aquifer underlying the Unit. The uppermost aquifer is hydraulically confined and first encountered at an elevation of approximately 401 ft., amsl at the northwest end of the landfill, and 367 ft., amsl at the southeast end of the landfill (AECOM, 2019).

Groundwater elevation data collected in April 2020 are summarized on **Table 3** below. These data were utilized to construct a piezometric surface map illustrating groundwater flow conditions for the uppermost aquifer (see **Figure 8**). Overall groundwater flow beneath the footprint of the Unit is to the east towards the Green River and south-southeast towards Groves Creek.

Table 3. Green Landfill -April 2020 Groundwater Elevation Data

Monitoring Well	Top of Casing Elevation (ft) [1]	Depth to Groundwater (ft)	Groundwater Elevation (ft, amsl)
MW-1	423.23	19.52	403.71
MW-2	392.37	16.24	376.13
MW-3A	386.48	12.08	374.40
MW-4	391.33	17.90	373.43
MW-5	390.18	17.62	372.56
MW-6	388.17	15.62	372.55
MW-12 [2]	395.54	22.15	373.39

1 Reference elevation of monitoring wells surveyed by Fuller, Mossbarger, Scott and May, Civil Engineers, Inc., Lexington, Kentucky, December 1996, December 1999. Survey coordinates were based on the Kentucky State Plane, Kentucky Southern Zone, NAD27 datum.
2. MW-12 is utilized for collection of piezometric data only and is not part of the CCR monitoring well network for the Green Landfill.

Slug tests were performed on April 25, 2019 at monitoring wells MW-3A, MW-4, MW-6, and MW-104 to assess the hydraulic characteristics of the uppermost aquifer. The estimated hydraulic conductivity of the monitoring wells tested ranged from 2×10^{-5} to 3×10^{-3} centimeters per second (cm/sec).

Although previous site-specific investigations have noted the presence of perched zones of saturation in the overlying unconsolidated materials, these discontinuous zones do not qualify as an uppermost aquifer under the CCR Rule because they do not produce usable quantities of groundwater (40CFR Part 257.53).

2.3.4 Non-Groundwater Hydrogeology

Two types of non-groundwater releases have been identified through inspection and investigation of the Unit: river seeps and perimeter seeps. The river seeps are those found along the Green River and its tributary streams. River seeps have been observed on the bank of the river/tributary and on the slope between the river/tributary and the landfill perimeter road. The river seeps on the northwest side of the

landfill drain to a KPDES permitted outfall, whereas the river seeps on the Green River side do not. Perimeter seeps are more surficial in nature and have been observed in various surface ditches located around the perimeter of the Green Landfill, all of which drain to sedimentation basins that discharge to a KPDES permitted outfall.

2.3.4.1 River Seeps

An investigation of the seeps along the Green River was conducted in July 2018 and was reported in a Technical Memorandum from AECOM to BREC dated September 6, 2018. The results of laboratory analysis of seep samples collected during this investigation are summarized in **Appendix A**. During this investigation, the banks of the Green River were surveyed by boat for evidence of seepage. The survey was conducted when the river stage had retreated to a low pool after a prolonged elevated stage so that the maximum number of seeps might be surveyed, and seepage rates might be high enough to allow sampling. Samples of seeps having visible flow were collected and tested for CCR indicator parameters (40 CFR Part 257 Appendix III), CCR constituents of concern (40 CFR Part 257 Appendix IV), and general chemistry parameters. The data from these analyses were used to evaluate whether individual seeps were likely associated with the Landfill.

Riverbank seeps were identified at sixteen discrete locations in the vicinity of Sebree Station. Seeps were recorded at locations on both the east and west banks of the river over two miles upstream of the landfill footprint and over 1.5 miles downstream of the landfill footprint. Some seeps appeared to potentially be associated with a surface water drainage feature, such as RS-11 where there appears to be a beaver pond beyond the riverbank, but most emanated from otherwise nondescript sections of riverbank. Some of the seeps resulted in a green discoloration of the riverbank, but most had orange staining.

Of the seven seeps tested, only three, RS-05, RS-07, and RS-08 as illustrated on Figure 1 in **Appendix A**, were found to have similar chemistry to leachate generated by the Green Landfill. These seeps did not differ greatly from the majority of the other riverbank seeps in that they were broadly seeping from the bank sediments and had a general orange discoloration, except that RS-07 had a some relatively discrete seepage points emanating from a few feet higher on the bank and RS-08 appeared to be emanating from on top of bedrock outcropping on the river bank. Seeps RS-05 and RS-07 are located near the center of the Landfill between monitoring wells MW-2 and MW-3A. This is the same area in which seeps have been observed higher on the slope between the river and the perimeter road, suggesting that they have a similar origin. Seep RS-08 is located adjacent to the South Sediment Basin and appears to be tied to that surface water feature. The approximate vertical position of the river seep locations relative to the Green Landfill are shown on **Figure 4**. It should be noted that the seep designated RS-06, located between RS-05 and RS-07, is likely to be of similar character and origin but was not generating enough flow to be sampled at the time of the survey.

The analytical results from the July 2018 river seep samples were compared to Kentucky Water Quality criteria for warm water aquatic habitat identified in 401 KAR 10:031 Section 6. Where there are no Kentucky Water Quality criteria for a specific constituent, the USEPA Region 4 surface water screening values were utilized for comparison. It should be noted that the Region 4 screening values are not compliance criteria, but rather values used to determine whether further evaluation is warranted. Samples from RS-05, -07 and -08 were found to exceed the 600 milligrams per liter (mg/L) limit for chloride. RS-05 also exceeded the current criteria for cadmium (0.00029 mg/L) and lead (0.0036 mg/L), but Kentucky has introduced a new cadmium criterion that may bring RS-05 back into compliance. Follow-up sampling conducted in December 2018 by the Kentucky Division of Water (KDoW) and BREC confirmed the exceedance of the chloride criteria. Accordingly, this parameter (chloride) is regarded as the primary COC for non-groundwater releases at the Unit requiring corrective action. Addressing the river seeps was included as a stipulation in the Agreed Order signed between BREC and the KDWM.

The analytical results for the river seep samples are summarized in **Appendix A**. Presented in parallel with the river seep results are deep in-stream river samples that were collected immediately adjacent to the river seeps to characterize the river water quality that is most likely to be impacted by seepage. The

deep samples were collected within 1 foot of the riverbed within 3 to 5 feet of the water line. None of the river sample results exceed the water quality or screening criteria suggesting that the identified river seeps are not impacting the Green River.

Additional data regarding the river seeps is provided in the *Assessment of Corrective Measures Non-Groundwater Release Under the CCR Rule, Green Station CCR Landfill* (AECOM June 28, 2019).

In April 2019, inspection of the Landfill site by the KDWM and KDoW identified an area of seepage outside the perimeter road on the northwest side of the Landfill (see **Figure 2**). This seepage (herein identified as the NW Seep) is adjacent to a tributary ditch that flows eastward to an unnamed outfall which has a KPDES discharge permit. The outfall was sampled by KDoW and BREC on April 2, 2019. A sample from this seep area (identified as sample 023) was collected by BREC personnel on April 11, 2019. The results indicated that the seep sample exceeded Kentucky Warm Water Aquatic Habitat criteria for Chronic Exposure for chloride and cadmium. As a result, this area was identified for corrective action. Addressing this seep area was included as a stipulation in the Agreed Order signed between BREC and the KDWM.

Photo 1: Bedrock outcrop located west of the NW Seep as observed on April 2, 2019.

The NW Seep appears to emanate from a horizon in or above a natural limestone ledge adjacent to the ditch. This conclusion is based on the observation of natural springs of groundwater upstream from the seep that clearly flows from fractures in the ledge. A series of three soil borings drilled between the landfill and the NW Seep area in May 2019 further suggest the seepage is controlled by this feature. **Figure 7** provides a cross-section illustrating the sequence of geologic materials present within the NW seep area as interpreted using the currently available data.

2.3.4.2 Perimeter Seeps

During the July 2018 investigation of Green River seeps, the area inside the Landfill perimeter road was also inspected for seeps. Four areas of perimeter seepage were identified (see **Figure 2**): along the west side of the landfill (LS-01), the southwest corner (LS-04), the south end adjacent to the South Sediment Basin (LS03), and the east side north of MW-2 vicinity (LS02). LS-01, LS-02 LS-03, and LS-04 are directed to the South Sediment Basin, which is pumped to the Northeast Sediment Basin and then further to the Green surface impoundment and eventually discharged to the Green River under KPDES permitted outfall #001.

Samples of a select set of these perimeter seeps were collected in July 2018 and tested for the Appendix III, Appendix IV, and general chemistry parameters. As previously noted, these seeps do not directly discharge to surface waters, but they may have the potential to influence groundwater and other non-groundwater releases. As such, they will be addressed by future corrective action to manage those potentials (see Section 4).

Additional data regarding the perimeter seeps is provided in the *Assessment of Corrective Measures Non-Groundwater Release Under the CCR Rule, Green Station CCR Landfill* (AECOM June 28,2019).

2.3.5 Constituents of Concern

Groundwater analytical data obtained from groundwater sampling events performed at the Unit through 2019 are summarized in **Appendix B**. A summary of the statistical evaluation conducted on the Appendix III and Assessment Appendix IV parameters for the Green Landfill is provided in **Appendix C**. Combined, these data indicate that the only COC detected at SSLs above its GWPS in groundwater at the Unit is lithium. Lithium has been detected at SSLs in the wells MW-4, MW-5, and MW-6 surrounding the South Sediment Basin and in MW-3A located north (downstream on the Green River) of MW-4.

Chloride is regarded as the primary COC for non-groundwater releases at the Unit requiring corrective action. Although there have been Appendix IV (Part 257) constituents detected in the surface seeps identified within the perimeter footprint of the landfill, these seeps are contained within a KPDES permitted discharge area that are monitored routinely to ensure compliance with applicable surface water quality standards.

2.3.6 Impacted Media

Both groundwater and surface water have been identified as impacted media of concern requiring corrective measures at the Unit.

2.3.7 Distribution of COCs

Groundwater sampling was performed at the Unit most recently in April 2020. Laboratory analytical data from the April 2020 sampling event is provided in **Appendix D**. The additional lithium data collected during this event are summarized below in **Table 4**.

Table 4. Green Landfill - April 2020 Lithium Analytical Results

Monitoring Well (Date)	Parameter
	Lithium GWPS 0.04 (mg/L)
MW-1	0.03
MW-2	0.007
MW-3A	0.68
MW-4	0.82
MW-5	0.38
MW-6	0.05

Figure 9 illustrates the distribution of COCs and other groundwater quality constituents in groundwater at the Unit. This distribution of COCs in groundwater suggests that impacts to groundwater likely originate from two primary source area. Impacts observed at MW-4, MW-5 and MW-6 likely originated as infiltration from the South Sediment Basin where storm water and landfill seepage accumulate on the south side of the landfill before being pumped to the Green Surface Impoundment. Data from characterization well MW-104 indicate that MW-3A may be effectively separated from the South Sediment Basin by a buried valley in the bedrock aquifer where groundwater does not appear to be impacted. This suggests that the impact observed at MW-3A may have instead originated from a different source, potentially from localized landfill seepage, which is now captured by the Deep Seep Collection Trench (see Section 2.4). It is possible that the MW-3A impact originates from the western end of the South Sediment Basin, but there is currently no feasible means of directly tracing that potential under the footprint of the landfill. It is, however, possible to evaluate this potential by monitoring MW-3A over time after the South Sediment Basin is rehabilitated as is currently planned (see Section 4). Ongoing monitoring of MW-3A also has the potential to demonstrate whether the landfill seepage intercepted by the Deep Seep Collection Trench is the source of impact.

2.3.8 Potential Receptors/Exposure Pathways

Contact with water (e.g., shallow groundwater or surface water) impacted by COCs at levels above GWPS or Water Quality Criteria is regarded as the potential pathway for exposure of potential receptors. Based on data published by KGS, there are no known groundwater wells used for drinking water within a 1-mile radius of the Unit, thus limiting the potential receptors to the surface water, i.e., the Green River and its tributary, Groves Creek. The potential pathways to these receptors include seepage of water from the Unit through manmade and natural hydraulic conduits.

Other potential exposure pathways (e.g., soil or vapor) are not considered a risk as the CCR material is isolated in the Unit. This isolation prevents direct access by individuals that might result in direct contact or ingestion. In addition, the inherent non-volatile nature of the Unit-specific COCs eliminates the potential for a complete vapor pathway (i.e., vapor intrusion to indoor air).

2.4 Interim Corrective Measures

In September and October 2019, BREC initiated design and construction of two containment systems intended as an interim corrective measure to reduce and prevent non-groundwater releases at the Unit from reaching the Green River. The containment systems are identified as the Deep Seep Collection Trench (also known as the Eastern Collection Trench) and the Northwest Seep Collection Trench.

No formal interim corrective measures have been performed at the Green Landfill to address groundwater impacts. However, the interim corrective measures for known non-groundwater releases completed at the Unit are expected to benefit corrective action for groundwater impacts. The compatibility of those corrective measures with potential groundwater remedies is currently being evaluated as part of the Unit's assessment monitoring and will continued to be evaluated in the future as part of systematic performance reviews (see Section 5.2).

2.4.1 Deep Seep Collection Trench

BREC began construction of the Deep Seep Collection Trench on October 7, 2019. The installation of four partially overlapping trenches and corresponding individual sumps was completed on November 11, 2019. This completion allowed removal of collected seepage using temporary pumping and piping until the permanent system components were completed.

The Deep Seep Collection Trench is located on the eastern side of the landfill, adjacent to the Green River. This collection system consists of 1,065 lineal feet of perforated (HDPE) pipe and four (4) stainless steel sumps. The HDPE perforated pipe is surrounded by a washed river gravel, with profiles set at a 0.5% slope toward the associated pumping (sump) station. Each section of HDPE pipe overlaps at the sump interconnection to prevent seepage bypass and to ensure all deep seeps are properly captured. Each sump was set at an elevation of 352 ft., amsl. The approximate vertical position of the

Photo 2: Installation of the Deep Seep Collection Trench in October 2019.

Deep Seep Collection Trench relative to the Green Landfill is shown on **Figure 4**. The location of the trench in plan view is provided on **Figure 10**.

The electrical and mechanical portion of the project that allows the system to become fully automated was finalized on May 29, 2020.

2.4.2 Northwest Seep Collection Trench

Photo 3: Installation of the Northwest Seep Collection Trench in September 2019.

BREC began construction of the Northwest Seep Collection Trench on September 3, 2019. The construction of the collection trench was completed on January 22, 2020. The system is located in the northwest corner of the landfill and consists of 357 lineal feet of HDPE perforated pipe within the primary collection trench installed at an elevation of 391.4 ft, amsl. The HDPE perforated pipe is surrounded by a washed river gravel, with profiles set at a 0.5% slope toward the associated pumping (sump) station. Since the installation of the primary trench, BREC has installed two relay stations to ensure all possible seeps are captured and pumped to a permitted KPDES outfall. The Northwest Seep Collection Trench is configured to pump the incoming flow to a target manhole, which is located on the northeast corner of the landfill. The target manhole subsequently discharges to KPDES permitted outfall #009. The approximate vertical position of the Northwest Seep Collection Trench relative to the Green Landfill is shown on **Figure 7**. The location of the trench in plan view is provided on **Figure 10**.

2.5 Assessment of Corrective Measures Summary

2.5.1 Assessment of Corrective Measures for Groundwater Impacts

In June 2019, BREC performed an ACM for the Unit to identify remedial alternatives to address groundwater impacts. Title 40 CFR Section 257.96(c) requires that the ACM include an analysis of the effectiveness of potential corrective measures in meeting the objectives for remedies identified under Section 257.97(b), by addressing at least the following:

1) The performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination;
2) The time required to begin and complete the remedy; and
3) The institutional requirements, such as state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy(s).

As part of the groundwater ACM, several potential corrective measures technologies were evaluated to identify which ones could be carried forward as components of corrective measures alternatives. The results of the corrective measures technology evaluation are presented below in **Table 5**.

Table 5 – Potential Corrective Measures Options for Groundwater Impacts

Potentially Applicable Technology	Status	Description/Overview
No Action	Not retained as standalone technology, but carried forward for baseline comparisons	This technology has been included in the preliminary evaluation/screening but is not retained because it will not meet the established Corrective Action Objectives (CAOs).
Institutional Controls (ICs)	Retained as supplement to corrective measures alternatives	The use of ICs (i.e., Environmental Covenant, groundwater use restrictions, etc.) is retained as a useful technology. However, it is noted the ICs are not anticipated to be used as a stand-alone technology. Environmental Covenants, groundwater use restrictions, etc., are expected to be combined with other applicable technologies as part of corrective measures alternatives.
Groundwater Monitoring (Assessment and Detection mode)	Retained as supplement to corrective measures alternatives	The use of groundwater monitoring (Assessment and/or Detection modes as appropriate) when combined with other applicable technologies as part of any proposed corrective measures alternative is retained to address the CAO and to track the effectiveness of the overall remedy. However, it is not retained as a standalone technology.
Hydraulic Containment	Retained	The use of hydraulic containment is retained because it is an effective means of preventing offsite migration of soluble contaminants. Hydraulic containment requires management and potential ex-situ treatment of extracted groundwater, so it is not a stand-alone technology. The CSM will guide the design of any groundwater extraction system to optimize the total discharge of groundwater needed to provide hydraulic containment.
Physical Containment	Retained	The use of physical containment is retained because it can be an effective means of managing groundwater flow. Physical containment often requires pairing with hydraulic containment and/or in-situ treatment (funnel and gate style) to manage the flux of groundwater flow into the system. The CSM will guide the design of any physical barrier system, but technology limitations increase implementation difficulty with scale.
Ex-situ Treatment (Physical, Chemical or Biological)	Retained	Ex-situ treatment technologies are retained as a way of removing contaminants from extracted groundwater from a hydraulic containment system. Ex-situ treatment may be paired with wastewater treatment, non-groundwater release treatment systems, or with permitted discharge to manage groundwater contamination. The CSM and data gaps investigations will guide the design of any ex-situ treatment
Closure in Place (CiP) (of the regulated unit)	Retained	The use of CiP as a source control technology and is amenable with respect to CAO attainment.
Closure by Removal (CbR) (of the regulated unit)	Retained	The use of CbR as a source control technology is amenable with respect to CAO attainment.

Potentially Applicable Technology	Status	Description/Overview
Other Source Control Technologies	Retained	Control of source area non-groundwater related releases. For the purposes of this groundwater ACM, management of non-groundwater releases are not included in the alternatives evaluation. Engineering measures, including leachate collection, lining of trenches and/or ponds, and other isolation methods are regarded as part of closure technologies selected by other means.

Note: Technologies that were retained may be used as components of a corrective action alternative, but when evaluated in conjunction with other available technologies any single technology may not be utilized.

Preliminary assembly of corrective measures alternatives was performed based on site-specific and regional geology and groundwater conditions. For the Unit, six corrective measures alternatives were developed from this list of applicable corrective measures technologies during the ACM screening process:

- Alternative #1 – No Action and Groundwater Monitoring
- Alternative #2a – Closure in Place (CiP), Institutional Controls (ICs), and Groundwater Monitoring
- Alternative #2b – Closure by Removal (CbR), ICs, and Groundwater Monitoring
- Alternative #3 – CiP, Hydraulic Containment, Other Source Control (consisting of seepage collection and treatment), Ex-Situ Treatment, ICs, and Groundwater Monitoring
- Alternative #4 – CiP, Physical Containment, Ex-Situ Treatment, ICs, and Groundwater Monitoring
- Alternative #5 – CiP, Other Source Control, ICs, and Groundwater Monitoring

The assembly of corrective measures alternatives presented in the ACM was considered preliminary and subject to revision following additional evaluation during the remedy selection process and/or following comment from the regulatory community and public. Further evaluation of the alternatives is discussed in the following sections.

2.5.2 Assessment of Corrective Measures for Non-Groundwater Impacts

Pursuant to Title 40 of the Code of Federal Regulations (CFR) parts 257.90(d) and 257.84(b)(5), BREC initiated design of containment systems intended to reduce and prevent non-groundwater releases from reaching the Green River as an interim corrective measure. Plans for these measures were submitted to the KDWM for review and comment in 2019. KDWM conditionally approved the interim corrective measures for implementation at the Unit and they were constructed in 2019 and 2020 (see Section 2.4).

In June 2019, BREC performed an ACM to evaluate whether additional remedial measures, that would be supplemental to the ICMs already planned, were warranted to address non-groundwater releases. Several potential corrective measures technologies were evaluated in order to identify which ones could be carried forward as components of corrective measure alternatives for non-groundwater releases, if required. The results of the corrective measures technology evaluation are presented below in **Table 6**.

Table 6 – Potential Corrective Measures Options for Non-Groundwater Impacts

Potentially Applicable Technology	Status	Description/Overview
No Action	Not retained as stand-alone technology, but carried forward for baseline comparisons	This technology has been included in the preliminary evaluation/screening but is not retained because it will not meet the established CAOs.

Potentially Applicable Technology	Status	Description/Overview
Hydraulic Containment	Retained	Hydraulic containment in the form of pumping of vertical or horizontal wells would potentially be used to provide spot control of seepage if the interim corrective measures are unable to fully capture the seepage.
Physical Containment	Retained	Physical containment in the form of a cutoff wall would potentially be used to re-direct or otherwise intercept seepage that was not adequately captured by the interim corrective measures.
Ex-situ Physical/Chemical/Biological Treatment	Retained	Ex-situ treatment is retained as a potential supplement to the interim corrective measures in the event that discharge via the station's KPDES permit is not possible.
In-situ Physical/Chemical Treatment	Retained	In-situ treatment is retained in the form of spot treatment or fixation of seepage areas in the event that the interim corrective measures do not adequately address all seepage areas.
Permeable Reactive Barriers (PRB)	Retained	The use of PRBs is retained in the form of a reactive cell in the event that interim measures result in seepage concentrations that require pre-treatment in-situ prior to discharge.
Closure in Place (CiP) (of the regulated unit)	Retained	The use of CiP as a source control technology and is amenable with respect to CAO attainment.
Closure by Removal (CbR) (of the regulated unit)	Retained	The use of CbR as a source control technology is amenable with respect to CAO attainment.
Other Source Control Technologies	Retained	Control of source area non-groundwater releases is being implemented as interim corrective measures but is retained in the event that interim measures need to be evaluated for expansion.

The ICMs implemented at the Unit in 2019 were designed to address river seepage and divert it to KPDES outfalls, eliminating any potential exposure to public health or the environment. During ACM development, it was anticipated that the ICMs would meet the CAOs by effectively eliminating any future river seepage through source control, and as a result, no supplemental remedies were considered warranted. Data collected at the Unit since installation of the ICMs suggests that the CAOs are being met and in compliance with the conditions of the Agreed Order.

Performance monitoring is ongoing and will continue to be performed in the future to demonstrate source control and evaluate the ability of the ICMs to meet the CAO. The ICMs implemented at the Unit in 2019 and 2020 are considered the final remedy for non-groundwater releases and are expected to benefit corrective action as a whole for the Unit. As a result, no separate remedy selection report is currently being developed for non-groundwater releases. If warranted based on performance monitoring results, additional evaluation of the non-groundwater corrective measures will be performed consistent with 40 CFR 257.98(b).

3. Corrective Measure Evaluation

To address the remedy selection requirement under 40 CFR Part 257.97, a corrective measure evaluation was performed to address groundwater impacts at the Unit. Currently, no separate corrective measure evaluation is planned for non-groundwater releases, as the ICMs implemented at the Unit in 2019 and 2020 are considered the final remedy for non-groundwater releases. The discussion included below details the evaluation performed to address groundwater impacts at the Unit.

3.1 Corrective Action Objectives

Corrective Action Objectives (CAOs) for the Unit were identified during the groundwater ACM completed for the Unit in June 2019. CAOs are overall descriptions of what remedial action is expected to accomplish at a given site. CAOs also provide a basis for evaluating the performance of a corrective measure. Title 40 CFR Section 257.97 (b) outlines the CAOs for corrective measures under the CCR Rule as follows:

(1) Be protective of human health and the environment;

(2) Attain the GWPS as specified pursuant to Section 257.95(h);

(3) Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of Appendix IV constituents into the environment;

(4) Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems;

(5) Comply with standards for management of wastes as specified in Section 257.98(d). [note: this statute refences all applicable requirements under the Resource Conservation and Recovery Act (RCRA)].

The corrective measure alternative selected for the Unit must ultimately demonstrate attainment of the CAOs. Compliance with the CAOs will be a primary factor in determining the effectiveness of the corrective measure alternative selected for the Unit during future systematic performance reviews.

Each of the CAOs have been adopted as Threshold Criteria (see Section 3.3.1 below) for evaluating potential corrective measures in alignment with 40 CFR Part 257.97 (b).

3.2 Corrective Measures Alternatives Assembly

The groundwater ACM performed for the Unit in June 2019 identified a total of six (6) corrective measures alternatives to be carried forward into the remedy selection process. In December 2019, BREC provided a *Semi-annual Remedy Selection Progress Report* (AECOM, December 2019) as required under 40 CFR 257.97(a). As part of this submittal, two (2) corrective measures alternatives were eliminated from further consideration, including:

- Alternative #1 (No Action and Groundwater Monitoring) – This alternative does not control or remove COCs from the environment and therefore does not achieve the RAOs.
- Alternative #2b – (CbR, ICs, and Groundwater Monitoring) – Implementing a CbR approach is considered cost prohibitive. In addition, any CbR approach would require relocating waste to an existing disposal unit or construction of a new waste disposal unit, which does not align with the one of the fundamental goals of RCRA (conserving energy and natural resources).

Four (4) potential corrective measures alternatives have been identified by BREC as viable options to address lithium impacts in groundwater and non-groundwater releases at the Unit, including:

- Alternative #2a (Alt 2a): CiP, ICs, and Groundwater Monitoring

- Alternative #3 (Alt 3): CiP, Hydraulic Containment, Other Source Control (consisting of seepage collection and treatment), Ex-Situ Treatment, ICs, and Groundwater Monitoring
- Alternative #4 (Alt 4): CiP, Physical Containment, Ex-Situ Treatment, ICs, and Groundwater Monitoring
- Alternative #5 (Alt 5): CiP, Other Source Control, ICs, and Groundwater Monitoring

Each of the remining 4 corrective measures alternatives was evaluated against the threshold, balancing, and modifying criteria as discussed below.

3.3 Corrective Measures Criteria Evaluation

40 CFR Part 257.97(a) outlines the criteria for evaluating corrective measures under the Federal CCR Rule. Although not specifically stated as such, these criteria mirror the criteria outlined for the National Oil and Hazardous Substance Contingency Plan, more commonly referred to as the National Contingency Plan (NCP), established under 40 CFR 300. 40 CFR 300.430 identifies 9 criteria for evaluating remedial alternatives which are further divided into 3 categories:

1) Threshold Criteria;
2) Balancing Criteria, and
3) Modifying Criteria.

These criteria were utilized by BREC to evaluate the potential corrective measures alternatives for the Unit. Each of the remaining 4 corrective measures alternatives was evaluated against each other and scored on a scale from 1 to 4 (1 being lowest and 4 being highest). Where multiple corrective measures alternatives were considered equal with respect to a given criteria, the available points were combined and divided equally. The results of analysis performed to evaluate each of the corrective measures alternative is discussed below and summarized in **Appendix E**.

3.3.1 Threshold Criteria Evaluation

Title 40 CFR Part 257.97 (b) outlines the threshold criteria (also viewed as CAOs) for evaluating corrective measures under the CCR Rule, and these criteria were presented in Section 3.1 above. The results of the threshold criteria evaluation are summarized below in **Table 7**.

Table 7. Threshold Criteria Evaluation Summary

40 CFR 257.97 Reference	Alternative 2a	Alternative 3	Alternative 4	Alternative 5
(b)(1)	1	3	3	3
(b)(2)	1	3.5	2	3.5
(b)(3)	1	3	2	4
(b)(4)	1	3	2	4
(b)(5)	2.5	2.5	2.5	2.5

Further detail regarding how threshold criteria were evaluated in provided on Table E-2 in **Appendix E**.

3.3.2 Balancing Criteria Evaluation

Title 40 CFR Section 257.97 (c) outlines the balancing criteria for evaluating corrective measures under the CCR Rule as follows:

1) The long and short-term effectiveness of the potential remedy(s), along with the degree of certainty that the remedy will prove successful based on a consideration of the following:

i. Magnitude of reduction of existing risks;
ii. Magnitude of residual risks in terms of likelihood of further releases due to CCR remaining following implementation of a remedy;
iii. The type and degree of long-term management required, including monitoring, operation, and maintenance;
iv. Short-term risks that might be posed to the community or the environment during implementation of such a remedy, including potential threats to human health and the environment associated with excavation, transportation, and re-disposal of contaminant;
v. Time until full protection is achieved;
vi. Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, or containment;
vii. Long-term reliability of the engineering and institutional controls; and
viii Potential need for replacement of the remedy

2) The effectiveness of the remedy in controlling the source to reduce further releases based on consideration of the following factors:
   i. The extent to which containment practices will reduce further releases; and
   ii. The extent to which treatment technologies may be used.

3) The ease or difficulty of implementing a potential remedy(s) based on consideration of the following types of factors:
   i. Degree of difficulty associated with constructing the technology;
   ii. Expected operational reliability of the technologies;
   iii. Need to coordinate with and obtain necessary approvals and permits from other agencies;
   iv. Availability of necessary equipment and specialists; and
   v. Available capacity and location of needed treatment, storage, and disposal services.

The results of the threshold criteria evaluation are summarized below in **Table 8**.

Table 8. Balancing Criteria Evaluation Summary

40 CFR 257.97 Reference	Alternative 2a	Alternative 3	Alternative 4	Alternative 5
(c)(1)(i)	1	4	3	2
(c)(1)(ii)	1	3.5	3.5	2
(c)(1)(iii)	1	2.5	2.5	4
(c)(1)(iv)	1	3	2	4
(c)(1)(v)	1	3	2	4
(c)(1)(vi)	1	3	2	4
(c)(1)(vii)	1	3	2	4
(c)(1)(viii)	4	2	1	3
(c)(2)(i)	1	3	2	4
(c)(2)(ii)	1	4	3	2
(c)(3)(i)	4	2	1	3
(c)(3)(ii)	4	2	1	3
(c)(3)(iii)	2.5	2.5	2.5	2.5
(c)(3)(iv)	4	2	1	3

(c)(3)(v)	1	2	3	4

Further detail regarding how threshold criteria were evaluated in provided on Table E-3 in **Appendix E**.

3.3.3 Modifying Criteria Evaluation

Title 40 CFR Section 257.97 (c) defines modifying criteria as “the degree to which community concerns are addressed by a potential remedy(s)”. Given that an Agreed Order was signed between BREC and the KDWM for the Unit, the modifying criteria were expanded as part of this evaluation to include separate criteria for state and community acceptance (40 CFR 300.430 divides modifying criteria into two categories).

The results of the modifying criteria evaluation are summarized below in **Table 9**.

Table 9. Modifying Criteria Evaluation Summary

40 CFR 257.97 Reference	Alternative 2a	Alternative 3	Alternative 4	Alternative 5
NA - state acceptance	1	3.5	3.5	2
(c)(4)	1	3.5	3.5	2

Further detail regarding how threshold criteria were evaluated in provided on Table E-4 in **Appendix E**.

3.3.4 Corrective Measures Alternative Evaluation Summary

The cumulative scoring of the criteria evaluation is summarized below in **Table 10**.

Table 10. Cumulative Criteria Evaluation Scoring Summary

40 CFR 257.97 Reference	Alternative 2a	Alternative 3	Alternative 4	Alternative 5
Total Score	37	63.5	50	**69.5**

Further detail regarding the cumulative scoring criteria is provided on Table E-1 in **Appendix E**. Alternative 5 scored highest of all the alternatives during the evaluation.

4. Remedy Selection

In alignment with the scoring completed as part of the corrective measure evaluation (see **Appendix E**), BREC has selected Alternative #5 (CiP, Other Source Control, ICs, and Groundwater Monitoring) as the remedy to address groundwater and non-groundwater impacts at the Unit. A description of each corrective measure technology incorporated into the selected remedy is provided below.

4.1 Closure in Place

In adherence with the BREC's permit conditions, the Site will continue to operate as a solid waste disposal facility through its life cycle and will be closed in accordance with the requirements of the permit. The current life cycle estimates for the Green Landfill predict that the Unit will reach capacity in approximately 2041. Source control through landfill closure will include installation of final cover that will prevent infiltration and contribute to groundwater quality restoration.

4.2 Source Control

To comply with the Agreed Order signed by BREC and KDWM for the Unit, additional source control measures will be implemented in 2020 and 2021 to reduce/eliminate the downward migration of COC into groundwater. As currently planned, theses measure will include the following:

- Landfill perimeter collection trenches; and
- Removal of CCR material from the South Sediment Basin.

Interim corrective measures for the perimeter seeps are being planned in a phased approach. The first step is to divert the seepage to the Northeast Sediment Basin which is routed to the KPDES outfall of the Green Surface Impoundment. Removing the seeps from stormwater channels will prevent mixing with impounded stormwater. The use of the South Sediment Basin requires that CCR materials be removed so that the seepage does not have the potential to impact groundwater. Corrective measures for the South Sediment Basin will involve the removal of any residual CCR material and creation of two lined sump areas, one on the east end to collect the South and East perimeter seeps and one on the west end to collect Southwest corner perimeter seeps. Additionally, perimeter seeps on the north side of the landfill will be similarly controlled but will be directly routed to the collector sump on the north side of the landfill.

Design of the additional source control remedies is currently being performed by BREC. A draft design package will be provided to KDWM as part of a separate submittal to comply with the conditions of Agreed Order #18-3-0138. The implementation schedule for source control measures is discussed in Section 5.

4.3 Institutional Controls

The use of ICs (i.e., Environmental Covenant, groundwater use restrictions, etc.) is retained as a useful technology. However, it is noted the ICs are not anticipated to be used as a stand-alone technology. Environmental Covenants, groundwater use restrictions, etc., are expected to be combined with other applicable technologies as part of the remedy for the Unit.

4.4 Groundwater Monitoring

Assessment monitoring is expected to continue at the Unit until the CAOs have been met.

5. Remedy Implementation Schedule

5.1 Schedule Evaluation Factors

The schedule for remedy implementation is provided in **Appendix F**. 40 CFR Part 257.97(d) outlines the factors that must be considered in specifying a schedule to remedial implementation at a CCR unit as follows.

1) Extent and nature of contamination, as determined by the characterization required under § 257.95(g);
2) Reasonable probabilities of remedial technologies in achieving compliance with the groundwater protection standards established under § 257.95(h) and other objectives of the remedy;
3) Availability of treatment or disposal capacity for CCR managed during implementation of the remedy;
4) Potential risks to human health and the environment from exposure to contamination prior to completion of the remedy;
5) Resource value of the aquifer including:
    i. Current and future uses;
    ii. Proximity and withdraw rate of users;
    iii. Groundwater quantity and quality;
    iv. The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to CCR constituents;
    v. The hydrogeologic characteristic of the facility and surrounding land;
    vi. The availability of alternative water supplies; and
6) Other relevant factors.

Each of these factors was consider by BREC as part of the remedy selection process as described below.

5.1.1 Nature and Extent of Contamination

The data obtained during characterization monitoring performed at the Unit under 40 CFR Part 257.95(g) indicates that the extent of groundwater and non-groundwater impacts is confined to Sebree Station. Source control measures implemented to date will ensure that non-groundwater releases are captured and will not migrate beyond the functional perimeter of the Unit and the property controlled by BREC.

Assessment monitoring will continue at the Unit to confirm that the nature and extent of contamination is defined and progressing in accordance with the CAOs.

5.1.2 Compliance Probability

Implementation of the selected remedy is expected to have a high probability of meeting the CAOs. There is firm evidence of a relatively direct connection between infiltration of co-mingled leachate and stormwater at the South Sediment Basin and the observed impact to monitoring wells MW-4, -5, and -6. Consequently, removal of that infiltration by the planned corrective measures (excavating CCR from the South Sediment Basin and containing leachate in a series of sumps and piped conveyance) is expected to have a direct influence on groundwater quality. The time required to achieve GWPSs at the affected wells has not been modeled but is expected to be on the order of one to five years if the remedy is implemented as planned.

Impacts observed at MW-3A may be tied to the nearby non-groundwater release captured by the Deep Seep Collection Trench, in which case, the time to achieve CAOs may be relatively quick now that the

seepage is being hydraulically controlled. However, there are unknowns regarding the nature of how lithium is transported to that well location. Those uncertainties cannot be evaluated given the physical constraints of the site (proximity of the landfill to the river), so the time frame required to meet CAOs cannot be predicted until additional Assessment monitoring data are available.

5.1.3 CCR Treatment and Disposal Capacity

Wastes generated by the groundwater corrective measures activities will include residual CCR content removed from the South Sediment Basin and seepage collected from the perimeter seepage controls. Wastes generated by the non-groundwater corrective measures activities will be seepage collected from the Deep Seep Collection Trench and the Northwest Seep Collection Trench.

The solids (dredged material from the South Sediment Basin) will be interred in the Landfill as allowed under the existing solid waste permit. The Landfill has sufficient capacity for this one-time waste stream volume. The liquid wastes will be managed under the KPDES permit for the station.

5.1.4 Exposure Risk

As detailed in Section 2.3.8, there is no data to suggest that human health and the environment are currently being exposed to COC emanating from the Unit. This condition is not expected to change prior to implementation of the remedy but will continue to be evaluated through Assessment monitoring and systematic performance reviews.

5.1.5 Aquifer Resource Value

Based on data published by KGS, there are no known groundwater wells used for drinking water within a 1-mile radius of the Unit. This is not expected to change in the future but will be re-examined during future performance reviews. Therefore, the significance of aquifer resource value is not considered pertinent to this evaluation or the resulting schedule.

5.1.6 Other Relevant Factors

Within Exhibit 4 of the Agreed Order, a milestone schedule was provided for groundwater corrective action. Although the milestone schedule has been adjusted due to the work conditions imposed by the COVID-19 pandemic, which includes holding the public meeting at an earlier date, BREC has moved forward with the activities required in the Agreed Order.

5.2 Performance Review

Source control measures are viewed as the remedial component likely to have the most significant short- and long-term benefit on reducing groundwater and non-groundwater impacts at the Unit. As such, evaluating the performance of source control measures constructed at the Unit should be evaluated through systematic review.

Although not specifically mandated under the CCR Rule, five-year reviews are generally required by the regulatory agency under corrective action programs (i.e. CERCLA) when hazardous substances remain at a site above levels that permit unlimited use and unrestricted exposure. Five-year reviews provide an opportunity to evaluate the implementation and performance of a remedy to determine whether it remains protective of human health and the environment. Generally, reviews take place five years following the start of corrective action and are repeated every succeeding five years so long as future uses remain restricted. BREC will perform a five-year review to evaluate compliance with the CAOs and evaluate the effectiveness of the remedy selected for the Unit five years after construction completion (approximately 2026).

6. References

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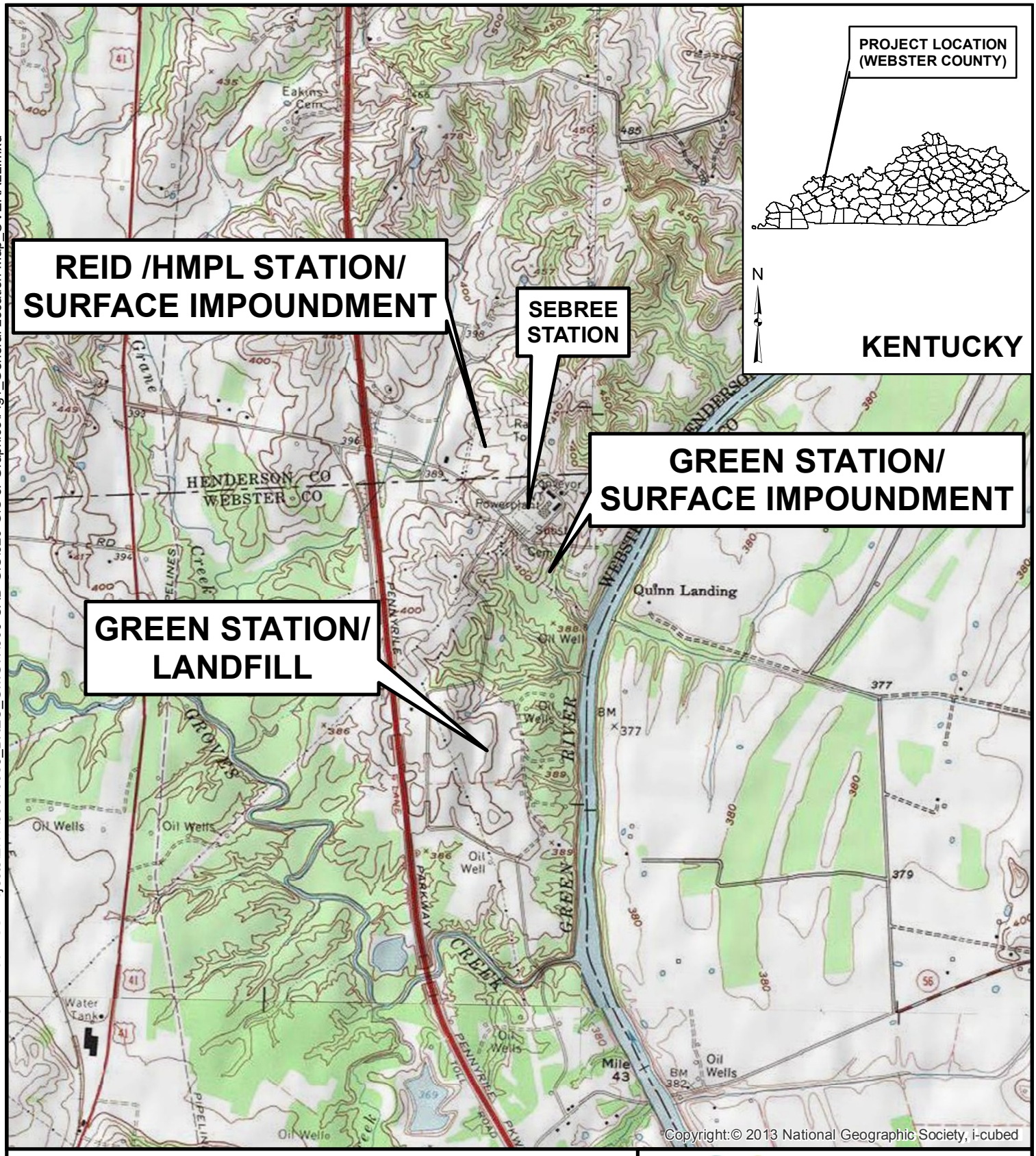
Figures



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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

ROBARDS QUADRANGLE
DELAWARE QUADRANGLE
(FROM ARCGIS ONLINE Copyright:© 2011 National Geographic Society, i-cubed)

0 2,000 4,000 Feet

N

Big Rivers ELECTRIC CORPORATION

Sebree Station
Webster County, Kentucky

FIGURE 1
GENERAL LOCATION MAP

DATE: 1/8/2019	SCALE: 1IN = 2,000 FEET
CREATED BY: ALW	
JOB NO. 60579938	

RS 04
MW-12
GNWSB-1
GNWSB-3
GNWSB-2
N
N′
B
B′
MW-1
A′
MW-2
GESB-01
GESB-02
LS 02
GESB-03
GESB-04
GESB-05
GESB-06
GESB-07
GESB-08
GESB-09
GESB-10
GESB-11
GESB-12
GESB-13
GESB-14
GESB-15
GESB-16
GESB-17
RS 05
RS 06
Green River
GESB-18
GESB-19
RS 07
GESB-20
GESB-21
GESB-22
MW-3A
GESB-23
GESB-24
GESB-25
MW-104
GESB-26
LS 01
LS 04
LS 03
GESB-27
GESB-28
GESB-29
RS 08
C
C′
A
MW-6
MW-5
MW-4
Groves Creek
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Property Line
- KAR Permit Area
- CCR Fill Area
- Downgradient CCR Monitoring Well
- Upgradient CCR Monitoring Well
- Characterization Well
- A — A' Transect Line
- GESB-01 Seeps Investigation Borings
- Landfill Seep Sample
- River Seep Sample

0 400 800
Feet

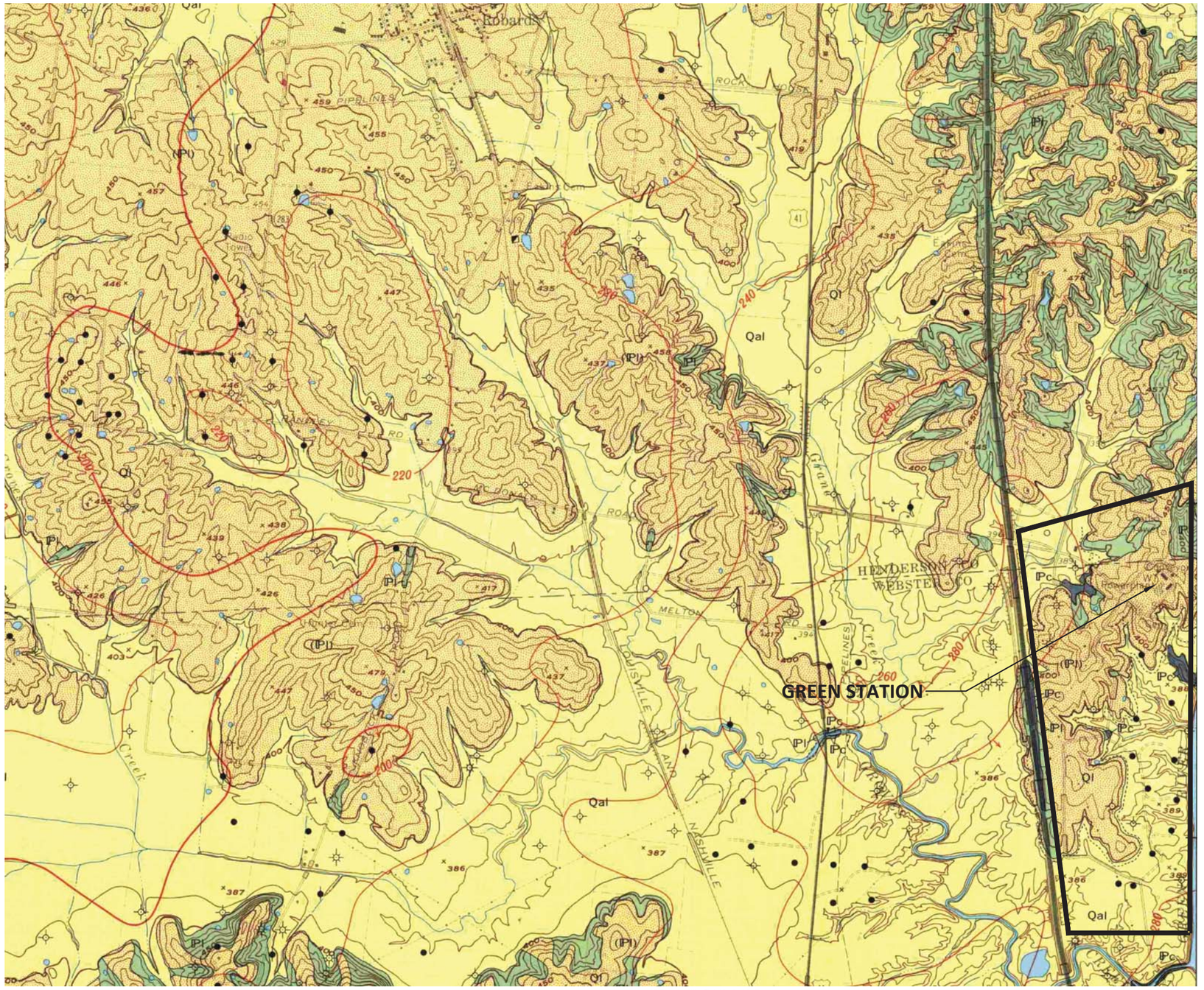
N

Big Rivers Electric Corporation

Green Station
Webster County, Kentucky

FIGURE 2
WELL LOCATION MAP

DATE:06/04/2019	SCALE: 1IN = 300 FEET
CREATED BY: DAS	
JOB NO. 60602364	



SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET

DATUM IS MEAN SEA LEVEL

EXPLANATION

Pleistocene and Holocene	Qal	Alluvium	QUATERNARY
Pleistocene	Ql	Loess *Adapted in part from soil map of Henderson County (Converse and Cox, 1967)*	QUATERNARY
Upper Pennsylvanian	Pl / m / Pl	Lisman Formation m, *base of Madisonville Limestone Member*	PENNSYLVANIAN
Middle Pennsylvanian	Pc	Carbondale Formation	PENNSYLVANIAN

Formation symbols enclosed in parentheses where units concealed by mapped surficial deposits

Contact or key bed

Dashed where inferred; dotted where concealed. Triangles indicate selected localities where contacts were well exposed at time of mapping

7

Strike and dip of beds

200

Structure contours

Drawn on base of No. 9 coal bed; projected where contoured horizon is missing. Arrows indicate direction of dip. Contour interval 20 feet

Outline of area where No. 9 coal bed is missing

DRILL HOLES FROM WHICH SUBSURFACE STRUCTURAL DATA WERE OBTAINED, AS OF JANUARY 1, 1971

Dry hole

Oil well

Big Rivers Electric Corporation

Green Station
Webster County, Kentucky

FIGURE 3
SITE GEOLOGIC MAP
(KENTUCKY GEOLOGICAL SURVEY)

DATE: 05/21/2019	SCALE: AS SHOWN
CREATED BY: DAS	
JOB NO. 60602364	

S
A

N
A'

South Pond Extent

Historical "Bottom Ash" Pond Extent

MW-4* GESB-29 P-3* GESB-28 B-8* GESB-27 GESB-26 GESB-25 MW-104 GESB-24 GESB-23 B-6 B-5* MW-3A* GESB-22 GESB-21 GESB-20 GESB-19 P-6* Sump A Sump B GESB-18 B-4 GESB-17 GESB-16 GESB-15 GESB-14 GESB-13 GESB-12 GESB-11 Sump C GESB-09 Sump D GESB-08 GESB-07 GESB-06 GESB-05 GESB-04 GESB-03 GESB-02 GESB-01 MW-2 B-2* P-9

AVERAGE ROAD LEVEL

08 07 06 05

FEET, MSL

430 420 410 400 390 380 370 360 350 340 330 320 310

0 500 1000 1500 2000 2500 3000 3500

FEET

(Vertical Exaggeration = 20x)

Bedrock Lithologies:

- Sandstone
- Shale
- Interbedded Sandstone and Shale
- Interbedded Shale and Sandstone

Unconsolidated Materials:

- Silty Clay
- Fill

- Collection Area
- River Seep (projected) (07)
- APROX. RIVER LEVEL
- Sump
- Potentiometric Surface
- 11/11/2019 - 11/12/2019
- Boring (*Projected)
- MW-2 — Well ID
  - Riser
  - Screen

Big Rivers Electric Corporation

Green Station
Webster County, Kentucky

FIGURE 4
CROSS SECTION A - A'
East (River) Side of Ash Pile

DATE: 05/01/2020	SCALE: AS SHOWN
CREATED BY: ALY	JOB NO. 60619283

W
B

E
B′

Fly Ash (Landfill)

Pennyrile Parkway

MW-1
P-7*
B-1*
P-8*
P-9*
B-2*
MW-2*

North Settling Basin

Green River

FEET, MSL

430
420
410
400
390
380
370
360
350
340
330
320
310

0
500
1000
1500
2000
2500
3000
3500

FEET

Bedrock Lithologies:

- Sandstone
- Shale
- Limestone
- Interbedded Sandstone and Shale
- Interbedded Shale and Sandstone

Unconsolidated Materials:

- Silty Clay
- Fill

Potentiometric Surface

11/11/2019 - 11/12/2019

Boring
(*Projected)

MW-2— Well ID
Riser
Screen

Big Rivers Electric Corporation

Green Station
Webster County, Kentucky

FIGURE 5
CROSS SECTION B - B'
North Side of Ash Pile

DATE: 05/01/2020	SCALE: AS SHOWN
CREATED BY: ALY	JOB NO. 60619283

W_C

C'E

Pennyrile Parkway

P-1
MW-6
B-7

P-2
MW-5*

MW-4
P-3

Green River

FEET, MSL

430
420
410
400
390
380
370
360
350
340
330
320
310

0
500
1000
1500
2000
2500
3000
3500

FEET

Bedrock Lithologies:

- Sandstone
- Shale
- Interbedded Sandstone and Shale
- Interbedded Shale and Sandstone

Unconsolidated Materials:

- Silty Clay
- Fill

- River Seep (projected)

- Potentiometric Surface
- 11/11/2019 - 11/12/2019
- Boring (*Projected)
- MW-4 — Well ID
  - Riser
  - Screen

Big Rivers Electric Corporation

Green Station
Webster County, Kentucky

FIGURE 6
CROSS SECTION C - C'
South Side of Ash Pile

DATE: 05/01/2020	SCALE: AS SHOWN
CREATED BY: ALY	JOB NO. 60619283

W
N

E
N'

GNWSB-2*
NWS Collection Sump
GNWSB-1*
RS-1*
RS-2*
GNWSB-3
Manhole*
MW-12
Target Manhole*
Green River

FEET, MSL
430
420
410
400
390
380
370
360
350
340
330
320
310

0
500
1000
1500
2000
2500
3000
3500
FEET

Bedrock Lithologies:

- Sandstone
- Shale
- Limestone
- Interbedded Sandstone and Shale
- Interbedded Shale and Sandstone

Unconsolidated Materials:

- Silty Clay
- Fill
- Collection Area
- Sump

Boring (*Projected)

MW-12 — Well ID
Riser
Screen

Relay Station

RS-1*
Horizontal Pipe
Transparent Lithology is projected. Perceived dip is a result of localized slumping towards the creek.

* Projected

Big Rivers Electric Corporation

Green Station
Webster County, Kentucky

FIGURE 7
CROSS SECTION N - N'
North Side of Ash Pile

DATE: 05/01/2020	SCALE: AS SHOWN
CREATED BY: ALY	JOB NO. 60619283

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MW-1
403.71

MW-12
373.39

MW-2
376.13

MW-3A
374.40

MW-4
373.43

MW-5
372.56

MW-6
372.55

375

380

385

390

395

400

Green River

Groves Creek

bing

Legend

- Property Line
- KAR Permit Area
- CCR Fill Area
- Downgradient CCR Monitoring Well
- Upgradient CCR Monitoring Well
- Water Table Contour (Dashed where Inferred from Available Monitoring Data)
- Groundwater Flow Direction
- 373.43 Groundwater Elevation (Feet, MSL) Measured April 7, 2020
- NM - not measured

0 400 800
Feet

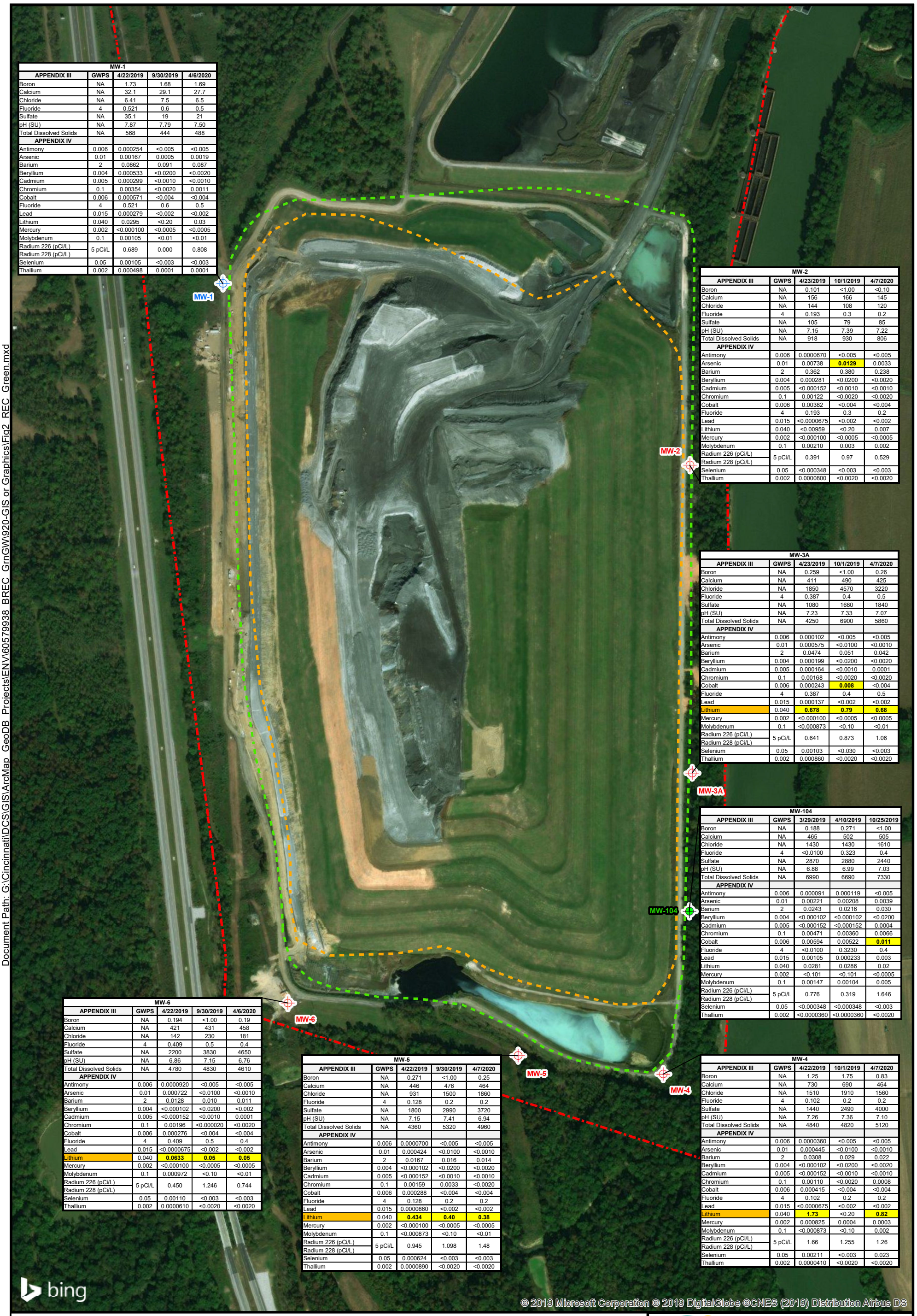
N

Big Rivers Electric Corporation

Green Station Landfill
Webster County, Kentucky

FIGURE 8
POTENTIOMETRIC SURFACE MAP
APRIL 7, 2020

DATE: 4/20/2020	SCALE: 1IN = 400 FEET
CREATED BY: TMJ	
JOB NO. 60579938	



MW-1				
APPENDIX III	GWPS	4/22/2019	9/30/2019	4/6/2020
Boron	NA	1.73	1.68	1.69
Calcium	NA	32.1	29.1	27.7
Chloride	NA	6.41	7.5	6.5
Fluoride	4	0.521	0.6	0.5
Sulfate	NA	35.1	19	21
pH (SU)	NA	7.87	7.79	7.50
Total Dissolved Solids	NA	568	444	488
APPENDIX IV				
Antimony	0.006	0.000254	<0.005	<0.005
Arsenic	0.01	0.00167	0.0005	0.0019
Barium	2	0.0862	0.091	0.087
Beryllium	0.004	0.000533	<0.0200	<0.0020
Cadmium	0.005	0.000299	<0.0010	<0.0010
Chromium	0.1	0.00354	<0.0020	0.0011
Cobalt	0.006	0.000571	<0.004	<0.004
Fluoride	4	0.521	0.6	0.5
Lead	0.015	0.000279	<0.002	<0.002
Lithium	0.040	0.0295	<0.20	0.03
Mercury	0.002	<0.000100	<0.0005	<0.0005
Molybdenum	0.1	0.00105	<0.01	<0.01
Radium 226 (pCi/L) + Radium 228 (pCi/L)	5 pCi/L	0.689	0.000	0.808
Selenium	0.05	0.00105	<0.003	<0.003
Thallium	0.002	0.000498	0.0001	0.0001

MW-1

MW-2				
APPENDIX III	GWPS	4/23/2019	10/1/2019	4/7/2020
Boron	NA	0.101	<1.00	<0.10
Calcium	NA	156	166	145
Chloride	NA	144	108	120
Fluoride	4	0.193	0.3	0.2
Sulfate	NA	105	79	85
pH (SU)	NA	7.15	7.39	7.22
Total Dissolved Solids	NA	918	930	806
APPENDIX IV				
Antimony	0.006	0.0000670	<0.005	<0.005
Arsenic	0.01	0.00738	**0.0129**	0.0033
Barium	2	0.362	0.380	0.238
Beryllium	0.004	0.000281	<0.0200	<0.0020
Cadmium	0.005	<0.000152	<0.0010	<0.0010
Chromium	0.1	0.00122	<0.0020	<0.0020
Cobalt	0.006	0.00382	<0.004	<0.004
Fluoride	4	0.193	0.3	0.2
Lead	0.015	<0.0000675	<0.002	<0.002
Lithium	0.040	<0.00959	<0.20	0.007
Mercury	0.002	<0.000100	<0.0005	<0.0005
Molybdenum	0.1	0.00210	0.003	0.002
Radium 226 (pCi/L) + Radium 228 (pCi/L)	5 pCi/L	0.391	0.97	0.529
Selenium	0.05	<0.000348	<0.003	<0.003
Thallium	0.002	0.0000800	<0.0020	<0.0020

MW-2

MW-3A				
APPENDIX III	GWPS	4/23/2019	10/1/2019	4/7/2020
Boron	NA	0.259	<1.00	0.26
Calcium	NA	411	490	425
Chloride	NA	1850	4570	3220
Fluoride	4	0.387	0.4	0.5
Sulfate	NA	1080	1680	1840
pH (SU)	NA	7.23	7.33	7.07
Total Dissolved Solids	NA	4250	6900	5860
APPENDIX IV				
Antimony	0.006	0.000102	<0.005	<0.005
Arsenic	0.01	0.000575	<0.0100	<0.0010
Barium	2	0.0474	0.051	0.042
Beryllium	0.004	0.000199	<0.0200	<0.0020
Cadmium	0.005	0.000164	<0.0010	0.0001
Chromium	0.1	0.00168	<0.0020	<0.0020
Cobalt	0.006	0.000243	**0.008**	<0.004
Fluoride	4	0.387	0.4	0.5
Lead	0.015	0.000137	<0.002	<0.002
Lithium	0.040	**0.678**	**0.79**	**0.68**
Mercury	0.002	<0.000100	<0.0005	<0.0005
Molybdenum	0.1	<0.000873	<0.10	<0.01
Radium 226 (pCi/L) + Radium 228 (pCi/L)	5 pCi/L	0.641	0.873	1.06
Selenium	0.05	0.00103	<0.030	<0.003
Thallium	0.002	0.000860	<0.0020	<0.0020

MW-3A

MW-104				
APPENDIX III	GWPS	3/29/2019	4/10/2019	10/25/2019
Boron	NA	0.188	0.271	<1.00
Calcium	NA	465	502	505
Chloride	NA	1430	1430	1610
Fluoride	4	<0.0100	0.323	0.4
Sulfate	NA	2870	2880	2440
pH (SU)	NA	6.88	6.99	7.03
Total Dissolved Solids	NA	6990	6690	7330
APPENDIX IV				
Antimony	0.006	0.000091	0.000119	<0.005
Arsenic	0.01	0.00221	0.00208	0.0039
Barium	2	0.0243	0.0216	0.030
Beryllium	0.004	<0.000102	<0.000102	<0.0200
Cadmium	0.005	<0.000152	<0.000152	0.0004
Chromium	0.1	0.00471	0.00360	0.0066
Cobalt	0.006	0.00594	0.00522	**0.011**
Fluoride	4	<0.0100	0.3230	0.4
Lead	0.015	0.00105	0.000233	0.003
Lithium	0.040	0.0281	0.0286	0.02
Mercury	0.002	<0.101	<0.101	<0.0005
Molybdenum	0.1	0.00147	0.00104	0.005
Radium 226 (pCi/L) + Radium 228 (pCi/L)	5 pCi/L	0.776	0.319	1.646
Selenium	0.05	<0.000348	<0.000348	<0.003
Thallium	0.002	<0.0000360	<0.0000360	<0.0020

MW-104

MW-6				
APPENDIX III	GWPS	4/22/2019	9/30/2019	4/6/2020
Boron	NA	0.194	<1.00	0.19
Calcium	NA	421	431	458
Chloride	NA	142	230	181
Fluoride	4	0.409	0.5	0.4
Sulfate	NA	2200	3830	4650
pH (SU)	NA	6.86	7.15	6.76
Total Dissolved Solids	NA	4780	4830	4610
APPENDIX IV				
Antimony	0.006	0.0000920	<0.005	<0.005
Arsenic	0.01	0.000722	<0.0100	<0.0010
Barium	2	0.0128	0.010	0.011
Beryllium	0.004	<0.000102	<0.0200	<0.002
Cadmium	0.005	<0.000152	<0.0010	0.0001
Chromium	0.1	0.00196	<0.000020	<0.0020
Cobalt	0.006	0.000276	<0.004	<0.004
Fluoride	4	0.409	0.5	0.4
Lead	0.015	<0.0000675	<0.002	<0.002
Lithium	0.040	**0.0633**	**0.05**	**0.05**
Mercury	0.002	<0.000100	<0.0005	<0.0005
Molybdenum	0.1	0.000972	<0.10	<0.01
Radium 226 (pCi/L) + Radium 228 (pCi/L)	5 pCi/L	0.450	1.246	0.744
Selenium	0.05	0.00110	<0.003	<0.003
Thallium	0.002	0.0000610	<0.0020	<0.0020

MW-6

MW-5				
APPENDIX III	GWPS	4/22/2019	9/30/2019	4/7/2020
Boron	NA	0.271	<1.00	0.25
Calcium	NA	446	476	464
Chloride	NA	931	1500	1860
Fluoride	4	0.128	0.2	0.2
Sulfate	NA	1800	2990	3720
pH (SU)	NA	7.15	7.41	6.94
Total Dissolved Solids	NA	4360	5320	4960
APPENDIX IV				
Antimony	0.006	0.0000700	<0.005	<0.005
Arsenic	0.01	0.000424	<0.0100	<0.0010
Barium	2	0.0167	0.016	0.014
Beryllium	0.004	<0.000102	<0.0200	<0.0020
Cadmium	0.005	<0.000152	<0.0010	<0.0010
Chromium	0.1	0.00159	0.0033	<0.0020
Cobalt	0.006	0.000288	<0.004	<0.004
Fluoride	4	0.128	0.2	0.2
Lead	0.015	0.0000860	<0.002	<0.002
Lithium	0.040	**0.434**	**0.40**	**0.38**
Mercury	0.002	<0.000100	<0.0005	<0.0005
Molybdenum	0.1	<0.000873	<0.10	<0.01
Radium 226 (pCi/L) + Radium 228 (pCi/L)	5 pCi/L	0.945	1.098	1.48
Selenium	0.05	0.000624	<0.003	<0.003
Thallium	0.002	0.0000890	<0.0020	<0.0020

MW-5

MW-4				
APPENDIX III	GWPS	4/22/2019	10/1/2019	4/7/2020
Boron	NA	1.25	1.75	0.83
Calcium	NA	730	690	464
Chloride	NA	1510	1910	1560
Fluoride	4	0.102	0.2	0.2
Sulfate	NA	1440	2490	4000
pH (SU)	NA	7.26	7.36	7.10
Total Dissolved Solids	NA	4840	4820	5120
APPENDIX IV				
Antimony	0.006	0.0000360	<0.005	<0.005
Arsenic	0.01	0.000445	<0.0100	<0.0010
Barium	2	0.0308	0.029	0.022
Beryllium	0.004	<0.000102	<0.0200	<0.0020
Cadmium	0.005	<0.000152	<0.0010	<0.0010
Chromium	0.1	0.00110	<0.0020	0.0008
Cobalt	0.006	0.000415	<0.004	<0.004
Fluoride	4	0.102	0.2	0.2
Lead	0.015	<0.0000675	<0.002	<0.002
Lithium	0.040	**1.73**	<0.20	**0.82**
Mercury	0.002	0.000825	0.0004	0.0003
Molybdenum	0.1	<0.000873	<0.10	0.002
Radium 226 (pCi/L) + Radium 228 (pCi/L)	5 pCi/L	1.66	1.255	1.26
Selenium	0.05	0.00211	<0.003	0.023
Thallium	0.002	0.0000410	<0.0020	<0.0020

MW-4

MW-1
MW-2
MW-3A
MW-104
MW-6
MW-5
MW-4

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Legend

- Property Line
- KAR Permit Area
- CCR Fill Area
- Downgradient CCR Monitoring Well
- Upgradient CCR Monitoring Well
- Characterization Well

All results listed in milligrams per liter (mg/L) unless otherwise noted.
Yellow highlighted values indicate GWPS exceedance.
Orange highlighted analyte indicate SSL above GWPS.
SSL = Statistically Significant Level
GWPS = Groundwater Protection Standard
NA = Not Applicable
ND = Not Detected at or above Method Detection Limit
pCi/L = picoCuries per Liter

N

0 400 800
Feet

Big Rivers ELECTRIC CORPORATION

Green Landfill
Webster County, Kentucky

FIGURE 9.
GROUNDWATER CONDITIONS MAP
2019-2020 ANALYTICAL RESULTS

DATE: 5/13/2020	SCALE: 1IN = 300 FEET
CREATED BY: SEL	
JOB NO. 60619283	

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MW-1
MW-2
MW-3A
MW-104
MW-6
MW-5
MW-4
Green River
Groves Creek
bing
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Legend

- Property Line
- KAR Permit Area
- CCR Fill Area
- Downgradient CCR Monitoring Well
- Upgradient CCR Monitoring Well
- Characterization Well
- Northwest Seep Collection Trench
- Deep Seep Collection Trench

0 400 800
Feet

N

Big Rivers Electric Corporation

Green Landfill
Webster County, Kentucky

FIGURE 10
SEEP COLLECTION TRENCH
LOCATION MAP

DATE: 05/14/2020	SCALE: 1IN = 300 FEET
CREATED BY: SEL	
JOB NO. 60626688	

Appendix A
July 2018 River and Seep Sampling and Analysis Data

TABLE 1

CCR ANALYTICAL SUMMARY
RIVER SEEP AND RIVER SAMPLE EVALUATION

JULY 2018

BIG RIVERS ELECTRIC CORPORATION
GREEN STATION LANDFILL
WEBSTER COUNTY, KENTUCKY

Field Parameters	PRIMARY MCL and CCR LIMITS	Water Quality Criteria (mg/L) Human Health: Domestic Water Supply Source	Human Health: Fish	Warm Water Aquatic Habitat: Acute	Warm Water Aquatic Habitat: Chronic	River Seep-14-71318 Lat 37.661126 Long -87.4894		River Seep-12-71318 Lat 37.61732 Long -87.4936		RiverSeep-16-71318 Lat 37.62167 Long -87.4967		River 01A 71218 Lat 37.64610 Long -87.5059		River 01B 71218 Lat 37.64610 Long -87.5059		RiverSeep-08-71318 Lat 37.62860 Long -87.5003		RiverSeep-07-71218 Lat 37.63299 Long -87.5003		River 02A 71218 Lat 37.63303 Long -87.5002		River 02B 71218 Lat 37.63303 Long -87.5002		RiverSeep-05-71218 Lat 37.63433 Long -87.5003		River 03A 71218 Lat 37.63433 Long -87.5002		River 03B 71218 Lat 37.63433 Long -87.5002		River 04A 71218 Lat 37.63789 Long -87.5004		River 04B 71218 Lat 37.63789 Long -87.5004		River-Seep-04-71218 Lat 37.64122 Long -87.4997	
pH (Field Measurement) SU	NA					7.54		7.37		7.46		7.94		7.94		7.09		7.27		7.91		7.91		6.92		7.94		7.94		7.86		7.86		5.13	
pH (Lab Measurement) SU	NA					8.14		8.00		8.40		7.64		7.62		8.16		8.01		7.45		7.50		7.95		7.50		7.51		7.52		7.53		5.26	
Conductivity (µmhos/cm)	NA					1207		226.2		654		268		268		7674		7715		267.7		267.7		6174		262.2		262.2		265.1		265.1		2545	
Temperature (°F)	NA					88.34		84.0		91.58		82.9		82.9		70.52		79.7		84.2		84.2		94.28		84.2		84.2		82.6		82.6		71.6	
Oxidation-Reduction Potential (m	NA					-92		-98		-48		131		131		29		-123		98		98		-137		133		133		133		133		125	
APPENDIX III CONSTITUENTS																																			
Boron	NA					0.0694	J	0.0379	J	0.0321	J	0.0281	J	0.0252	J	0.510	J	1.46		0.0323	J	0.0322	J	0.853	J	0.0251	J	0.0235	J	0.0229	J	0.0234	J	2.19	
Calcium	NA					171		21.1		93.8		31.8		33.2		801		1120		32.8		35.8		916		34.8		32.6		32.9		34.5		460	
Chloride	NA	250	-	1200	600	22.7		32.7		23.2		4.58	B	4.52	B	2040		1990		6.75	B	6.69	B	1670		5.33	B	5.59	B	4.83	B	4.75	B	189	
Fluoride	4 mg/L	4	-	-	-	0.144	J	0.0803	J	0.177	J	0.111	J	0.105	J	0.0915	J	0.102	J	0.0958	J	0.0979	J	0.0795	J	0.100	J	0.0954	J	0.0948	J	0.0945	J	0.239	J F1
Sulfate	NA	250	-	-	-	159	B	16.1	B	26.5	B	28.5		28.3		1440	B	1480	B	30.6		30.1		1170	B	28.8		28.9		28.6		28.6		1310	B
Total Dissolved Solids	NA	250	-	-	-	790		157		504		169		161		5310		6080		173		170		5140		175		170		174		156		2130	
APPENDIX IV CONSTITUENTS																																			
Antimony	0.006 mg/L	0.0056	0.64	-	-	0.000312	J	0.000499	J	0.000270	J	0.000591	JB	0.000476	JB	0.00141	J	ND		0.00276	B	0.00106	JB	0.000366	J	0.000571	JB	0.000514	JB	0.000504	JB	0.000360	JB	0.000200	J
Arsenic	0.01 mg/L	0.01	-	0.340	0.150	0.0173		0.00467	J	0.0247		0.00124	J	0.00137	J	0.000404	J	0.00182	J	0.00131	J	0.00135	J	0.0192		0.00126	J	0.00131	J	0.00118	J	0.00109	J	0.00188	J
Barium	2 mg/L	1	-	-	-	0.242		0.0757	J	0.190	J	0.0330	J	0.0374	J	0.0443	J	0.0605	J	0.0350	J	0.0396	J	0.718		0.0366	J	0.0362	J	0.0382	J	0.0402	J	0.0384	J
Beryllium	0.004 mg/L	0.004	-	-	-	0.000497	J	0.000145	J	0.000211	J	ND		ND		ND		ND		ND		ND		0.000545	J	ND		ND		ND		ND		0.00372	
Cadmium	0.005 mg/L	0.005	-	0.00235	0.00029	0.000312	J	0.000183	J	0.000196	J	ND		ND		ND		ND		ND		ND		0.000563	J	ND		ND		ND		ND		0.00307	
Chromium	0.1 mg/L	0.1	-	-	-	0.00969		0.00200	J	0.00383		0.000676	J	0.00143	J	0.000560	J	0.000340	J	0.00111	J	0.00155	J	0.0124		0.00112	J	0.00119	J	0.00134	J	0.00105	J	0.00386	
Cobalt	0.006 mg/L					0.0125		0.00581		0.00613		0.000401	J	0.000623	J	0.000691	J	0.0218		0.000730	J	0.000937	J	0.0327		0.000934	J	0.000800	J	0.000841	J	0.000738	J	0.0447	
Fluoride	4 mg/L	4	-	-	-	0.144	J	0.0803	J	0.177	J	0.111	J	0.105	J	0.0915	J	0.102	J	0.0958	J	0.0979	J	0.0795	J	0.100	J	0.0954	J	0.0948	J	0.0945	J	0.239	J F1
Lead	0.015 mg/L	0.015	-	0.092	0.0036	0.0109		0.00221	J	0.00521		0.000994	JB	0.00600	B	0.000769	J	0.000523	J	0.00125	JB	0.00199	JB	0.0104		0.00115	JB	0.00166	JB	0.00141	JB	0.00147	JB	0.00507	
Lithium	0.040 mg/L					0.0126	J	ND		ND		ND		ND		1.80		0.772		ND		ND		0.340		ND		ND		ND		ND		0.0209	J
Mercury	0.002 mg/L	0.002	0.000051	0.0014	0.00077	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
Molybdenum	0.1 mg/L					0.00550	J	0.000948	J	0.00878	J	0.00217	J	0.00130	J	0.00296	J	0.00219	J	0.00222	J	0.00145	J	0.00442	J	0.00105	J	0.00103	J	0.00101	J	0.000981	J	ND	
Radium 226 Radium 228	5 pCi/L	5 pCi/L				NS		1.17		NS		0.417		0.249	U	1.31		1.4		0.554		0.735		7.64		0.404	U	0.391	U	0.544		0.423	U	1.48	
Selenium	0.05 mg/L	0.17	4.2	-	0.005	0.000582	J	ND		0.000906	J	ND		ND	F2	ND		ND		0.000423	J	0.000636	J	0.00121	J	ND		ND		0.000402	J	ND		0.00216	J
Thallium	0.002 mg/L	0.00024	0.00047	-	-	0.000126	J	ND		ND		0.0000500	J	ND		ND		ND		ND		ND		0.000164	J	ND		ND		ND		ND		ND	
IONIC CONSTITUENTS																																			
Total Alkalinity	NA					443		38.2		393		85.6		85.6		174		87.7		85.7		85.8		229		86.1		86.4		80.9		85.8		ND	
Hardness (as mg/L of CaCO3)**	NA					578		74		318		106		110		3198		3010		108		117		2608		115		108		109		114		1411	
Magnesium	NA					36.6		5.20		20.3		6.41		6.62		291		51.8		6.32		6.76		77.8		6.87		6.41		6.45		6.73		63.6	
Potassium	NA					4.96		2.37		4.85		2.68		2.91		125		262		3.01		3.65		285		3.06		2.87		2.85		2.95		9.51	
Sodium	NA					18.5		5.52		26.7		3.79		3.95		274		277		3.98		4.63		285		4.64		4.01		3.87		4.02		42.1	

*All results listed in milligrams per liter (mg/L) unless otherwise noted by the Maximum Contaminant Level (MCL)
NA = Not available
pCi/L = picoCuries per Liter
SU = Standards units
µmhos/cm = microSiems per centimeter
°F = Degrees Fahrenheit
mV = millivolts
ND = Not detected above the Method Detection Limit
J = Result is less than the Reporting Limit but greater than or equal to the Method Detection Limit and the concentration is an approximate value.
B = Compound was found in the blank and sample.
F1 = MS and/or MSD Recovery is outside acceptance limits.
NM = Not measured
U = Result is less than the sample detection limit

Note: River "A" samples collected from surface
River "B" samples collected <1 foot above river bed

** The water hardness is using American degree equivalent to mg/L.
Water hardness(mg/L) = Ca(mg/L)×2.497 + Mg(mg/L)×4.118

Constituent	KY Acute Warm Water Habitat Equation	Hardness (mg/L $CaCO_3$)	Hardness** (mg/L $CaCO_3$)
		50	110
		Criterion (ug/L)	Criterion (ug/L)
Cadmium	Criterion = e(1.0166 (ln Hard*)-3.924)	1.05	2.35
Lead	Criterion = e(1.273 (ln Hard*)-1.460)	34	92

Constituent	KY Chronic Warm Water Habitat Equation	Hardness (mg/L $CaCO_3$)	Hardness** (mg/L $CaCO_3$)
		50	110
		Criterion (ug/L)	Criterion (ug/L)
Cadmium	Criterion = e(0.7409 (ln Hard*)-4.719)	0.16	0.29
Lead	Criterion = e(1.273 (ln Hard*)-4.705)	1.3	3.6

*Hard = Hardness as mg/L $CaCO_3$ **Average hardness concentration from collected River Samples (7/12/18)

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Legend

- Pond Sample
- River Seep Sample
- River Sample
- Downgradient Monitoring Well
- Upgradient Monitoring Well

0 1,450 2,900

Feet

N

Big Rivers Electric Corporation

Green Station Landfill
Webster County, Kentucky

FIGURE 1
RIVER AND SEEP
SAMPLING LOCATIONS

DATE: 9/6/2018	SCALE: 1IN = 1800 FEET
CREATED BY: MRH	
JOB NO. 60579938	

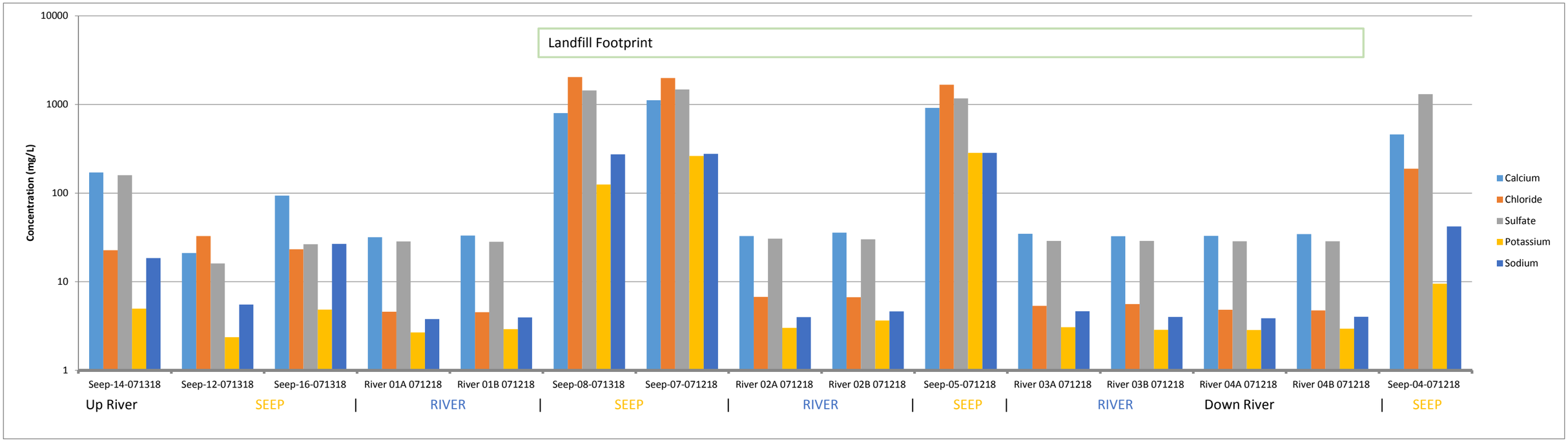

FIGURE 2
CCR ANALYTICAL SUMMARY - GREEN STATION LANDFILL
RIVER SEEP AND RIVER SAMPLE EVALUATION, JULY 2018

8/30/2018

Appendix B
Green Landfill Analytical Summary Tables

GREEN LANDFILL ANALYTICAL SUMMARY TABLES

GREEN LANDFILL - CCR ANALYTICAL SUMMARY
MW-1

APPENDIX III CONSTITUENTS	Detection Limit	GWPS	DATE																									
			3/26/2016		5/23/2016		8/18/2016		10/26/2016		2/1/2017		5/2/2017		8/7/2017		9/5/2017		10/5/2017		6/4/2018		7/10/2018		9/28/2018		4/22/2019		9/30/2019	
			Baseline Events																		Assessment		Re-Sampling		Assessment				
Boron	0.08		1.67		1.49		2.25		1.70		1.71	J	1.68		1.85	B	1.79		1.92				1.41		1.94	B	1.73	B	1.68	D2 M4
Calcium	0.5		29.1		31.8	B	33.0		30.9		20.8		28.1		27.1		29.9	B	26.4				26.5		28.5	B	32.1		29.1	D2
Chloride	3		9.03	JB	0.501	JB	6.60	B	6.02	B	5.56	B F1	5.30	B	5.12	B F1	5.71	B	4.07	F1 B			6.34	B	6.17	B	6.41	B F1	7.5	
Fluoride	1		ND	J	ND	JB	ND	J	ND	JB	ND	J F1	ND	JB	ND	J F1	ND	J	ND	J F1			ND	J	ND	JB	0.521	J	0.6	
Sulfate	5		25.2		22.8	JB	22.9		20.7	B	28.4		24.0	B	25.3	B	23.4		24.9	JB			23.5		22.5	B	35.1	B F1	19	
pH (SU)	0.10		7.39		7.24		7.57		7.19		7.63		7.54		7.45		7.48		7.63				7.08		8.43		7.87		7.79	H3
Total Dissolved Solids	10		598		588		585		585		605		630		614		627		636				585		616		568	B	444	H1
APPENDIX IV CONSTITUENTS																														
Antimony	0.002	0.006 mg/L	ND		ND	J	ND	B	ND		ND		ND	JB	0.00297	B	ND	JB			ND	JB	ND	J	NA		0.000254	JB	ND	M1 V1 U
Arsenic	0.005	0.01 mg/L	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J F1	ND	JB			ND	JB	ND	J	ND	JB	0.00167	JB	0.0005	V1 J
Barium	0.2	2 mg/L	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J F1	ND	J			ND	JB	ND	J	ND	J	0.0862	J	0.091	D2
Beryllium	0.002	0.004 mg/L	ND		ND		ND		ND		ND		ND		ND		ND				ND		ND		NA		0.000533	J	ND	D2 U
Cadmium	0.001	0.005 mg/L	ND		ND		ND		ND		ND		ND		ND		ND				ND		ND		NA		0.000299	J	ND	VI U
Chromimum	0.003	0.1 mg/L	ND		ND	J	ND		ND		ND		ND		ND		ND	J			ND	JB	ND		NA		0.00354	B	ND	U
Cobalt	0.005	0.006 mg/L	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J			ND	JB	ND	J	NA		0.000571	J	ND	U
Fluoride	1	4 mg/L	ND	J	ND	J	ND	J	ND	JB	ND	J F1	ND	JB	ND	J F1	ND	J			ND	J	ND	J	ND	JB	0.521	J	0.6	
Lead	0.005	0.015 mg/L	ND	J	ND	J	ND	J	ND		ND		ND		ND		ND	J			ND		ND	J	NA		0.000279	J	ND	V1 U
Lithium	0.05	0.040 mg/L	0.0293	J	0.0317	J	0.0326	J	0.0286	J	0.0342	J	0.0396	J	0.0314	J	0.0315	J			0.0319	J	0.0298	J	0.0279	J	0.0295	J	ND	D2 M3 U
Mercury	0.0002	0.002 mg/L	ND		ND		ND		ND		ND		ND		ND		ND				ND		ND		ND		ND		ND	V1 U
Molybdenum	0.01	0.1 mg/L	ND		ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND				ND	J	ND	J	NA		0.00105	J	ND	U
Radium 226	1	5 pCi/L	1.05		1.02		0.676		1.02		0.694		0.666		0.491		0.601				1.92		0.882		0.905		0.689		0.782	
Radium 228																													0.733	
Selenium	0.01	0.05 mg/L	ND		ND		ND		ND		ND		ND		ND	J	ND				ND		ND		NA		0.00105	J	ND	U
Thallium	0.001	0.002 mg/L	ND		ND	J	ND		ND	J	ND		ND		ND	J	ND				ND		ND		NA		0.000498	J	0.0001	V1 J

*All results listed in milligrams per liter (mg/L) unless otherwise noted by the Maximum Contaminant Level (MCL)
GWPS = Groundwater Protection Standard
NA = Not Analyzed
ND = Not Detected at or above Method Detection Limit
pCi/L = picoCuries per Liter
J = Result is less than the Reporting Limit but greater than or equal to the Method Detection Limit and the concentration is an approximate value.
B = Compound was found in the blank and sample.
F1 = MS and/or MSD Recovery is outside acceptance limits.
D2 = Sample required dilution due to matrix interference
H1 = Sample analysis performed pasts holding time
H3 = Sample received and analyzed past holding time
M3 = The accuracy of the spike recovery value is reduced since the analyte concentration in the sample is disproportionate to spike level. The method control sample recovery was acceptable
M4 = The analysis of the spike sample required a dilution such that the spike concentration was diluted below the reporting limit. The method control sample recovery was acceptable
U = Target analyte was analyzed for, but was below detection limit
V1 = CCV recovery was above method acceptance limits. This target analyte not detected in the sample

GREEN LANDFILL - CCR ANALYTICAL SUMMARY
MW-2

APPENDIX III CONSTITUENTS	Detection Limit	GWPS	DATE																			
			3/26/2016		5/23/2016		8/18/2016		11/14/2016		2/1/2017		5/2/2017		8/8/2017		9/7/2017		10/6/2017		6/5/2018		7/11/2018		9/28/2018		4/23/2019		10/1/2019	
			Baseline Events																		Assessment		Re-Sampling		Assessment			
Boron	0.08		ND	J	ND	J	ND	J	ND	J	ND	JB	ND	J	0.113	JB	ND	JB	ND	J			ND	J	0.0630	JB	0.101	JB	ND	D2 U
Calcium	0.5		119		116	B	140		140	B	126		152		154		121		150				155		165	B	156		166	D1
Chloride	3		126	B	125	B	129	B	133		142	B	129	B	145	B	136	B	129	B			154	B	159	B	144		108	D
Fluoride	1		ND	J	ND		ND	J	ND	JB F1	ND	J	ND	JB	ND	JB	ND	JB F1	ND	J			ND	J	ND	JB	0.193	J	0.3	
Sulfate	5		80.0		84.5	J	85.5	J	90.1		89.8		83.2		92.0	JB	90.8		88.6	JB			107		108	B	105		79.0	D
pH (SU)	0.10		6.81		6.59		6.7		6.78		7.12		7.04		6.77		6.69		6.86		6.64		6.40		7.02		7.15		7.39	H3
Total Dissolved Solids	10		764		780		830		880		862		918		913		818		970				884		937		918	B	930	H1
APPENDIX IV CONSTITUENTS																														
Antimony	0.002	0.006 mg/L	ND		ND	J	ND	JB	ND	JB	ND		ND	JB	ND	B	ND	JB			ND	JB	ND	J	NA		0.0000670	JB	ND	V1 U
Arsenic	0.005	0.01 mg/L	0.00703	J	0.00633		0.0110		0.0159		0.0462		0.00755		0.0381		0.00527				0.0327	B	0.0119		0.0211	B	0.00738	B	0.0129	D2
Barium	0.2	2 mg/L	ND	J	ND	J	0.280		0.319		0.347		0.332		0.308		ND	J			0.369		0.323		0.367		0.362		0.380	D2
Beryllium	0.002	0.004 mg/L	ND		ND		ND		ND		ND		ND		ND		ND				ND		ND		NA		0.000281	J	ND	D2 U
Cadmium	0.001	0.005 mg/L	ND	J	ND		ND		ND		ND		ND		ND		ND				ND		ND		NA		ND		ND	V1 U
Chromimum	0.003	0.1 mg/L	ND		ND	J	ND		ND		ND		ND		ND		ND				ND	JB	ND		NA		0.00122	JB	ND	D2 U
Cobalt	0.005	0.006 mg/L	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	JB	ND	J			ND	JB	ND	J	NA		0.00382	J	ND	D2 U
Fluoride	1	4 mg/L	ND	J	ND		ND	J	ND	JB F1	ND	J	ND	JB	ND	JB	ND	JB F1			ND	J	ND	J	ND	JB	0.193	J	0.3	
Lead	0.005	0.015 mg/L	ND		ND		ND		ND		ND		ND		ND		ND				ND		ND	J	NA		ND		ND	V1 U
Lithium	0.05	0.040 mg/L	ND	J	ND		ND		ND		ND	J	ND	J	ND	JB	ND				ND		ND		ND		ND		ND	D2 VI U
Mercury	0.0002	0.002 mg/L	ND		ND		ND		ND		ND		ND		ND		ND				ND		ND		ND		ND		ND	V1 U
Molybdenum	0.01	0.1 mg/L	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	JB	ND	JB			ND	J	ND	J	NA		0.00210	J	0.003	J
Radium 226	1	5 pCi/L	0.533		ND		0.46		ND		0.856		0.73		0.968		0.537				1.18		0.733		0.803		0.391		0.136	
Radium 228																													0.834	
Selenium	0.01	0.05 mg/L	ND		ND		ND		ND	JB	ND		ND		ND	JB	ND				ND		ND		NA		ND		ND	U
Thallium	0.001	0.002 mg/L	ND		ND	J	ND		ND		ND		ND		ND		ND				ND		ND		NA		0.0000800	J	ND	V1 U

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NA = Not Analyzed
ND = Not Detected at or above Method Detection Limit
pCi/L = picoCuries per Liter
J = Result is less than the Reporting Limit but greater than or equal to the Method Detection Limit and the concentration is an approximate value.
B = Compound was found in the blank and sample.
F1 = MS and/or MSD Recovery is outside acceptance limits.
D1 = Sample required dilution due to high concentration of target analyte
D2 = Sample required dilution due to matrix interference
H1 = Sample analysis performed pasts holding time
H3 = Sample received and analyzed past holding time
U = Target analyte was analyzed for, but was below detection limit
V1 = CCV recovery was above method acceptance limits. This target analyte not detected in the sample

GREEN LANDFILL - CCR ANALYTICAL SUMMARY
MW-3A

APPENDIX III CONSTITUENTS	Detection Limit	GWPS	DATE																					
			3/26/2016		5/23/2016		8/18/2016		11/14/2016		2/1/2017		5/2/2017		8/8/2017		9/6/2017		10/6/2017		6/5/2018		7/11/2018		9/28/2018		4/23/2019		10/1/2019	
			Baseline Events																		Assessment		Re-Sampling		Assessment			
Boron	0.08		0.145		0.135	J	0.279	J	0.213	J	0.235	JB	0.232	J	0.304	JB	0.376	J	0.313				0.177	J	0.257	JB	0.259	JB	ND	D2 U
Calcium	0.5		431		322	B	362		365	B	327		420		421		438	B	408				469		447	B	411		490	D1
Chloride	3		2630	HB	3070		2150	B	2150	B	2220	B	2120	B	1790	B	2270	B	1870	B			2180	B	2040	B	1850		4570	D
Fluoride	1		ND	J	ND	J	ND	J	ND	JB	ND	J	ND	JB	ND		3.16		ND	J			ND	J	ND	JB	0.387	J	0.4	
Sulfate	5		1330		1330		1190		1660		1080		1030	B	942		1130		1030	B			1010		1130	B	1080		1680	D
pH (SU)	0.10		6.92		6.86		6.95		6.75		7.17		7.11		6.81		6.9		6.95		6.84		6.55		7.98		7.23		7.33	H3
Total Dissolved Solids	10		4440		5010		4170		4450		4270		5170		5010		5020		5300				4540		4940		4250	B	6900	H1
APPENDIX IV CONSTITUENTS																														
Antimony	0.002	0.006 mg/L	ND		ND	J	ND	JB	ND	JB	ND		ND	JB	ND	JB	ND	JB			ND	JB	ND		NA		0.000102	JB	ND	V1 U
Arsenic	0.005	0.01 mg/L	ND		ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	JB			ND	JB	ND	J	ND	JB	0.000575	JB	ND	D2 U
Barium	0.2	2 mg/L	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J			ND	J	ND	J	ND	J	0.0474	J	0.051	D2 U
Beryllium	0.002	0.004 mg/L	ND		ND		ND		ND		ND		ND		ND		ND				ND		ND		NA		0.000199	J	ND	D2 U
Cadmium	0.001	0.005 mg/L	ND	J	ND	J	ND		ND		ND	J	ND	J	ND		ND				ND	J	ND	J	NA		0.000164	J	ND	V1 U
Chromimum	0.003	0.1 mg/L	ND		ND	J	ND		ND		ND		ND		ND		ND	J			ND	JB	ND		NA		0.00168	JB	ND	D2 U
Cobalt	0.005	0.006 mg/L	ND		ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J			ND	JB	ND	J	NA		0.000243	J	0.008	
Fluoride	1	4 mg/L	ND	J	ND	J	ND	J	ND	JB	ND	J	ND	JB	ND		3.16				ND	J	ND	J	ND	JB	0.387	J	0.4	
Lead	0.005	0.015 mg/L	ND	J	ND		ND		ND		ND		ND		ND	J	ND	J			ND		ND	J	NA		0.000137	J	ND	V1 U
Lithium	0.05	0.040 mg/L	0.669		0.516		0.648		0.677		0.689		0.746		0.767		0.762				0.699		0.790		0.766		0.678		0.79	D1
Mercury	0.0002	0.002 mg/L	ND		ND		ND		ND		ND		ND		ND		ND				ND		ND		ND		ND		ND	V1 U
Molybdenum	0.01	0.1 mg/L	ND		ND	J	ND		ND		ND		ND		ND		ND				ND		ND		NA		ND		ND	D2 U
Radium 226	1	5 pCi/L	1.38		0.386		0.472		1.15		1.15		0.923		1.53		1.03				1.18		1.43		1.21		0.641		0.139	
Radium 228																													0.734	
Selenium	0.01	0.05 mg/L	ND		ND		ND	J	ND	JB	ND		ND		ND		ND				ND	J	ND		NA		0.00103	J	ND	D2 U
Thallium	0.001	0.002 mg/L	ND		ND	J	ND		ND		ND		ND		ND		ND	J			ND		ND		NA		0.000860	J	ND	V1 U

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GREEN LANDFILL - CCR ANALYTICAL SUMMARY
MW-4

APPENDIX III CONSTITUENTS	Detection Limit	GWPS	DATE																					
			3/29/2016		5/23/2016		8/18/2016		10/26/2016		2/1/2017		5/2/2017		8/8/2017		9/7/2017		10/6/2017		6/5/2018		7/11/2018		9/28/2018		4/22/2019		10/1/2019	
			Baseline Events																		Assessment		Re-Sampling				Assessment			
Boron	0.08		0.602		0.498	J	1.58		1.7		1.54	B	2.09		2.51	B	2.87	B	1.36				0.751	J	1.33	B	1.25	B	1.75	D2
Calcium	0.5		660		386	B	464		558		591		774		743		739		828				822		722	B	730		690	D1
Chloride	3		1450	B	939	B	952	B	1000	B	1420	B	1320	B	1360	B	1880	B	1730	B			1430	B	1310	B	1510		1910	D
Fluoride	1		ND	J	ND		ND	J	ND	JB	ND	J	1.06	B	ND		ND	JB	ND	J			ND	J	ND	JB	0.102	J	0.2	
Sulfate	5		1830		1640		1420		1420	B	1620		1430	B	1600	B	2020		1590	B			1460		1400	B	1440		2490	D
pH (SU)	0.10		6.36		6.83		7.08		6.61		7.28		7.1		6.84		6.64		6.93		6.86		6.58		8.06		7.26		7.36	H3
Total Dissolved Solids	10		3700		4250		3440		3250		4420		4550		4890		4700	H	6220				4880		5170		4840	B	4820	H1
APPENDIX IV CONSTITUENTS																														
Antimony	0.002	0.006 mg/L	ND		ND	J	ND	JB	ND		ND		ND	JB	ND	JB	ND	JB			ND	JB	ND		NA		0.0000360	JB	ND	V1 U
Arsenic	0.005	0.01 mg/L	ND		ND	J	ND	J	ND		ND	J	ND	J	ND	J	ND	JB			ND	JB	ND	J	ND	JB	0.000445	JB	ND	D2 U
Barium	0.2	2 mg/L	ND	J	ND	J	ND	J	ND	JB	ND	J	ND	J	ND	J	ND	JB			ND	J	ND	J	ND	J	0.0308	JB	0.029	D2 J
Beryllium	0.002	0.004 mg/L	ND		ND		ND		ND		ND		ND		ND		ND				ND		ND		NA		ND		ND	D2 U
Cadmium	0.001	0.005 mg/L	ND	J	ND		ND		ND		ND		ND		ND		ND				ND		ND		NA		ND		ND	V1 U
Chromimum	0.003	0.1 mg/L	ND		ND	J	ND		ND		ND		ND		ND		ND				ND	JB	ND		NA		0.00110	JB	ND	D2 U
Cobalt	0.005	0.006 mg/L	ND		ND	J	ND		ND		ND		ND		ND		ND				ND	JB	ND	J	NA		0.000415	J	ND	U
Fluoride	1	4 mg/L	ND		ND		ND	J	ND	JB	ND	J	ND	B	ND		ND	JB			ND	J	ND	J	ND	JB	0.102	J	0.2	
Lead	0.005	0.015 mg/L	ND	J	ND	J	ND		ND		ND		ND		ND		ND				ND		ND	J	NA		ND		ND	V1 U
Lithium	0.05	0.040 mg/L	1.39		0.838		1.13		1.25		1.35		1.59		1.77		1.66				1.81		1.91		1.81		1.73		ND	D2 V1 U
Mercury	0.0002	0.002 mg/L	0.00027		0.000224		ND	J	0.000248		0.000302		0.000717		0.000825		0.000485				0.000824		0.000832		0.000680		0.000825		0.0004	V1 J
Molybdenum	0.01	0.1 mg/L	ND	J	ND	J	ND		ND		ND	J	ND		ND		ND				ND		ND		NA		ND		ND	D2 U
Radium 226	1	5 pCi/L	1.26		0.592		ND		0.536		1.22		1.43		1.94		1.19				1.62		2.00		1.51		1.66		0.451	
Radium 228																													0.804	
Selenium	0.01	0.05 mg/L	ND	J	ND	J	ND	J	ND		ND	J	ND		ND		ND	J			ND	J	ND		NA		0.00211	J	ND	U
Thallium	0.001	0.002 mg/L	ND		ND		ND		ND	J	ND		ND		ND		ND				ND		ND		NA		0.0000410	J	ND	V1 U

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H1 = Sample analysis performed pasts holding time
H3 = Sample received and analyzed past holding time
U = Target analyte was analyzed for, but was below detection limit
V1 = CCV recovery was above method acceptance limits. This target analyte not detected in the sample

GREEN LANDFILL - CCR ANALYTICAL SUMMARY
MW-5

APPENDIX III CONSTITUENTS	Detection Limit	GWPS	DATE																			
			3/29/2016		5/23/2016		8/18/2016		10/26/2016		2/1/2017		5/2/2017		8/7/2017		9/7/2017		10/6/2017		6/5/2018		7/11/2018		9/28/2018		4/22/2019		9/30/2019	
			Baseline Events																		Assessment		Re-Sampling		Assessment				
Boron	0.08		0.217		0.0896	J	0.216	J	0.214	J	0.222	JB	0.241	J	0.257	JB	0.276	B	0.262				0.207	J	0.263	JB	0.271	JB	ND	D2 U
Calcium	0.5		452		189	B	374		399		335		464		423		407	B	383				469		441	B	446		476	D1
Chloride	3		1630	B	521		688	B	755	B	734	B	722	B	945	B	779	B	608	B			941	B	1140	B	931		1500	D
Fluoride	1		ND	J	ND		ND	J	ND		ND	J	ND	JB	ND		3.69		ND	J			ND	J	ND	JB	0.128	J	0.2	
Sulfate	5		1760	HB	876		1780		1740	B	1880		1760	B	2060	B	1920		1600	B			1800		1890	B	1800		2990	D
pH (SU)	0.10		6.76		6.74		6.99		6.61		7.14		7.44		6.87		7.13		7.06		6.88		6.40		7.99		7.15		7.41	H3
Total Dissolved Solids	10		4210		1660		3470		3610		3680		4250		4130		4120		4390				4100		4540		4360	B	5320	H1
APPENDIX IV CONSTITUENTS																														
Antimony	0.002	0.006 mg/L	ND		ND	J	ND	JB	ND		ND		ND	JB	ND	JB	ND	JB			ND	JB	ND		NA		0.0000700	JB	ND	V1 U
Arsenic	0.005	0.01 mg/L	ND		ND	J	ND	JB	ND	J	ND	J	ND	J	ND	J	ND	JB			ND	JB	ND	J	ND	JB	0.000424	JB	ND	D2 U
Barium	0.2	2 mg/L	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J			ND	J	ND	J	ND	J	0.0167	J	0.016	D2 J
Beryllium	0.002	0.004 mg/L	ND		ND		ND	J	ND		ND		ND		ND		ND				ND		ND		NA		ND		ND	D2 U
Cadmium	0.001	0.005 mg/L	ND	J	ND		ND		ND		ND		ND		ND		ND				ND		ND		NA		ND		ND	V1 U
Chromimum	0.003	0.1 mg/L	ND		ND	J	ND		ND		ND	J	ND	J	ND		ND	J			0.00363	B	ND		NA		0.00159	JB	0.0033	
Cobalt	0.005	0.006 mg/L	ND		ND	J	ND	J	ND	J	ND		ND	J	ND		ND	J			ND	JB	ND	J	NA		0.000288	J	ND	U
Fluoride	1	4 mg/L	ND	J	ND		ND	J	ND		ND	J	ND		ND		3.69				ND	J	ND	J	ND	JB	0.128	J	0.2	
Lead	0.005	0.015 mg/L	ND	J	ND	J	ND		ND		ND		ND		ND		ND				ND	J	ND	J	NA		0.0000860	J	ND	V1 U
Lithium	0.05	0.040 mg/L	0.521		0.136		0.305		0.325		0.368		0.415		0.405		0.353				0.459		0.481		0.425		0.434		0.40	D1
Mercury	0.0002	0.002 mg/L	ND		ND		ND		ND		ND		ND		0.00351		ND				ND		ND		ND		ND		ND	V1 U
Molybdenum	0.01	0.1 mg/L	ND		ND	J	ND		ND		ND		ND		ND		ND				ND		ND		NA		ND		ND	D2 U
Radium 226	1	5 pCi/L	1.16		0.736		0.959		0.957		0.765		0.888		1.54		0.773				0.862		1.42		1.37		0.945		0.368	
Radium 228																													0.730	
Selenium	0.01	0.05 mg/L	ND		ND		ND		ND		ND	J	ND	J	ND		ND				ND	J	ND		NA		0.000624	J	ND	U
Thallium	0.001	0.002 mg/L	ND		ND		ND	J	ND	J	ND		ND	J	ND		ND	J			ND	J	ND		NA		0.0000890	J	ND	V1 U

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D1 = Sample required dilution due to high concentration of target analyte
D2 = Sample required dilution due to matrix interference
H1 = Sample analysis performed pasts holding time
H3 = Sample received and analyzed past holding time
U = Target analyte was analyzed for, but was below detection limit
V1 = CCV recovery was above method acceptance limits. This target analyte not detected in the sample

GREEN LANDFILL - CCR ANALYTICAL SUMMARY
MW-6

APPENDIX III CONSTITUENTS	Detection Limit	GWPS	DATE																					
			3/29/2016		5/23/2016		8/18/2016		10/26/2016		2/1/2017		5/2/2017		8/7/2017		9/5/2017		10/5/2017		6/4/2018		7/10/2018		9/28/2018		4/22/2019		9/30/2019	
			Baseline Events																		Assessment		Re-Sampling				Assessment			
Boron	0.08		0.156		0.137	J	0.193	J	0.168	J	0.173	B	0.179	J	0.167	JB	0.199	J	0.178				0.155	J	0.196	JB	0.194	JB	ND	D2 U
Calcium	0.5		467		374	B	373		400		320		415		365		382	B	376				386		356	B	421		431	D1
Chloride	3		167	B	149	B	136	JB	150	B	125	B	129	B	128	B	123	B	138	B			147	B	142	B	142		230	D
Fluoride	1		ND	J	ND	J	ND	J	ND	JB	ND	J	ND	JB	ND		ND	J	ND	J			ND	J	ND	JB	0.409	J	0.5	
Sulfate	5		2250	HB	3340		2550		2610	B	2700		2600	B	2820	B	2490		2700	B			2120		2420		2200		3830	D
pH (SU)	0.10		6.66		6.65		6.96		6.6		6.92		6.97		6.76		6.95		6.86				6.50		7.94		6.86		7.15	H3
Total Dissolved Solids	10		4060		4280		4350		4470		4720		4700		4830		4890		4910				4500		4820		4780	B	4830	H1
APPENDIX IV CONSTITUENTS																														
Antimony	0.002	0.006 mg/L	ND		ND	J	ND	JB	ND		ND		ND	JB	ND	JB	ND	JB			ND	JB	ND		NA		0.0000920	JB	ND	V1 U
Arsenic	0.005	0.01 mg/L	ND		ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	JB			ND	JB	ND	J	ND	JB	0.000722	JB	ND	V1 U
Barium	0.2	2 mg/L	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J			ND	J	ND	J	ND	J	0.0128	J	0.010	D2 J
Beryllium	0.002	0.004 mg/L	ND		ND		ND		ND		ND		ND		ND		ND				ND		ND		NA		ND		ND	D2 U
Cadmium	0.001	0.005 mg/L	ND		ND		ND		ND		ND		ND		ND		ND				ND		ND		NA		ND		ND	V1 U
Chromimum	0.003	0.1 mg/L	ND		ND	J	ND		ND		ND		ND		ND		ND	J			ND	JB	ND		NA		0.00196	JB	ND	U
Cobalt	0.005	0.006 mg/L	ND		ND	J	ND	J	ND	J	ND	J	ND	J	ND	J	ND	J			ND	JB	ND	J	NA		0.000276	J	ND	U
Fluoride	1	4 mg/L	ND	J	ND	J	ND	J	ND	JB	ND	J	ND	JB	ND		ND	J			ND	J	ND	J	ND	JB	0.409	J	0.5	
Lead	0.005	0.015 mg/L	ND	J	ND	J	ND		ND		ND		ND		ND		ND				ND		ND	J	NA		ND		ND	V1 U
Lithium	0.05	0.040 mg/L	0.0475	J	0.0527		0.0555		0.0524		0.0607		0.0724		0.0589		0.0554				0.0650		0.0592		0.0558		0.0633		0.05	D2 V1 J
Mercury	0.0002	0.002 mg/L	ND		ND		ND		ND		ND		ND		ND		ND				ND		ND		ND		ND		ND	V1 U
Molybdenum	0.01	0.1 mg/L	ND	J	ND	J	ND	J	ND	B	ND	J	ND	J	ND	J	ND	J			ND	J	ND	J	NA		0.000972	J	ND	D2 U
Radium 226	1	5 pCi/L	0.741		0.386		ND		0.751		ND		ND		0.462		ND				0.392		0.532		ND	U	0.450		0.548	
Radium 228																													0.698	
Selenium	0.01	0.05 mg/L	ND		ND		ND		ND		ND		ND		ND		ND				ND	J	ND		NA		0.00110	J	ND	U
Thallium	0.001	0.002 mg/L	ND		ND	J	ND		ND		ND		ND		ND		ND				ND		ND		NA		0.0000610	J	ND	V1 U

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D1 = Sample required dilution due to high concentration of target analyte
D2 = Sample required dilution due to matrix interference
H1 = Sample analysis performed pasts holding time
H3 = Sample received and analyzed past holding time
U = Target analyte was analyzed for, but was below detection limit
V1 = CCV recovery was above method acceptance limits. This target analyte not detected in the sample

GREEN LANDFILL - CCR ANALYTICAL SUMMARY
MW-104

APPENDIX III CONSTITUENTS	Detection Limit	GWPS	DATE					
			3/29/2019		4/10/2019		10/25/2019	
			Characterization					
Boron	0.08		0.1880	JB	0.2710	JB	ND	D2, U
Calcium	0.5		465	B	502		505	D1
Chloride	3		1430		1430	B	1610	D
Fluoride	1		ND		0.3230	JB	0.4	
Sulfate	5		2870		2880	B	2440	D
pH (Field Measurement)	0.10		6.88		6.99		6.86	
Total Dissolved Solids	10		6990		6690		7330	
APPENDIX IV CONSTITUENTS								
Antimony	0.002	0.006 mg/L	0.0001	JB	0.0001	JB	ND	U
Arsenic	0.005	0.01 mg/L	0.0022	J	0.0021	J	0.0039	
Barium	0.2	2 mg/L	0.0243	J	0.0216	JB	0.030	
Beryllium	0.002	0.004 mg/L	ND		ND		ND	U
Cadmium	0.001	0.005 mg/L	ND		ND		0.0004	J
Chromium	0.003	0.1 mg/L	0.0047	B	0.0036		0.0066	
Cobalt	0.005	0.006 mg/L	0.0059	B	0.0052		0.011	
Fluoride	1	4 mg/L	ND		0.3230	JB	0.4	
Lead	0.005	0.015 mg/L	0.0011	J	0.0002	J	0.003	
Lithium	0.05	0.040 mg/L	0.0281	J	0.0286	J	0.02	
Mercury	0.0002	0.002 mg/L	ND		ND	^	ND	U
Molybdenum	0.01	0.1 mg/L	0.0015	J	0.0010	J	0.005	J
Radium 226	1	5 pCi/L	0.7760		0.3190	U	0.126	
Radium 228							1.52	
Selenium	0.01	0.05 mg/L	ND		ND		ND	U
Thallium	0.001	0.002 mg/L	ND		ND		ND	U

*All results listed in milligrams per liter (mg/L) unless otherwise noted by the Maximum Contaminant Level (MCL)
GWPS = Groundwater Protection Standard
ND = Not Detected at or above Method Detection Limit
pCi/L = picoCuries per Liter
J = Result is less than the Reporting Limit but greater than or equal to the Method Detection Limit and the concentration is an approximate value.
B = Compound was found in the blank and sample.
D1 = Sample required dilution due to high concentration of target analyte
D2 = Sample required dilution due to matrix interference
U = Target analyte was analyzed for, but was below detection limit

Appendix C
Green Landfill Statistical Procedures and Results

1.0 GREEN LANDFILL STATISTICAL PROCEDURES AND RESULTS

The Appendix III and IV groundwater quality data for the Green Landfill were evaluated using an interwell approach that statistically compared constituent concentrations at downgradient compliance monitoring wells to those present at a background monitoring well. For the Green Landfill, monitoring well MW-1 is designated as the background well because it is located upgradient, whereas monitoring wells MW-2, MW-3A, MW-4, MW-5, and MW-6 are designated as compliance wells because they are located downgradient.

The statistical analyses were performed in accordance with the U.S. Environmental Protection Agency's Final CCR Rule 40 CFR Parts 257.93(f), 257.93(g), and 257.93(h) and the Groundwater Monitoring System and Statistical Methods Certification. Prediction limits (i.e., parametric or nonparametric) with 1 of 2 retesting were developed for each constituent based on the frequency of non-detect values and whether the background data for that constituent exhibited a normal, lognormal, or nonparametric distribution. For the statistical analysis, non-detect values were represented as one-half the detection limit. No outliers were identified in the background data. Analytical data from the background monitoring wells collected between March 2016 and October 2019 were used to develop an upper prediction limit (UPL) for the Appendix III and IV background data at 95 percent confidence. Data from the downgradient monitoring wells for the same time period were compared to the UPL to identify statistically significant increases (SSIs) over background. Mann-Kendall trend analysis was used to identify statistically significant increasing trends for constituents with SSIs. ProUCL Version 5.1 was used to store the data and run the statistical analyses. The results of the analyses, including the UPLs, are provided in **Tables C1** and **C2**.

The statistical analysis results indicate that Appendix III constituents calcium, chloride, sulfate, and total dissolved solids (TDS) at monitoring wells MW-2, MW-3A, MW-4, MW-5, and MW-6 have SSIs over background (**Table C3**) that were confirmed by subsequent sampling events. Boron, fluoride, and pH did not have any verified SSIs over background. pH at MW-6 had a verified SSI below the background lower prediction limit (LPL). Based on these results, assessment monitoring was conducted at the landfill. Statistical analysis of the April and October 2019 Appendix IV assessment monitoring results indicate that arsenic and barium at monitoring well MW-2, lithium at monitoring wells MW-3A, MW-4, MW-5, and MW-6, and mercury at monitoring well MW-4 have verified SSIs over background (**Table C4**).

The Appendix IV constituents with SSIs were further evaluated to determine whether they are present at statistically significant levels (SSLs) over the groundwater protection standards (GWPS) by calculating the lower confidence limit at 95% confidence (95LCL) for each well and constituent identified as a SSI using the baseline, detection, and assessment monitoring results collected to date. For a constituent to be present at a SSL over the GWPS, its 95LCL must be greater than the GWPS. **Table C5** provides a summary of the 95LCLs and GWPS for arsenic, barium, lithium, and mercury at monitoring wells MW-2, MW-3A, MW-4, MW-5, and MW-6. The results indicate that lithium at monitoring wells MW-3A, MW-4, MW-5, and MW-6 (yellow highlight) is present as a SSL above the GWPS. The LCLs for the remaining wells and constituents (arsenic, barium, and mercury) are less than the GWPS and thus are not considered SSLs.

Table C1. Well MW-1 Appendix III Constituents Background Upper Prediction Limits

Parameter (Units)	Number of Samples	Percent Non-detects	Normal or Lognormal Distribution?	Statistical Test	Background Limit
Boron (mg/L)	13	0	Yes/Yes	Parametric	2.122
Calcium (mg/L)	13	0	Yes/Yes	Parametric	35
Chloride (mg/L)	13	0	Yes/No	Parametric	9.3
Fluoride (mg/L)	13	0	No/No	Nonparametric	0.89
pH (std units)	13	0	Yes/Yes	Parametric	6.99/7.93
Sulfate (mg/L)	13	0	Yes/Yes	Parametric	33
TDS (mg/L)	13	0	No/No	Nonparametric	636

Note: pH has both a lower prediction limit (LPL) and upper prediction limit (UPL); all other constituents are represented as UPLs

Table C2. Well MW-1 Appendix IV Constituents Background Upper Prediction Limits

Parameter (Units)	Number of Samples	Percent Non-detects	Normal or Lognormal Distribution?	Statistical Test	Background Limit
Antimony (mg/L)	13	31	No/No	Nonparametric	0.003
Arsenic (mg/L)	12	0	No/No	Nonparametric	0.0026
Barium (mg/L)	12	0	Yes/Yes	Parametric	0.098
Beryllium (mg/L)	12	92	No/No	Nonparametric	0.002
Cadmium (mg/L)	12	92	No/No	Nonparametric	0.001
Chromium (mg/L)	12	62	Yes/Yes	Parametric	0.0024
Cobalt (mg/L)	12	8	Yes/Yes	Parametric	0.0014
Fluoride (mg/L)	13	0	No/No	Nonparametric	0.89
Lead (mg/L)	13	46	Yes/No	Parametric	0.0003
Lithium (mg/L)	12	8	Yes/Yes	Parametric	0.037
Mercury (mg/L)	13	100	No/No	Nonparametric	0.0002
Molybdenum (mg/L)	13	31	No/No	Nonparametric	0.01
Ra-226+228 (pCi/L)	12	0	No/Yes	Parametric	1.74
Selenium (mg/L)	12	85	No/No	Nonparametric	0.01
Thallium (mg/L)	13	61	No/No	Nonparametric	0.0006

Note: The UPL for constituents with 100 percent nondetects (Be, Cd, and Hg) is established as the maximum laboratory analytical reporting limit.

Table C3. Big Rivers Green Landfill Appendix III SSI Summary

Well	Location	B	Ca	Cl	F	pH (LPL/UPL)		SO4	TDS
MW-1	Upgradient	P	P	P	NP	P	P	P	NP
MW-2	Downgradient								
MW-3A	Downgradient								
MW-4	Downgradient								
MW-5	Downgradient								
MW-6	Downgradient								

Notes:

SSIs determined using interwell prediction limits; MW-8 is upgradient background well

P = parametric prediction limit; NP = nonparametric prediction limit

Less than or equal to background upper prediction limit (UPL) or greater than lower prediction limit (LPL) for pH

Statistically significant increase (SSI) over background UPL or below background LPL for pH

Table C4. Big Rivers Green Landfill Appendix IV SSI Summary

Well	Location	Sb	As	Ba	Be	Cd	Cr	Co	F	Pb	Li	Hg	Mo	Ra-226+228	Se	Tl
MW-1	Upgradient	NP	Np	P	NP	NP	P	P	NP	Pb	P	NP	NP	P	NP	NP
MW-2	Downgradient															
MW-3A	Downgradient															
MW-4	Downgradient															
MW-5	Downgradient															
MW-6	Downgradient															

Notes:

SSIs determined using interwell prediction limits; MW-8 is upgradient background well

P = parametric prediction limit; NP = nonparametric prediction limit

Less than or equal to background upper prediction limit (UPL) or greater than lower prediction limit (LPL) for pH

Statistically significant increase (SSI) over background UPL or below background LPL for pH

Table C5. Summary of LCLs and GWPS for Arsenic, Barium, Lithium, and Mercury

Well	Parameter	95%LCL (mg/L)	GWPS (mg/L)
MW-2	Arsenic	0.008	0.01
MW-2	Barium	0.25	2.0
MW-3A	Lithium	**0.65**	0.04
MW-3A	Mercury	0.0001	0.002
MW-4	Lithium	**1.04**	0.04
MW-5	Lithium	**0.32**	0.04
MW-6	Lithium	**0.055**	0.04

95%LCL = lower confidence limit at 95% confidence. Yellow highlighted results exhibit a statistically significant level (SSL) above the GWPS.

Appendix D
Green Landfill – April 2020 Groundwater Analytical Data

Pace Analytical Services, LLC
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Certificate of Analysis
0041376

Chad Phillips
Big Rivers Electric Corporation Reid/Green Station
PO Box 24
Henderson KY, 42419

Customer ID: 44-102032
Report Printed: 04/30/2020 14:59

Project Name:	Green Landfill Semiannual Groundwater	Workorder:	0041376

Dear Chad Phillips

Enclosed are the analytical results for samples received at one of our laboratories on 04/07/2020 15:49.

Pace Analytical Services LLC Kentucky is a commercial laboratory accredited by various state and national authorities, including Indiana, Kentucky, Tennessee, and Virginia's National Environmental Laboratory Accreditation Program (NELAP). With the NELAP accreditation, applicable test results are certified to meet the requirements of the National Environmental Laboratory Accreditation Program.

If you have any questions concerning this report please contact the individual listed below.

Please note that this certificate of analysis may not be reproduced without the written consent of Pace Analytical Services, LLC Kentucky.

#460210 Madisonville, KY
#460293 Pikeville, KY

Rob Whittington, Project Manager

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Pace Analytical Services, LLC
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Madisonville, KY 42431
270.821.7375
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SAMPLE SUMMARY

Lab ID	Client Sample ID/Alias	Matrix	Date Collected	Date Received	Sampled By
0041376-01	MW1/	Groundwater	04/06/2020 13:05	04/07/2020 15:49	Phillip Hill
0041376-02	MW2/	Groundwater	04/07/2020 11:40	04/07/2020 15:49	Phillip Hill
0041376-03	MW3A/	Groundwater	04/07/2020 13:55	04/07/2020 15:49	Phillip Hill
0041376-04	MW4/	Groundwater	04/07/2020 09:55	04/07/2020 15:49	Phillip Hill
0041376-05	MW5/	Groundwater	04/07/2020 10:10	04/07/2020 15:49	Phillip Hill
0041376-06	MW6/	Groundwater	04/06/2020 14:20	04/07/2020 15:49	Phillip Hill
0041376-07	DUPLICATE/	Groundwater	04/07/2020 10:20	04/07/2020 15:49	Phillip Hill
0041376-08	FIELD BLANK/	Water	04/07/2020 11:50	04/07/2020 15:49	Phillip Hill

LabNumber	Measurement	Value
0041376-01	Field Conductance	867
	Field pH	7.22
	Field Temp (C)	18.23
0041376-02	Field Conductance	1590
	Field pH	6.92
	Field Temp (C)	16.86
0041376-03	Field Conductance	8090
	Field pH	6.92
	Field Temp (C)	16.86
0041376-04	Field Conductance	6770
	Field pH	6.70
	Field Temp (C)	16.47
0041376-05	Field Conductance	6250
	Field pH	6.77
	Field Temp (C)	14.85
0041376-06	Field Conductance	5010
	Field pH	6.36
	Field Temp (C)	20.50
0041376-07	Field Conductance	6770
	Field pH	6.70
	Field Temp (C)	16.47

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ANALYTICAL RESULTS

Lab Sample ID: **0041376-01**
Description: **MW1**

Sample Collection Date Time: 04/06/2020 13:05
Sample Received Date Time: 04/07/2020 15:49

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Antimony	ND	U	mg/L	0.005	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:13	DMH
Arsenic	**0.0019**		mg/L	0.0010	0.0004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:13	DMH
Barium	**0.087**		mg/L	0.004	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:13	DMH
Beryllium	ND	U	mg/L	0.0020	0.0010	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:13	DMH
Boron	**1.69**	D1, M3	mg/L	1.00	1.00	SW846 6010 B	04/09/2020 07:40	04/12/2020 16:42	DMH
Cadmium	ND	U	mg/L	0.0010	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:13	DMH
Calcium	**27.7**	D1, M3	mg/L	4.00	1.30	SW846 6010 B	04/09/2020 07:40	04/12/2020 16:42	DMH
Chromium	**0.0011**	J	mg/L	0.0020	0.0006	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:13	DMH
Cobalt	ND	U	mg/L	0.004	0.004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:13	DMH
Copper	ND	U	mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:13	DMH
Iron	**1.57**		mg/L	0.100	0.050	SW846 6010 B	04/09/2020 07:40	04/12/2020 16:39	DMH
Lead	ND	U	mg/L	0.002	0.0005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:13	DMH
Lithium	**0.03**		mg/L	0.02	0.005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:13	DMH
Mercury	ND	U	mg/L	0.0005	0.0002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:13	DMH
Molybdenum	ND	U	mg/L	0.01	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:13	DMH
Selenium	ND	U	mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:13	DMH
Sodium	**206**	D1, M3	mg/L	26.0	10.0	SW846 6010 B	04/09/2020 07:40	04/12/2020 16:46	DMH
Thallium	**0.0001**	J	mg/L	0.0020	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:13	DMH

Conventional Chemistry Analyses Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chemical Oxygen Demand	ND	U	mg/L	8	8	HACH 8000	04/10/2020 13:13	04/10/2020 13:13	ALT
Specific Conductance (Lab)	**962**		umhos/cm	1	1	2510 B-2011	04/09/2020 15:52	04/09/2020 15:52	JLW
pH (Lab)	**7.50**	H3	Std. Units	0.10	0.10	4500-H+ B-2000	04/09/2020 16:14	04/09/2020 16:14	GAT
Total Dissolved Solids	**488**		mg/L	50	50	2540 C-2011	04/13/2020 10:14	04/14/2020 12:26	MAG
Total Organic Carbon	**1.0**		mg/L	0.5		5310 C-2011	04/14/2020 10:27	04/14/2020 10:27	HMF

Subcontracted Analyses

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Radium-226	**0.340**	_Sub	pCi/L			EPA 903.1	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium-228	**0.468**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium	**0.808**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW

Ion Chromatography Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chloride	**6.5**		mg/L	2.0	1.3	SW846 9056	04/16/2020 00:56	04/16/2020 00:56	CSC
Fluoride	**0.5**		mg/L	0.2	0.1	SW846 9056	04/16/2020 00:56	04/16/2020 00:56	CSC
Sulfate	**21**		mg/L	1	0.5	SW846 9056	04/16/2020 00:56	04/16/2020 00:56	CSC

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ANALYTICAL RESULTS

Lab Sample ID: **0041376-02**
Description: **MW2**

Sample Collection Date Time: 04/07/2020 11:40
Sample Received Date Time: 04/07/2020 15:49

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Antimony	ND	U	mg/L	0.005	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:16	DMH
Arsenic	**0.0033**		mg/L	0.0010	0.0004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:16	DMH
Barium	**0.238**		mg/L	0.004	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:16	DMH
Beryllium	ND	U	mg/L	0.0020	0.0010	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:16	DMH
Boron	ND	U	mg/L	0.10	0.10	SW846 6010 B	04/09/2020 07:40	04/12/2020 16:49	DMH
Cadmium	ND	U	mg/L	0.0010	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:16	DMH
Calcium	**145**	D1	mg/L	40.0	13.0	SW846 6010 B	04/09/2020 07:40	04/12/2020 16:55	DMH
Chromium	ND	U	mg/L	0.0020	0.0006	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:16	DMH
Cobalt	ND	U	mg/L	0.004	0.004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:16	DMH
Copper	ND	U	mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:16	DMH
Iron	**0.459**		mg/L	0.100	0.050	SW846 6010 B	04/09/2020 07:40	04/12/2020 16:49	DMH
Lead	ND	U	mg/L	0.002	0.0005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:16	DMH
Lithium	**0.007**	J	mg/L	0.02	0.005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:16	DMH
Mercury	ND	U	mg/L	0.0005	0.0002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:16	DMH
Molybdenum	**0.002**	J	mg/L	0.01	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:16	DMH
Selenium	ND	U	mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:16	DMH
Sodium	**66.5**	D1	mg/L	26.0	10.0	SW846 6010 B	04/09/2020 07:40	04/12/2020 16:55	DMH
Thallium	ND	U	mg/L	0.0020	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:16	DMH

Conventional Chemistry Analyses Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chemical Oxygen Demand	**12**		mg/L	8	8	HACH 8000	04/10/2020 13:13	04/10/2020 13:13	ALT
Specific Conductance (Lab)	**1530**		umhos/cm	1	1	2510 B-2011	04/09/2020 15:53	04/09/2020 15:53	JLW
pH (Lab)	**7.22**	H3	Std. Units	0.10	0.10	4500-H+ B-2000	04/09/2020 16:15	04/09/2020 16:15	CML
Total Dissolved Solids	**806**		mg/L	50	50	2540 C-2011	04/13/2020 10:18	04/14/2020 12:26	MAG
Total Organic Carbon	**1.0**		mg/L	0.5		5310 C-2011	04/14/2020 10:48	04/14/2020 10:48	HMF

Subcontracted Analyses

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Radium-226	**0.513**	_Sub	pCi/L			EPA 903.1	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium-228	**0.016**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium	**0.529**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW

Ion Chromatography Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chloride	**120**	D	mg/L	100	64.0	SW846 9056	04/16/2020 01:29	04/16/2020 01:29	CSC
Fluoride	**0.2**		mg/L	0.2	0.1	SW846 9056	04/16/2020 01:12	04/16/2020 01:12	CSC
Sulfate	**85**	D	mg/L	50	25	SW846 9056	04/16/2020 01:29	04/16/2020 01:29	CSC

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ANALYTICAL RESULTS

Lab Sample ID: **0041376-03**
Description: **MW3A**

Sample Collection Date Time: 04/07/2020 13:55
Sample Received Date Time: 04/07/2020 15:49

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Antimony	ND	U	mg/L	0.005	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:20	DMH
Arsenic	ND	U	mg/L	0.0010	0.0004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:20	DMH
Barium	**0.042**		mg/L	0.004	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:20	DMH
Beryllium	ND	U	mg/L	0.0020	0.0010	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:20	DMH
Boron	**0.26**		mg/L	0.10	0.10	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:11	DMH
Cadmium	**0.0001**	J	mg/L	0.0010	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:20	DMH
Calcium	**425**	D1	mg/L	40.0	13.0	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:17	DMH
Chromium	ND	U	mg/L	0.0020	0.0006	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:20	DMH
Cobalt	ND	U	mg/L	0.004	0.004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:20	DMH
Copper	ND	U	mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:20	DMH
Iron	ND	U	mg/L	0.100	0.050	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:11	DMH
Lead	ND	U	mg/L	0.002	0.0005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:20	DMH
Lithium	**0.68**		mg/L	0.02	0.005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:20	DMH
Mercury	ND	U	mg/L	0.0005	0.0002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:20	DMH
Molybdenum	ND	U	mg/L	0.01	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:20	DMH
Selenium	ND	U	mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:20	DMH
Sodium	**352**	D1	mg/L	26.0	10.0	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:17	DMH
Thallium	ND	U	mg/L	0.0020	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:20	DMH

Conventional Chemistry Analyses Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chemical Oxygen Demand	**160**		mg/L	8	8	HACH 8000	04/10/2020 13:14	04/10/2020 13:14	ALT
Specific Conductance (Lab)	**7660**		umhos/cm	1	1	2510 B-2011	04/09/2020 15:54	04/09/2020 15:54	JLW
pH (Lab)	**7.07**	H3	Std. Units	0.10	0.10	4500-H+ B-2000	04/09/2020 16:16	04/09/2020 16:16	CML
Total Dissolved Solids	**5860**		mg/L	50	50	2540 C-2011	04/13/2020 10:22	04/14/2020 12:26	MAG
Total Organic Carbon	ND	U	mg/L	0.5		5310 C-2011	04/14/2020 12:15	04/14/2020 12:15	HMF

Subcontracted Analyses

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Radium-226	**0.603**	_Sub	pCi/L			EPA 903.1	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium-228	**0.460**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium	**1.06**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW

Ion Chromatography Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chloride	**3220**	D	mg/L	200	128	SW846 9056	04/16/2020 02:02	04/16/2020 02:02	CSC
Fluoride	**0.5**		mg/L	0.2	0.1	SW846 9056	04/16/2020 01:45	04/16/2020 01:45	CSC
Sulfate	**1840**	D	mg/L	100	50	SW846 9056	04/16/2020 02:02	04/16/2020 02:02	CSC

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ANALYTICAL RESULTS

Lab Sample ID: **0041376-04**
Description: **MW4**

Sample Collection Date Time: 04/07/2020 09:55
Sample Received Date Time: 04/07/2020 15:49

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Antimony	ND	U	mg/L	0.005	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:24	DMH
Arsenic	ND	U	mg/L	0.0010	0.0004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:24	DMH
Barium	**0.022**		mg/L	0.004	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:24	DMH
Beryllium	ND	U	mg/L	0.0020	0.0010	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:24	DMH
Boron	**0.83**		mg/L	0.10	0.10	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:20	DMH
Cadmium	ND	U	mg/L	0.0010	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:24	DMH
Calcium	**464**	D1	mg/L	40.0	13.0	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:27	DMH
Chromium	**0.0008**	J	mg/L	0.0020	0.0006	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:24	DMH
Cobalt	ND	U	mg/L	0.004	0.004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:24	DMH
Copper	ND	U	mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:24	DMH
Iron	ND	U	mg/L	0.100	0.050	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:20	DMH
Lead	ND	U	mg/L	0.002	0.0005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:24	DMH
Lithium	**0.82**		mg/L	0.02	0.005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:24	DMH
Mercury	**0.0003**	J	mg/L	0.0005	0.0002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:24	DMH
Molybdenum	**0.002**	J	mg/L	0.01	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:24	DMH
Selenium	**0.023**		mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:24	DMH
Sodium	**433**	D1	mg/L	26.0	10.0	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:27	DMH
Thallium	ND	U	mg/L	0.0020	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:24	DMH

Conventional Chemistry Analyses Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chemical Oxygen Demand	**44**		mg/L	8	8	HACH 8000	04/10/2020 13:14	04/10/2020 13:14	ALT
Specific Conductance (Lab)	**6460**		umhos/cm	1	1	2510 B-2011	04/09/2020 15:55	04/09/2020 15:55	JLW
pH (Lab)	**7.10**	H3	Std. Units	0.10	0.10	4500-H+ B-2000	04/09/2020 16:17	04/09/2020 16:17	CML
Total Dissolved Solids	**5120**		mg/L	50	50	2540 C-2011	04/13/2020 10:26	04/14/2020 12:26	MAG
Total Organic Carbon	**0.6**		mg/L	0.5		5310 C-2011	04/14/2020 12:37	04/14/2020 12:37	HMF

Subcontracted Analyses

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Radium-226	**0.476**	_Sub	pCi/L			EPA 903.1	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium-228	**0.787**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium	**1.26**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW

Ion Chromatography Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chloride	**1560**	D	mg/L	200	128	SW846 9056	04/16/2020 02:34	04/16/2020 02:34	CSC
Fluoride	**0.2**		mg/L	0.2	0.1	SW846 9056	04/16/2020 02:18	04/16/2020 02:18	CSC
Sulfate	**4000**	D	mg/L	100	50	SW846 9056	04/16/2020 02:34	04/16/2020 02:34	CSC

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ANALYTICAL RESULTS

Lab Sample ID: **0041376-05**
Description: **MW5**

Sample Collection Date Time: 04/07/2020 10:10
Sample Received Date Time: 04/07/2020 15:49

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Antimony	ND	U	mg/L	0.005	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:28	DMH
Arsenic	ND	U	mg/L	0.0010	0.0004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:28	DMH
Barium	**0.014**		mg/L	0.004	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:28	DMH
Beryllium	ND	U	mg/L	0.0020	0.0010	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:28	DMH
Boron	**0.25**		mg/L	0.10	0.10	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:30	DMH
Cadmium	ND	U	mg/L	0.0010	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:28	DMH
Calcium	**464**	D1	mg/L	40.0	13.0	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:36	DMH
Chromium	ND	U	mg/L	0.0020	0.0006	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:28	DMH
Cobalt	ND	U	mg/L	0.004	0.004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:28	DMH
Copper	ND	U	mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:28	DMH
Iron	ND	U	mg/L	0.100	0.050	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:30	DMH
Lead	ND	U	mg/L	0.002	0.0005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:28	DMH
Lithium	**0.38**		mg/L	0.02	0.005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:28	DMH
Mercury	ND	U	mg/L	0.0005	0.0002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:28	DMH
Molybdenum	ND	U	mg/L	0.01	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:28	DMH
Selenium	ND	U	mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:28	DMH
Sodium	**217**	D1	mg/L	26.0	10.0	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:36	DMH
Thallium	ND	U	mg/L	0.0020	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:28	DMH

Conventional Chemistry Analyses Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chemical Oxygen Demand	**463**		mg/L	8	8	HACH 8000	04/10/2020 13:14	04/10/2020 13:14	ALT
Specific Conductance (Lab)	**5950**		umhos/cm	1	1	2510 B-2011	04/09/2020 15:56	04/09/2020 15:56	JLW
pH (Lab)	**6.94**	H3	Std. Units	0.10	0.10	4500-H+ B-2000	04/09/2020 16:18	04/09/2020 16:18	CML
Total Dissolved Solids	**4960**		mg/L	50	50	2540 C-2011	04/13/2020 10:30	04/14/2020 12:26	MAG
Total Organic Carbon	**0.6**		mg/L	0.5		5310 C-2011	04/16/2020 21:48	04/16/2020 21:48	HMF

Subcontracted Analyses

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Radium-226	**0.302**	_Sub	pCi/L			EPA 903.1	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium-228	**1.18**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium	**1.48**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW

Ion Chromatography Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chloride	**1860**	D	mg/L	200	128	SW846 9056	04/16/2020 03:07	04/16/2020 03:07	CSC
Fluoride	**0.2**		mg/L	0.2	0.1	SW846 9056	04/16/2020 02:51	04/16/2020 02:51	CSC
Sulfate	**3720**	D	mg/L	100	50	SW846 9056	04/16/2020 03:07	04/16/2020 03:07	CSC

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ANALYTICAL RESULTS

Lab Sample ID: **0041376-06**
Description: **MW6**

Sample Collection Date Time: 04/06/2020 14:20
Sample Received Date Time: 04/07/2020 15:49

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Antimony	ND	U	mg/L	0.005	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:32	DMH
Arsenic	ND	U	mg/L	0.0010	0.0004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:32	DMH
Barium	**0.011**		mg/L	0.004	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:32	DMH
Beryllium	ND	U	mg/L	0.0020	0.0010	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:32	DMH
Boron	**0.19**		mg/L	0.10	0.10	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:49	DMH
Cadmium	**0.0001**	J	mg/L	0.0010	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:32	DMH
Calcium	**458**	D1	mg/L	40.0	13.0	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:55	DMH
Chromium	ND	U	mg/L	0.0020	0.0006	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:32	DMH
Cobalt	ND	U	mg/L	0.004	0.004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:32	DMH
Copper	ND	U	mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:32	DMH
Iron	**0.078**	J	mg/L	0.100	0.050	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:49	DMH
Lead	ND	U	mg/L	0.002	0.0005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:32	DMH
Lithium	**0.05**		mg/L	0.02	0.005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:32	DMH
Mercury	ND	U	mg/L	0.0005	0.0002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:32	DMH
Molybdenum	ND	U	mg/L	0.01	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:32	DMH
Selenium	ND	U	mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:32	DMH
Sodium	**435**	D1	mg/L	26.0	10.0	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:55	DMH
Thallium	ND	U	mg/L	0.0020	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:32	DMH

Conventional Chemistry Analyses Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chemical Oxygen Demand	**22**		mg/L	8	8	HACH 8000	04/10/2020 13:14	04/10/2020 13:14	ALT
Specific Conductance (Lab)	**4960**		umhos/cm	1	1	2510 B-2011	04/09/2020 15:57	04/09/2020 15:57	JLW
pH (Lab)	**6.76**	H3	Std. Units	0.10	0.10	4500-H+ B-2000	04/09/2020 16:19	04/09/2020 16:19	CML
Total Dissolved Solids	**4610**		mg/L	50	50	2540 C-2011	04/13/2020 10:34	04/14/2020 12:26	MAG
Total Organic Carbon	**2.0**		mg/L	0.5		5310 C-2011	04/16/2020 22:11	04/16/2020 22:11	HMF

Subcontracted Analyses

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Radium-226	**0.061**	_Sub	pCi/L			EPA 903.1	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium-228	**0.683**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium	**0.744**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW

Ion Chromatography Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chloride	**181**	D	mg/L	100	64.0	SW846 9056	04/16/2020 04:13	04/16/2020 04:13	CSC
Fluoride	**0.4**		mg/L	0.2	0.1	SW846 9056	04/16/2020 03:57	04/16/2020 03:57	CSC
Sulfate	**4650**	D	mg/L	100	50	SW846 9056	04/16/2020 12:57	04/16/2020 12:57	CSC

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ANALYTICAL RESULTS

Lab Sample ID: **0041376-07**
Description: **DUPLICATE**

Sample Collection Date Time: 04/07/2020 10:20
Sample Received Date Time: 04/07/2020 15:49

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Antimony	ND	U	mg/L	0.005	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:36	DMH
Arsenic	ND	U	mg/L	0.0010	0.0004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:36	DMH
Barium	**0.022**		mg/L	0.004	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:36	DMH
Beryllium	ND	U	mg/L	0.0020	0.0010	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:36	DMH
Boron	**0.86**		mg/L	0.10	0.10	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:58	DMH
Cadmium	ND	U	mg/L	0.0010	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:36	DMH
Calcium	**503**	D1	mg/L	40.0	13.0	SW846 6010 B	04/09/2020 07:40	04/12/2020 18:05	DMH
Chromium	**0.0009**	J	mg/L	0.0020	0.0006	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:36	DMH
Cobalt	ND	U	mg/L	0.004	0.004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:36	DMH
Copper	ND	U	mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:36	DMH
Iron	ND	U	mg/L	0.100	0.050	SW846 6010 B	04/09/2020 07:40	04/12/2020 17:58	DMH
Lead	ND	U	mg/L	0.002	0.0005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:36	DMH
Lithium	**0.84**		mg/L	0.02	0.005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:36	DMH
Mercury	**0.0003**	J	mg/L	0.0005	0.0002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:36	DMH
Molybdenum	**0.003**	J	mg/L	0.01	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:36	DMH
Selenium	**0.025**		mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:36	DMH
Sodium	**468**	D1	mg/L	26.0	10.0	SW846 6010 B	04/09/2020 07:40	04/12/2020 18:05	DMH
Thallium	ND	U	mg/L	0.0020	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:36	DMH

Conventional Chemistry Analyses Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chemical Oxygen Demand	**62**		mg/L	8	8	HACH 8000	04/10/2020 13:14	04/10/2020 13:14	ALT
Specific Conductance (Lab)	**6410**		umhos/cm	1	1	2510 B-2011	04/09/2020 15:58	04/09/2020 15:58	JLW
pH (Lab)	**7.12**	H3	Std. Units	0.10	0.10	4500-H+ B-2000	04/09/2020 16:20	04/09/2020 16:20	CML
Total Dissolved Solids	**4700**		mg/L	50	50	2540 C-2011	04/13/2020 10:38	04/14/2020 12:26	MAG
Total Organic Carbon	**0.8**		mg/L	0.5		5310 C-2011	04/16/2020 22:34	04/16/2020 22:34	HMF

Subcontracted Analyses

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Radium-226	**0.371**	_Sub	pCi/L			EPA 903.1	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium-228	**1.10**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium	**1.47**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW

Ion Chromatography Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chloride	**1480**	D	mg/L	100	64.0	SW846 9056	04/21/2020 14:14	04/21/2020 14:14	CSC
Fluoride	**0.2**		mg/L	0.2	0.1	SW846 9056	04/16/2020 04:46	04/16/2020 04:46	CSC
Sulfate	**4050**	D	mg/L	100	50	SW846 9056	04/23/2020 12:44	04/23/2020 12:44	CSC

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ANALYTICAL RESULTS

Lab Sample ID: **0041376-08**
Description: **FIELD BLANK**

Sample Collection Date Time: 04/07/2020 11:50
Sample Received Date Time: 04/07/2020 15:49

Metals by SW846 6000 Series Methods

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Antimony	ND	U	mg/L	0.005	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:55	DMH
Arsenic	ND	U	mg/L	0.0010	0.0004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:55	DMH
Barium	ND	U	mg/L	0.004	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:55	DMH
Beryllium	ND	U	mg/L	0.0020	0.0010	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:55	DMH
Boron	ND	U	mg/L	0.10	0.10	SW846 6010 B	04/09/2020 07:40	04/12/2020 18:08	DMH
Cadmium	ND	U	mg/L	0.0010	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:55	DMH
Calcium	ND	U	mg/L	0.40	0.13	SW846 6010 B	04/09/2020 07:40	04/12/2020 18:08	DMH
Chromium	ND	U	mg/L	0.0020	0.0006	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:55	DMH
Cobalt	ND	U	mg/L	0.004	0.004	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:55	DMH
Copper	ND	U	mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:55	DMH
Iron	ND	U	mg/L	0.100	0.050	SW846 6010 B	04/09/2020 07:40	04/12/2020 18:08	DMH
Lead	ND	U	mg/L	0.002	0.0005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:55	DMH
Lithium	ND	U	mg/L	0.02	0.005	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:55	DMH
Mercury	ND	U	mg/L	0.0005	0.0002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:55	DMH
Molybdenum	ND	U	mg/L	0.01	0.002	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:55	DMH
Selenium	ND	U	mg/L	0.003	0.001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:55	DMH
Sodium	ND	U	mg/L	0.26	0.10	SW846 6010 B	04/09/2020 07:40	04/12/2020 18:08	DMH
Thallium	ND	U	mg/L	0.0020	0.0001	SW846-6020 A	04/09/2020 07:40	04/12/2020 16:55	DMH

Conventional Chemistry Analyses Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chemical Oxygen Demand	ND	U	mg/L	8	8	HACH 8000	04/10/2020 13:15	04/10/2020 13:15	ALT
Specific Conductance (Lab)	**8**		umhos/cm	1	1	2510 B-2011	04/09/2020 15:59	04/09/2020 15:59	JLW
pH (Lab)	**7.62**	H3	Std. Units	0.10	0.10	4500-H+ B-2000	04/09/2020 16:21	04/09/2020 16:21	CML
Total Dissolved Solids	ND	U	mg/L	50	50	2540 C-2011	04/13/2020 10:42	04/14/2020 12:26	MAG
Total Organic Carbon	ND	U	mg/L	0.5		5310 C-2011	04/16/2020 22:57	04/16/2020 22:57	HMF

Subcontracted Analyses

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Radium-226	**0.224**	_Sub	pCi/L			EPA 903.1	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium-228	**0.262**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW
Radium	**0.486**	_Sub	pCi/L			EPA 904.0 Radium Sum Calc	04/30/2020 14:07	04/30/2020 14:09	RCW

Ion Chromatography Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Chloride	ND	M1, U	mg/L	2.0	1.3	SW846 9056	04/16/2020 05:03	04/16/2020 05:03	CSC
Fluoride	ND	M1, U	mg/L	0.2	0.1	SW846 9056	04/16/2020 05:03	04/16/2020 05:03	CSC
Sulfate	ND	M1, U	mg/L	1	0.5	SW846 9056	04/16/2020 05:03	04/16/2020 05:03	CSC

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Notes for work order 0041376

- Samples collected by MMLI personnel are done so in accordance with procedures set forth in MMLI field services SOPs.
- Results contained in this report are only representative of the samples received.
- MMLI does not provide interpretation of these results unless otherwise stated.
- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- The Chain of Custody document is included as part of this report.
- All Library Search analytes should be regarded as tentative identification based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.

Qualifiers

_Sub	See subcontractors report.
D	Results reported from dilution.
D1	Sample required dilution due to high concentration of target analyte.
D2	Sample required dilution due to matrix interference.
H3	Sample received and analyzed past holding time.
J	Estimated value.
M1	Matrix spike recovery was high; the method control sample recovery was acceptable.
M3	The accuracy of the spike recovery value is reduced since the analyte concentration in the sample is disproportionate to spike level. The method control sample recovery was acceptable.
U	Target analyte was analyzed for, but was below detection limit (the value associated with the qualifier is the laboratory method detection limit in our LIMS system).

Standard Qualifiers/Acronymns

MDL	Method Detection Limit
MRL	Minimum Reporting Limit
ND	Not Detected
LCS	Laboratory Control Sample
MS	Matrix Spike
MSD	Matrix Spike Duplicate
DUP	Sample Duplicate
% Rec	Percent Recovery
RPD	Relative Percent Difference
>	Greater than
<	Less than

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Metals by SW846 6000 Series Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B015276 - EPA 200.2										
Blank (B015276-BLK1)										
Prepared: 4/9/2020 7:40, Analyzed: 4/12/2020 16:05										
Molybdenum	ND	0.01	mg/L							U
Antimony	ND	0.005	mg/L							U
Mercury	ND	0.0005	mg/L							U
Arsenic	ND	0.0010	mg/L							U
Barium	ND	0.004	mg/L							U
Beryllium	ND	0.0020	mg/L							U
Cadmium	ND	0.0010	mg/L							U
Chromium	ND	0.0020	mg/L							U
Cobalt	ND	0.004	mg/L							U
Copper	ND	0.003	mg/L							U
Lead	ND	0.002	mg/L							U
Lithium	ND	0.02	mg/L							U
Selenium	ND	0.003	mg/L							U
Thallium	ND	0.0020	mg/L							U
Blank (B015276-BLK2)										
Prepared: 4/9/2020 7:40, Analyzed: 4/12/2020 16:33										
Boron	ND	0.10	mg/L							U
Calcium	ND	0.40	mg/L							U
Iron	ND	0.100	mg/L							U
Sodium	ND	0.26	mg/L							U
LCS (B015276-BS1)										
Prepared: 4/9/2020 7:40, Analyzed: 4/12/2020 16:09										
Molybdenum	0.07	0.01	mg/L	0.0625		105	85-115			
Antimony	0.068	0.005	mg/L	0.0625		109	85-115			
Mercury	0.0025	0.0005	mg/L	0.00250		98.3	85-115			
Arsenic	0.0645	0.0010	mg/L	0.0625		103	85-115			
Barium	0.062	0.004	mg/L	0.0625		99.5	85-115			
Beryllium	0.0613	0.0020	mg/L	0.0625		98.1	85-115			
Cadmium	0.0621	0.0010	mg/L	0.0625		99.4	85-115			
Chromium	0.0641	0.0020	mg/L	0.0625		103	85-115			
Cobalt	0.064	0.004	mg/L	0.0625		102	85-115			
Copper	0.060	0.003	mg/L	0.0625		95.6	85-115			
Lead	0.062	0.002	mg/L	0.0625		98.7	85-115			
Lithium	0.06	0.02	mg/L	0.0625		96.9	85-115			
Selenium	0.065	0.003	mg/L	0.0625		104	85-115			
Thallium	0.0632	0.0020	mg/L	0.0625		101	85-115			

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Metals by SW846 6000 Series Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B015276 - EPA 200.2										
LCS (B015276-BS2)										
Prepared: 4/9/2020 7:40, Analyzed: 4/12/2020 16:36										
Boron	0.12	0.10	mg/L	0.125		94.1	85-115			
Calcium	5.92	0.40	mg/L	6.25		94.8	85-115			
Iron	6.27	0.100	mg/L	6.25		100	85-115			
Sodium	6.12	0.26	mg/L	6.25		97.9	85-115			
Matrix Spike (B015276-MS1)	**Source: 0041376-01**									
Prepared: 4/9/2020 7:40, Analyzed: 4/12/2020 16:59										
Molybdenum	0.06	0.01	mg/L	0.0625	ND	102	80-120			
Antimony	0.066	0.005	mg/L	0.0625	ND	106	80-120			
Mercury	0.0023	0.0005	mg/L	0.00250	ND	93.6	80-120			
Arsenic	0.0634	0.0010	mg/L	0.0625	0.0019	98.3	80-120			
Barium	0.150	0.004	mg/L	0.0625	0.087	101	80-120			
Beryllium	0.0547	0.0020	mg/L	0.0625	ND	87.4	80-120			
Cadmium	0.0562	0.0010	mg/L	0.0625	ND	89.9	80-120			
Chromium	0.0656	0.0020	mg/L	0.0625	0.0011	103	80-120			
Cobalt	0.063	0.004	mg/L	0.0625	ND	101	80-120			
Copper	0.056	0.003	mg/L	0.0625	ND	89.6	80-120			
Lead	0.056	0.002	mg/L	0.0625	ND	90.2	80-120			
Lithium	0.09	0.02	mg/L	0.0625	0.03	95.1	80-120			
Selenium	0.055	0.003	mg/L	0.0625	ND	88.1	80-120			
Thallium	0.0579	0.0020	mg/L	0.0625	0.0001	92.5	80-120			
Matrix Spike (B015276-MS2)	**Source: 0041376-01**									
Prepared: 4/9/2020 7:40, Analyzed: 4/12/2020 16:58										
Boron	1.85	1.00	mg/L	0.125	1.69	132	80-120			D2, M3
Calcium	34.4	4.00	mg/L	6.25	27.7	106	80-120			D2
Iron	7.68	1.00	mg/L	6.25	1.57	97.8	80-120			D2
Sodium	205	2.60	mg/L	6.25	206	NR	80-120			D2, M3
Matrix Spike Dup (B015276-MSD1)	**Source: 0041376-01**									
Prepared: 4/9/2020 7:40, Analyzed: 4/12/2020 17:03										
Antimony	0.071	0.005	mg/L	0.0625	ND	114	80-120	7.69	20	
Mercury	0.0025	0.0005	mg/L	0.00250	ND	99.2	80-120	5.81	20	
Molybdenum	0.07	0.01	mg/L	0.0625	ND	107	80-120	4.09	20	
Arsenic	0.0677	0.0010	mg/L	0.0625	0.0019	105	80-120	6.64	20	
Barium	0.157	0.004	mg/L	0.0625	0.087	111	80-120	4.16	20	
Beryllium	0.0585	0.0020	mg/L	0.0625	ND	93.6	80-120	6.82	20	
Cadmium	0.0610	0.0010	mg/L	0.0625	ND	97.6	80-120	8.15	20	
Chromium	0.0684	0.0020	mg/L	0.0625	0.0011	108	80-120	4.12	20	
Cobalt	0.066	0.004	mg/L	0.0625	ND	106	80-120	4.34	20	
Copper	0.059	0.003	mg/L	0.0625	ND	94.0	80-120	4.78	20	
Lead	0.061	0.002	mg/L	0.0625	ND	97.1	80-120	7.36	20	
Lithium	0.09	0.02	mg/L	0.0625	0.03	98.1	80-120	2.10	20	
Selenium	0.061	0.003	mg/L	0.0625	ND	97.1	80-120	9.79	20	
Thallium	0.0613	0.0020	mg/L	0.0625	0.0001	97.8	80-120	5.64	20	

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Metals by SW846 6000 Series Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B015276 - EPA 200.2										
Matrix Spike Dup (B015276-MSD2)	**Source: 0041376-01**									
Prepared: 4/9/2020 7:40, Analyzed: 4/12/2020 18:11										
Boron	1.80	1.00	mg/L	0.125	1.69	88.6	80-120	2.95	20	D2
Calcium	35.3	4.00	mg/L	6.25	27.7	121	80-120	2.64	20	D2, M3
Iron	8.28	1.00	mg/L	6.25	1.57	107	80-120	7.50	20	D2
Sodium	208	2.60	mg/L	6.25	206	23.5	80-120	1.56	20	D2, M3
Post Spike (B015276-PS1)	**Source: 0041376-01**									
Prepared: 4/9/2020 7:40, Analyzed: 4/12/2020 17:06										
Antimony	65.3		ug/L	62.5	0.087	104	75-125			
Mercury	2.49		ug/L	2.50	0.0595	97.1	75-125			
Molybdenum	62.9		ug/L	62.5	1.02	99.0	75-125			
Arsenic	63.0		ug/L	62.5	1.92	97.7	75-125			
Barium	153		ug/L	62.5	87.2	105	75-125			
Beryllium	55.2		ug/L	62.5	-0.0177	88.4	75-125			
Cadmium	57.4		ug/L	62.5	0.0329	91.8	75-125			
Chromium	63.2		ug/L	62.5	1.10	99.4	75-125			
Cobalt	61.3		ug/L	62.5	0.695	96.9	75-125			
Copper	54.1		ug/L	62.5	-2.87	86.6	75-125			
Lead	56.6		ug/L	62.5	0.013	90.6	75-115			
Lithium	85.9		ug/L	62.5	28.0	92.7	75-125			
Selenium	56.3		ug/L	62.5	0.072	89.9	75-125			
Thallium	57.4		ug/L	62.5	0.118	91.7	75-125			
Post Spike (B015276-PS2)	**Source: 0041376-01**									
Prepared: 4/9/2020 7:40, Analyzed: 4/12/2020 18:14										
Boron	1820		ug/L	125	1690	107	75-125			D2
Calcium	33800		ug/L	6250	27700	96.6	75-125			D2
Iron	7590		ug/L	6250	1570	96.4	75-125			D2
Sodium	202000		ug/L	6250	206000	NR	75-125			D2, M3

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B015432 - Default Prep Wet Chem										
Blank (B015432-BLK1)										
Prepared: 4/14/2020 1:48, Analyzed: 4/14/2020 1:48										
Total Organic Carbon	ND	0.5	mg/L							U
LCS (B015432-BS1)										
Prepared: 4/14/2020 2:09, Analyzed: 4/14/2020 2:09										
Total Organic Carbon	4.8	0.5	mg/L	5.00		95.5	80-120			
Duplicate (B015432-DUP1)	**Source: 0040539-01**									
Prepared: 4/14/2020 7:34, Analyzed: 4/14/2020 7:34										
Total Organic Carbon	2.0	0.5	mg/L		2.0			1.22	25	
Duplicate (B015432-DUP2)	**Source: 0041286-01**									
Prepared: 4/14/2020 12:59, Analyzed: 4/14/2020 12:59										
Total Organic Carbon	1.1	0.5	mg/L		1.1			5.36	25	
Matrix Spike (B015432-MS1)	**Source: 0040539-02**									
Prepared: 4/14/2020 7:55, Analyzed: 4/14/2020 7:55										
Total Organic Carbon	3.6	0.5	mg/L	2.50	1.1	102	80-120			
Matrix Spike (B015432-MS2)	**Source: 0041286-02**									
Prepared: 4/14/2020 13:20, Analyzed: 4/14/2020 13:20										
Total Organic Carbon	5.9	0.5	mg/L	5.00	0.9	100	80-120			
Batch B015433 - Default Prep Wet Chem										
Blank (B015433-BLK2)										
Prepared: 4/16/2020 20:16, Analyzed: 4/16/2020 20:16										
Total Organic Carbon	ND	0.5	mg/L							U
LCS (B015433-BS2)										
Prepared: 4/16/2020 20:39, Analyzed: 4/16/2020 20:39										
Total Organic Carbon	4.9	0.5	mg/L	5.00		98.4	80-120			
Duplicate (B015433-DUP1)	**Source: 0041409-01**									
Prepared: 4/14/2020 23:44, Analyzed: 4/14/2020 23:44										
Total Organic Carbon	1.0	0.5	mg/L		1.0			2.11	25	

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B015433 - Default Prep Wet Chem										
Duplicate (B015433-DUP3) **Source: 0042383-01**										
Prepared: 4/15/2020 12:23, Analyzed: 4/15/2020 12:23										
Total Organic Carbon	2.2	0.5	mg/L		2.2			1.81	25	
Matrix Spike (B015433-MS1) **Source: 0041409-02**										
Prepared: 4/15/2020 0:07, Analyzed: 4/15/2020 0:07										
Total Organic Carbon	3.4	0.5	mg/L	2.50	0.9	99.6	80-120			
Matrix Spike (B015433-MS3) **Source: 0042383-02RE1**										
Prepared: 4/15/2020 12:46, Analyzed: 4/15/2020 12:46										
Total Organic Carbon	6.4	0.5	mg/L	5.00	1.4	101	80-120			
Batch B015469 - Default Prep Wet Chem										
LCS (B015469-BS1)										
Prepared: 4/9/2020 16:08, Analyzed: 4/9/2020 16:08										
pH (Lab)	7.98		Std. Units	8.00		99.8	98.8-101.2			
LCS (B015469-BS2)										
Prepared: 4/9/2020 16:26, Analyzed: 4/9/2020 16:26										
pH (Lab)	8.04		Std. Units	8.00		100	98.8-101.2			
Duplicate (B015469-DUP1) **Source: 0041388-02**										
Prepared: 4/9/2020 16:24, Analyzed: 4/9/2020 16:24										
pH (Lab)	7.29	0.10	Std. Units		7.27			0.275	10	
Duplicate (B015469-DUP2) **Source: 0060028-01**										
Prepared: 4/9/2020 16:34, Analyzed: 4/9/2020 16:34										
pH (Lab)	7.77	0.10	Std. Units		7.76			0.129	10	
Batch B015470 - Default Prep Wet Chem										
Blank (B015470-BLK1)										
Prepared: 4/9/2020 15:46, Analyzed: 4/9/2020 15:46										
Specific Conductance (Lab)	ND	1	umhos/cm							U

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B015470 - Default Prep Wet Chem										
LCS (B015470-BS1)										
Prepared: 4/9/2020 15:47, Analyzed: 4/9/2020 15:47										
Specific Conductance (Lab)	1410		umhos/cm	1410		99.9	80-120			
Duplicate (B015470-DUP1)	**Source: 0042630-01**									
Prepared: 4/9/2020 16:02, Analyzed: 4/9/2020 16:02										
Specific Conductance (Lab)	202	1	umhos/cm		202			0.148	1.24	
Batch B015517 - Default Prep Wet Chem										
Blank (B015517-BLK1)										
Prepared: 4/10/2020 13:09, Analyzed: 4/10/2020 13:09										
Chemical Oxygen Demand	ND	8	mg/L							U
LCS (B015517-BS1)										
Prepared: 4/10/2020 13:09, Analyzed: 4/10/2020 13:09										
Chemical Oxygen Demand	116	8	mg/L	125		93.0	90-110			
Duplicate (B015517-DUP1)	**Source: 0041376-01**									
Prepared: 4/10/2020 13:18, Analyzed: 4/10/2020 13:18										
Chemical Oxygen Demand	ND	8	mg/L		ND				25	U
Matrix Spike (B015517-MS1)	**Source: 0041376-01**									
Prepared: 4/10/2020 13:18, Analyzed: 4/10/2020 13:18										
Chemical Oxygen Demand	262	8	mg/L	250	ND	105	90-110			
Matrix Spike Dup (B015517-MSD1)	**Source: 0041376-01**									
Prepared: 4/10/2020 13:18, Analyzed: 4/10/2020 13:18										
Chemical Oxygen Demand	256	8	mg/L	250	ND	102	90-110	2.46	10	
Batch B016032 - Default Prep Wet Chem										
Blank (B016032-BLK1)										
Prepared: 4/13/2020 9:34, Analyzed: 4/14/2020 12:26										
Total Dissolved Solids	ND	25	mg/L							U

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B016032 - Default Prep Wet Chem										
LCS (B016032-BS1)										
Prepared: 4/13/2020 9:38, Analyzed: 4/14/2020 12:26										
Total Dissolved Solids	1480	25	mg/L	1500		98.7	80-120			
Duplicate (B016032-DUP1) **Source: 0040819-01**										
Prepared: 4/13/2020 10:50, Analyzed: 4/14/2020 12:26										
Total Dissolved Solids	206	50	mg/L		226			9.26	10	
Duplicate (B016032-DUP2) **Source: 0041376-08**										
Prepared: 4/13/2020 10:54, Analyzed: 4/14/2020 12:26										
Total Dissolved Solids	ND	50	mg/L		ND				10	U

Pace Analytical Services, LLC
P.O. Box 907
Madisonville, KY 42431
270.821.7375
www.pacelabs.com

Ion Chromatography Madisonville - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B016360 - Default Prep IC										
Blank (B016360-BLK1)										
Prepared: 4/16/2020 0:39, Analyzed: 4/16/2020 0:39										
Chloride	ND	2.0	mg/L							U
Fluoride	ND	0.2	mg/L							U
Sulfate	ND	1	mg/L							U
LCS (B016360-BS1)										
Prepared: 4/16/2020 0:23, Analyzed: 4/16/2020 0:23										
Fluoride	9.5		mg/L	10.0		95.0	90-110			
Chloride	9.5		mg/L	10.0		94.9	90-110			
Sulfate	10		mg/L	10.0		98.1	90-110			
Matrix Spike (B016360-MS1) **Source: 0041376-08**										
Prepared: 4/16/2020 5:20, Analyzed: 4/16/2020 5:20										
Fluoride	13.2		mg/L	10.0	0.0	132	75-125			M1
Chloride	13.1		mg/L	10.0	0.1	130	75-125			M1
Sulfate	14		mg/L	10.0	0.1	139	75-125			M1
Matrix Spike Dup (B016360-MSD1) **Source: 0041376-08**										
Prepared: 4/16/2020 5:37, Analyzed: 4/16/2020 5:37										
Chloride	12.3		mg/L	10.0	0.1	122	75-125	6.11	15	
Fluoride	12.5		mg/L	10.0	0.0	125	75-125	5.37	15	
Sulfate	13		mg/L	10.0	0.1	125	75-125	10.7	15	
Batch B016418 - Default Prep IC										
Blank (B016418-BLK1)										
Prepared: 4/16/2020 12:41, Analyzed: 4/16/2020 12:41										
Sulfate	ND	1	mg/L							U
LCS (B016418-BS1)										
Prepared: 4/16/2020 12:24, Analyzed: 4/16/2020 12:24										
Sulfate	10		mg/L	10.0		98.8	90-110			

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Ion Chromatography Madisonville - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B016418 - Default Prep IC										
Matrix Spike (B016418-MS1) **Source: 0043228-02**										
Prepared: 4/16/2020 14:36, Analyzed: 4/16/2020 14:36										
Sulfate	30		mg/L	10.0	17	121	75-125			
Matrix Spike Dup (B016418-MSD1) **Source: 0043228-02**										
Prepared: 4/16/2020 14:52, Analyzed: 4/16/2020 14:52										
Sulfate	30		mg/L	10.0	17	130	75-125	2.87	15	M1

Certified Analyses included in this Report

Analyte	Certifications
2510 B-2011 in Water	
Specific Conductance (Lab)	KY Drinking Water Mdv (00030)
2540 C-2011 in Water	
Total Dissolved Solids	KY Drinking Water Mdv (00030)
4500-H+ B-2000 in Water	
pH (Lab)	KY Drinking Water Mdv (00030) TN Drinking Water (02819)
5310 C-2011 in Water	
Total Organic Carbon	KY Drinking Water Mdv (00030)
HACH 8000 in Water	
Chemical Oxygen Demand	KY Wastewater Mdv (00030)
SW846 6010 B in Water	

Sample Acceptance Checklist for Work Order 0041376

Shipped By: Client

Temperature: 1.90° Celcius

Condition	
Check if Custody Seals are Present/Intact	☐
Check if Custody Signatures are Present	☑
Check if Collector Signature Present	☑
Check if bottles are intact	☑
Check if bottles are correct	☑
Check if bottles have sufficient volume	☑
Check if samples received on ice	☑
Check if VOA headspace is acceptable	☐
Check if samples received in holding time.	☑
Check if samples are preserved properly	☑

Pace Analytical Services LLC Kentucky
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Chain of Custody

Scheduled for: 04/01/2020

Client: Big Rivers Electric Corporation Reid/Green Station

Project: Green Landfill Semiannual Groundwater

Report To:
Big Rivers Electric Corporation Reid/Green Station
Chad Phillips
PO Box 24
Henderson, KY 42419
Phone: (270) 844-6000
PWS ID#:
State: KY

Invoice To:
Big Rivers Electric Corporation Reid/Green Station
Chad Phillips
PO Box 24
Henderson, KY 42419
PO#:
Quote#

Please Print Legibly

Collected by (Signature): *required information*

Compliance Monitoring? Yes ✓ No

Samples Chlorinated? Yes No

*For composite samples please indicate begin time, end time and temp(oC) at end time below:

Influent: Start Date ____ Start time ____ End Date ____ End Time ____ Temp (oC) ____

Effluent: Start Date ____ Start time ____ End Date ____ End Time ____ Temp (oC) ____

MMLI USE ONLY
Workorder # 0041376

Sample ID#	Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-01 A	4/6/20	1305	Plastic 500mL pH<2 w/HNO3	1	MW1	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B
			Preservation Check: pH : ✓				
0041376-01 B	4/6/20	1305	Plastic 500mL pH<2 w/HNO3	1	MW1	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B
			Preservation Check: pH : ✓				
0041376-01 C	4/6/20	1305	Plastic 1L	1	MW1	g / c	pH (Lab) Conductivity (Lab) TDS Sulfate 9056 Chloride 9056 Fluoride 9056

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) 4/6/20 Time (24 hr) 1305

pH 7.22 Cond ~~(umho)~~ mS/cm 0.867 Res Cl (mg/L) ____ Tot Cl (mg/L) ____ Free Cl (mg/L) ____

Temp (oC) 18.23 or (oF) ____ Static Water Level ____ DO (mg/L) ____ Turb. (NTU) ____

Flow (MGD) ____ or (CFS) ____ or (g/min) ____

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
		4/7/20	1443
	(1.9°)	4-7-20	1549

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P.O. Box 907
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Quote# _____

Please Print Legibly

Collected by (Signature): _____ *required information*

Compliance Monitoring? Yes ✓ No ___

Samples Chlorinated? Yes ___ No ___

*For composite samples please indicate begin time, end time and temp(oC) at end time below:

Influent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

Effluent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

MMLI USE ONLY **Workorder # 0041376**

Sample ID#	Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-01 D	4/6/20	1305	Plastic 500mL pH<2 w/H2SO4 **Preservation Check: pH :** ✓	1	MW1	g / c	COD TOC
0041376-01 E	4/6/20	1305	Plastic 1L pH<2 w/HNO3 Rad 226 (Sub) **Preservation Check: pH :** ✓	1	MW1	g / c	Radium 226 (sub)
0041376-01 F	4/6/20	1305	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub) **Preservation Check: pH :** ✓	1	MW1	g / c	Radium 228 (sub)
0041376-01 G	4/6/20	1305	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub) **Preservation Check: pH :** ✓	1	MW1	g / c	Radium 228 (sub)
0041376-01 H	4/6/20	1305	AG 250mL pH<2 w/H2SO4 **Preservation Check: pH :** ✓	1	MW1	g / c	TOC

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) _____ Time (24 hr) _____

pH 7.22 Cond ~~(umho)~~ 0.867 Res Cl (mg/L) _____ Tot Cl (mg/L) _____ Free Cl (mg/L) _____

Temp (oC) 18.29 or (oF) _____ Static Water Level _____ DO (mg/L) _____ Turb. (NTU) _____

Flow (MGD) _____ or (CFS) _____ or (g/min) _____

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
		4/7/20	1443
		4-7-20	1549

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Collected by (Signature): _____ *required information*

Compliance Monitoring? Yes ✓ No ___

Samples Chlorinated? Yes ___ No ___

*For composite samples please indicate begin time, end time and temp(oC) at end time below:

Influent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

Effluent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

MMLI USE ONLY **Workorder # 0041376**

Sample ID#	Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-02 A	4/7/20	1140	Plastic 500mL pH<2 w/HNO3	1	MW2	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B
			Preservation Check: pH : ✓				
0041376-02 B	4/7/20	1140	Plastic 500mL pH<2 w/HNO3	1	MW2	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B
			Preservation Check: pH : ✓				
0041376-02 C	4/7/20	1140	Plastic 1L	1	MW2	g / c	pH (Lab) Conductivity (Lab) TDS Sulfate 9056 Chloride 9056 Fluoride 9056
0041376-02 D	4/7/20	1140	Plastic 500mL pH<2 w/H2SO4	1	MW2	g / c	COD TOC
			Preservation Check: pH : ✓				

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) 4/7/20 Time (24 hr) 1140

pH 6.92 Cond ~~(umho)~~ 1.59 Res Cl (mg/L) _____ Tot Cl (mg/L) _____ Free Cl (mg/L) _____

Temp (oC) 1686 or (oF) _____ Static Water Level _____ DO (mg/L) _____ Turb. (NTU) _____

Flow (MGD) _____ or (CFS) _____ or (g/min) _____

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
		4/7/20	1443
		4-7-20	1549

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Chain of Custody

Scheduled for: 04/01/2020

Client: Big Rivers Electric Corporation Reid/Green Station

Project: Green Landfill Semiannual Groundwater

Report To:
Big Rivers Electric Corporation Reid/Green Station
Chad Phillips
PO Box 24
Henderson, KY 42419
Phone: (270) 844-6000
PWS ID#:
State: KY

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Big Rivers Electric Corporation Reid/Green Station
Chad Phillips
PO Box 24
Henderson, KY 42419
PO#: _____
Quote# _____

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Collected by (Signature): _____ *required information*

Compliance Monitoring? Yes ✓ No ___

Samples Chlorinated? Yes ___ No ___

*For composite samples please indicate begin time, end time and temp(oC) at end time below:

Influent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

Effluent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

MMLI USE ONLY ***required information***
Workorder # 0041376

Sample ID#	Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-02 E	4/7/20	1140	Plastic 1L pH<2 w/HNO3 Rad 226 (Sub) **Preservation Check: pH :** ✓	1	MW2	g / c	Radium 226 (sub)
0041376-02 F	4/7/20	1140	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub) **Preservation Check: pH :** ✓	1	MW2	g / c	Radium 228 (sub)
0041376-02 G	4/7/20	1140	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub) **Preservation Check: pH :** ✓	1	MW2	g / c	Radium 228 (sub)
0041376-02 H	4/7/20	1140	AG 250mL pH<2 w/H2SO4 **Preservation Check: pH :** ✓	1	MW2	g / c	TOC
0041376-03 A	4/7/20	1355	Plastic 500mL pH<2 w/HNO3 **Preservation Check: pH :** ✓	1	MW3A	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) 4/7/20 Time (24 hr) 1140

pH 6.92 Cond (umho) 1.59 Res Cl (mg/L) _____ Tot Cl (mg/L) _____ Free Cl (mg/L) _____

Temp (oC) 16.84 or (oF) _____ Static Water Level _____ DO (mg/L) _____ Turb. (NTU) _____

Flow (MGD) _____ or (CFS) _____ or (g/min) _____

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
_____	_____	4/7/20	1443
_____	_____	4-7-20	1549
_____	_____	_____	_____
_____	_____	_____	_____

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P.O. Box 907
Madisonville, KY 42431

Chain of Custody

Scheduled for: 04/01/2020

Client: Big Rivers Electric Corporation Reid/Green Station

Project: Green Landfill Semiannual Groundwater

Report To:
Big Rivers Electric Corporation Reid/Green Station
Chad Phillips
PO Box 24
Henderson, KY 42419
Phone: (270) 844-6000
PWS ID#:
State: KY

Invoice To:
Big Rivers Electric Corporation Reid/Green Station
Chad Phillips
PO Box 24
Henderson, KY 42419
PO#: _____
Quote# _____

Please Print Legibly

Collected by (Signature): _____ *required information*

Compliance Monitoring? Yes ✓ No ___

Samples Chlorinated? Yes ___ No ___

*For composite samples please indicate begin time, end time and temp(oC) at end time below:

Influent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

Effluent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

MMLI USE ONLY **Workorder # 0041376**

Sample ID#	Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-03 B	4/7/20	1355	Plastic 500mL pH<2 w/HNO3	1	MW3A	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B
			Preservation Check: pH : ✓				
0041376-03 C	4/7/20	1355	Plastic 1L	1	MW3A	g / c	pH (Lab) Conductivity (Lab) TDS Sulfate 9056 Chloride 9056 Fluoride 9056
0041376-03 D	4/7/20	1355	Plastic 500mL pH<2 w/H2SO4	1	MW3A	g / c	COD TOC
			Preservation Check: pH : ✓				
0041376-03 E	4/7/20	1355	Plastic 1L pH<2 w/HNO3 Rad 226 (Sub)	1	MW3A	g / c	Radium 226 (sub)
			Preservation Check: pH : ✓				
0041376-03 F	4/7/20	1355	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub)	1	MW3A	g / c	Radium 228 (sub)
			Preservation Check: pH : ✓				

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) 4/7/20 Time (24 hr) 1355

pH 6.86 Cond ~~(umho)~~ 8.09 Res Cl (mg/L) _____ Tot Cl (mg/L) _____ Free Cl (mg/L) _____

Temp (oC) 16.32 or (oF) _____ Static Water Level _____ DO (mg/L) _____ Turb. (NTU) _____

Flow (MGD) _____ or (CFS) _____ or (g/min) _____

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
		4/7/20	1443
		4-7-20	1549

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Printed: 3/25/2020 2:51:08PM

Pace Analytical Services LLC Kentucky
P.O. Box 907
Madisonville, KY 42431

Chain of Custody

Scheduled for: 04/01/2020

Client: Big Rivers Electric Corporation Reid/Green Station

Project: Green Landfill Semiannual Groundwater

Report To:
Big Rivers Electric Corporation Reid/Green Station
Chad Phillips
PO Box 24
Henderson, KY 42419
Phone: (270) 844-6000
PWS ID#:
State: KY

Invoice To:
Big Rivers Electric Corporation Reid/Green Station
Chad Phillips
PO Box 24
Henderson, KY 42419
PO#: _____
Quote# _____

Please Print Legibly

Collected by (Signature): _____ *required information*

Compliance Monitoring? Yes ✓ No ___

Samples Chlorinated? Yes ___ No ___

*For composite samples please indicate begin time, end time and temp(oC) at end time below:

Influent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

Effluent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

MMLI USE ONLY Workorder # 0041376 Sample ID#	*required information* Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-03 G	4/7/20	1355	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub)	1	MW3A	g / c	Radium 228 (sub)
			Preservation Check: pH : ✓				
0041376-03 H	4/7/20	1355	AG 250mL pH<2 w/H2SO4	1	MW3A	g / c	TOC
			Preservation Check: pH : ✓				
0041376-04 A	4/7/20	955	Plastic 500mL pH<2 w/HNO3	1	MW4	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B
			Preservation Check: pH : ✓				

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) _____ Time (24 hr) _____

pH 6.86 Cond ~~(umho)~~ 8.09 Res Cl (mg/L) _____ Tot Cl (mg/L) _____ Free Cl (mg/L) _____

Temp (oC) 16.32 or (oF) _____ Static Water Level _____ DO (mg/L) _____ Turb. (NTU) _____

Flow (MGD) _____ or (CFS) _____ or (g/min) _____

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
		4/7/20	1443
		4-7-20	1549

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Compliance Monitoring? Yes ✓ No ___

Samples Chlorinated? Yes ___ No ___

*For composite samples please indicate begin time, end time and temp(oC) at end time below:

Influent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

Effluent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

MMLI USE ONLY Workorder # 0041376 Sample ID#	*required information* Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-04 B	4/7/20	955	Plastic 500mL pH<2 w/HNO3	1	MW4	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B
			Preservation Check: pH : ✓				
0041376-04 C	4/7/20	955	Plastic 1L	1	MW4	g / c	pH (Lab) Conductivity (Lab) TDS Sulfate 9056 Chloride 9056 Fluoride 9056
0041376-04 D	4/7/20	955	Plastic 500mL pH<2 w/H2SO4	1	MW4	g / c	COD TOC
			Preservation Check: pH : ✓				
0041376-04 E	4/7/20	955	Plastic 1L pH<2 w/HNO3 Rad 226 (Sub)	1	MW4	g / c	Radium 226 (sub)
			Preservation Check: pH : ✓				
0041376-04 F	4/7/20	955	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub)	1	MW4	g / c	Radium 228 (sub)
			Preservation Check: pH : ✓				

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) 4/7/20 Time (24 hr) 955

pH 6.70 Cond (~~umho~~) 6.77 Res Cl (mg/L) _____ Tot Cl (mg/L) _____ Free Cl (mg/L) _____

Temp (oC) 16.47 or (oF) _____ Static Water Level _____ DO (mg/L) _____ Turb. (NTU) _____

Flow (MGD) _____ or (CFS) _____ or (g/min) _____

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
		4/7/20	1443
		4-7-20	1549

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Compliance Monitoring? Yes ✓ No ___

Samples Chlorinated? Yes ___ No ___

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Influent: Start Date ___ Start time ___ End Date ___ End Time ___ Temp (oC) ___

Effluent: Start Date ___ Start time ___ End Date ___ End Time ___ Temp (oC) ___

MMLI USE ONLY Workorder # 0041376 Sample ID#	*required information* Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-04 G	4/7/20	955	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub)	1	MW4	g / c	Radium 228 (sub)
			Preservation Check: pH : ✓				
0041376-04 H	4/7/20	955	AG 250mL pH<2 w/H2SO4	1	MW4	g / c	TOC
			Preservation Check: pH : ✓				
0041376-05 A	4/7/20	1010	Plastic 500mL pH<2 w/HNO3	1	MW5	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B
			Preservation Check: pH : ✓				

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) 4/7/20 Time (24 hr) 955

pH 6.70 Cond ~~(umho)~~ 6.77 Res Cl (mg/L) ___ Tot Cl (mg/L) ___ Free Cl (mg/L) ___

Temp (oC) 16.47 or (oF) ___ Static Water Level ___ DO (mg/L) ___ Turb. (NTU) ___

Flow (MGD) ___ or (CFS) ___ or (g/min) ___

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
		4/7/20	1443
		4-7-20	1549

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Pace Analytical Services LLC Kentucky
P.O. Box 907
Madisonville, KY 42431

Chain of Custody

Scheduled for: 04/01/2020

Client: Big Rivers Electric Corporation Reid/Green Station

Project: Green Landfill Semiannual Groundwater

Report To:
Big Rivers Electric Corporation Reid/Green Station
Chad Phillips
PO Box 24
Henderson, KY 42419
Phone: (270) 844-6000
PWS ID#:
State: KY

Invoice To:
Big Rivers Electric Corporation Reid/Green Station
Chad Phillips
PO Box 24
Henderson, KY 42419
PO#: _____
Quote# _____

Please Print Legibly

Collected by (Signature): _____ *required information*

Compliance Monitoring? Yes ✓ No ___

Samples Chlorinated? Yes ___ No ___

*For composite samples please indicate begin time, end time and temp(oC) at end time below:

Influent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

Effluent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

MMLI USE ONLY Workorder # 0041376 Sample ID#	*required information* Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-05 B	4/7/20	1010	Plastic 500mL pH<2 w/HNO3	1	MW5	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B
			Preservation Check: pH : ✓				
0041376-05 C	4/7/20	1010	Plastic 1L	1	MW5	g / c	pH (Lab) Conductivity (Lab) TDS Sulfate 9056 Chloride 9056 Fluoride 9056
0041376-05 D	4/7/20	1010	Plastic 500mL pH<2 w/H2SO4	1	MW5	g / c	COD TOC
			Preservation Check: pH : ✓				
0041376-05 E	4/7/20	1010	Plastic 1L pH<2 w/HNO3 Rad 226 (Sub)	1	MW5	g / c	Radium 226 (sub)
			Preservation Check: pH : ✓				
0041376-05 F	4/7/20	1010	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub)	1	MW5	g / c	Radium 228 (sub)
			Preservation Check: pH : ✓				

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) 4/7/20 Time (24 hr) 1010

pH 6.77 ~~Cond (umho)~~ 6.25 Res Cl (mg/L) _____ Tot Cl (mg/L) _____ Free Cl (mg/L) _____

Temp (oC) 14.85 or (oF) _____ Static Water Level _____ DO (mg/L) _____ Turb. (NTU) _____

Flow (MGD) _____ or (CFS) _____ or (g/min) _____

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
		4/7/20	1443
		4-7-20	1549

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Madisonville, KY 42431

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PWS ID#:
State: KY

Invoice To:
Big Rivers Electric Corporation Reid/Green Station
Chad Phillips
PO Box 24
Henderson, KY 42419
PO#:
Quote#

Please Print Legibly

Collected by (Signature): *required information*

Compliance Monitoring? Yes ✓ No

Samples Chlorinated? Yes No

*For composite samples please indicate begin time, end time and temp(oC) at end time below:

Influent: Start Date ____ Start time ____ End Date ____ End Time ____ Temp (oC) ____

Effluent: Start Date ____ Start time ____ End Date ____ End Time ____ Temp (oC) ____

MMLI USE ONLY **Workorder # 0041376**

Sample ID#	Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-05 G	4/7/20	1010	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub) **Preservation Check: pH :** ~	1	MW5	g / c	Radium 228 (sub)
0041376-05 H	4/7/20	1010	AG 250mL pH<2 w/H2SO4 **Preservation Check: pH :** ✓	1	MW5	g / c	TOC
0041376-06 A	4/6/20	1420	Plastic 500mL pH<2 w/HNO3	1	MW6	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B

Preservation Check: pH : ✓

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) 4/7/20 Time (24 hr) 1010

pH 6.77 Cond (~~umho~~) 6.25 Res Cl (mg/L) ____ Tot Cl (mg/L) ____ Free Cl (mg/L) ____

Temp (oC) 14.85 or (oF) ____ Static Water Level ____ DO (mg/L) ____ Turb. (NTU) ____

Flow (MGD) ____ or (CFS) ____ or (g/min) ____

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
		4/7/20	1443
		4-7-20	1549

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Quote#

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Collected by (Signature): _____ *required information*

Compliance Monitoring? Yes ✓ No ___

Samples Chlorinated? Yes ___ No ___

*For composite samples please indicate begin time, end time and temp(oC) at end time below:

Influent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

Effluent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

MMLI USE ONLY Workorder # 0041376 Sample ID#	*required information* Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-06 B	4/6/20	1420	Plastic 500mL pH<2 w/HNO3	1	MW6	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B
			Preservation Check: pH : ✓				
0041376-06 C	4/6/20	1420	Plastic 1L	1	MW6	g / c	pH (Lab) Conductivity (Lab) TDS Sulfate 9056 Chloride 9056 Fluoride 9056
0041376-06 D	4/6/20	1420	Plastic 500mL pH<2 w/H2SO4	1	MW6	g / c	COD TOC
			Preservation Check: pH : ✓				
0041376-06 E	4/6/20	1420	Plastic 1L pH<2 w/HNO3 Rad 226 (Sub)	1	MW6	g / c	Radium 226 (sub)
			Preservation Check: pH : ✓				
0041376-06 F	4/6/20	1420	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub)	1	MW6	g / c	Radium 228 (sub)
			Preservation Check: pH : ✓				

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) 4/6/20 Time (24 hr) 1420

pH 6.36 Cond ~~(umho)~~ 5.01 Res Cl (mg/L) _____ Tot Cl (mg/L) _____ Free Cl (mg/L) _____

Temp (oC) 20.50 or (oF) _____ Static Water Level _____ DO (mg/L) _____ Turb. (NTU) _____

Flow (MGD) _____ or (CFS) _____ or (g/min) _____

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
		4/7/20	1443
		4-7-20	1549

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Pace Analytical Services LLC Kentucky
P.O. Box 907
Madisonville, KY 42431

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State: KY

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Big Rivers Electric Corporation Reid/Green Station
Chad Phillips
PO Box 24
Henderson, KY 42419
PO#: _____
Quote# _____

Please Print Legibly

Collected by (Signature): _____ *required information*

Compliance Monitoring? Yes ✓ No ___

Samples Chlorinated? Yes ___ No ___

*For composite samples please indicate begin time, end time and temp(oC) at end time below:

Influent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

Effluent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

MMLI USE ONLY Workorder # 0041376 Sample ID#	*required information* Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-06 G	4/6/20	1420	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub) **Preservation Check: pH :** ✓	1	MW6	g / c	Radium 228 (sub)
0041376-06 H	4/6/20	1420	AG 250mL pH<2 w/H2SO4 **Preservation Check: pH :** ✓	1	MW6	g / c	TOC
0041376-07 A	4/7/20	1020	Plastic 500mL pH<2 w/HNO3 **Preservation Check: pH :** ✓	1	DUPLICATE	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) 4/6/20 Time (24 hr) 1420

pH 6.36 Cond ~~(umho)~~ 5.01 Res Cl (mg/L) _____ Tot Cl (mg/L) _____ Free Cl (mg/L) _____

Temp (oC) 20.50 or (oF) _____ Static Water Level _____ DO (mg/L) _____ Turb. (NTU) _____

Flow (MGD) _____ or (CFS) _____ or (g/min) _____

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
[signature]	[signature]	4/7/20	1443
[signature]	[signature]	4-7-20	1549

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Henderson, KY 42419
PO#:
Quote#

Please Print Legibly

Collected by (Signature): *required information*

Compliance Monitoring? Yes L No ___

Samples Chlorinated? Yes ___ No ___

*For composite samples please indicate begin time, end time and temp(oC) at end time below:

Influent: Start Date ___ Start time ___ End Date ___ End Time ___ Temp (oC) ___

Effluent: Start Date ___ Start time ___ End Date ___ End Time ___ Temp (oC) ___

MMLI USE ONLY Workorder # 0041376 Sample ID#	*required information* Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-07 B	4/7/20	1020	Plastic 500mL pH<2 w/HNO3	1	DUPLICATE	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B
			Preservation Check: pH : ✓				
0041376-07 C	4/7/20	1020	Plastic 1L	1	DUPLICATE	g / c	pH (Lab) Conductivity (Lab) TDS Sulfate 9056 Chloride 9056 Fluoride 9056
0041376-07 D	4/7/20	1020	Plastic 500mL pH<2 w/H2SO4	1	DUPLICATE	g / c	COD TOC
			Preservation Check: pH : ✓				
0041376-07 E	4/7/20	1020	Plastic 1L pH<2 w/HNO3 Rad 226 (Sub)	1	DUPLICATE	g / c	Radium 226 (sub)
			Preservation Check: pH : ✓				
0041376-07 F	4/7/20	1020	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub)	1	DUPLICATE	g / c	Radium 228 (sub)
			Preservation Check: pH : ✓				

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) 4/7/20 Time (24 hr) 1020

pH 6.70 Cond ~~(umho)~~ 677 Res Cl (mg/L) ___ Tot Cl (mg/L) ___ Free Cl (mg/L) ___

Temp (oC) 16.47 or (oF) ___ Static Water Level ___ DO (mg/L) ___ Turb. (NTU) ___

Flow (MGD) ___ or (CFS) ___ or (g/min) ___

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
		4/7/20	1443
		4-7-20	1549

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Pace Analytical Services LLC Kentucky
P.O. Box 907
Madisonville, KY 42431

Chain of Custody

Scheduled for: 04/01/2020

Client: Big Rivers Electric Corporation Reid/Green Station

Project: Green Landfill Semiannual Groundwater

Report To:
Big Rivers Electric Corporation Reid/Green Station
Chad Phillips
PO Box 24
Henderson, KY 42419
Phone: (270) 844-6000
PWS ID#:
State: KY

Invoice To:
Big Rivers Electric Corporation Reid/Green Station
Chad Phillips
PO Box 24
Henderson, KY 42419
PO#: _____
Quote# _____

Please Print Legibly

Collected by (Signature): _____ *required information*

Compliance Monitoring? Yes ✓ No ___

Samples Chlorinated? Yes ___ No ___

*For composite samples please indicate begin time, end time and temp(oC) at end time below:

Influent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

Effluent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

MMLI USE ONLY **Workorder # 0041376**

Sample ID#	*required information* Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-07 G	4/7/20	1020	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub) **Preservation Check: pH :** ✓	1	DUPLICATE	g / c	Radium 228 (sub)
0041376-07 H	4/7/20	1020	AG 250mL pH<2 w/H2SO4 **Preservation Check: pH :** ✓	1	DUPLICATE	g / c	TOC
0041376-08 A	4/7/20	1150	Plastic 500mL pH<2 w/HNO3 **Preservation Check: pH :** ✓	1	FIELD BLANK	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B

Preservation Check Performed by: CLH

Field data collected by: Phillip Hall Date (mm/dd/yy) 4/7/20 Time (24 hr) 1020

pH 6.70 Cond ~~(umho)~~ 6.77 Res Cl (mg/L) _____ Tot Cl (mg/L) _____ Free Cl (mg/L) _____

Temp (oC) 16.47 or (oF) _____ Static Water Level _____ DO (mg/L) _____ Turb. (NTU) _____

Flow (MGD) _____ or (CFS) _____ or (g/min) _____

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
		4/7/20	1447
		4-7-20	1549

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Quote# _____

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Collected by (Signature): _____ *required information*

Compliance Monitoring? Yes ✓ No ___

Samples Chlorinated? Yes ___ No ___

*For composite samples please indicate begin time, end time and temp(oC) at end time below:

Influent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

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MMLI USE ONLY **Workorder # 0041376**

Sample ID#	Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-08 B	4/7/20	1150	Plastic 500mL pH<2 w/HNO3	1	FIELD BLANK	g / c	Beryllium Tot 6020 Cadmium Tot 6020 Calcium Tot 6010B Barium Tot 6020 Chromium Tot 6020 Cobalt Tot 6020 Arsenic Tot 6020 Boron Tot 6010B Copper Tot 6020 Antimony Tot 6020 Lead Tot 6020 Lithium Tot 6020 Mercury Tot 6020 Molybdenum Tot 6020 Sodium Tot 6010B
			Preservation Check: pH : ✓				
0041376-08 C	4/7/20	1150	Plastic 1L	1	FIELD BLANK	g / c	pH (Lab) Conductivity (Lab) TDS Sulfate 9056 Chloride 9056 Fluoride 9056
0041376-08 D	4/7/20	1150	Plastic 500mL pH<2 w/H2SO4	1	FIELD BLANK	g / c	COD TOC
			Preservation Check: pH : ✓				
0041376-08 E	4/7/20	1150	Plastic 1L pH<2 w/HNO3 Rad 226 (Sub)	1	FIELD BLANK	g / c	Radium 226 (sub)
			Preservation Check: pH : ✓				
0041376-08 F	4/7/20	1150	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub)	1	FIELD BLANK	g / c	Radium 228 (sub)
			Preservation Check: pH : ✓				

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) 4/7/20 Time (24 hr) 1150

pH _____ Cond (umho) _____ Res Cl (mg/L) _____ Tot Cl (mg/L) _____ Free Cl (mg/L) _____

Temp (oC) _____ or (oF) _____ Static Water Level _____ DO (mg/L) _____ Turb. (NTU) _____

Flow (MGD) _____ or (CFS) _____ or (g/min) _____

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
		4/7/20	1443
		4-7-20	1549

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Collected by (Signature): _____ *required information*

Compliance Monitoring? Yes ✓ No ___

Samples Chlorinated? Yes ___ No ___

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Effluent: Start Date _____ Start time _____ End Date _____ End Time _____ Temp (oC) _____

MMLI USE ONLY **Workorder # 0041376**

Sample ID#	Date (mm/dd/yy):	Collection Time (24 hr):	Bottle and Preservative	Containers	Sample Description	Composite	Sample Analysis Requested
0041376-08 G	4/7/20	1150	Plastic 1L pH<2 w/HNO3 Rad 228 (Sub) **Preservation Check: pH :** ✓	1	FIELD BLANK	g / c	Radium 228 (sub)
0041376-08 H	4/7/20	1150	AG 250mL pH<2 w/H2SO4 **Preservation Check: pH :** ✓	1	FIELD BLANK	g / c	TOC
			HNO3 **Preservation Check: pH :** ____	1			Be [illegible] 6020 Cadmium Tot [illegible] Tot 6010B Cadmium Tot 60[illegible] Cobalt Tot [illegible] Tot 6020 Iron Tot [illegible] Tot 6020 Antimony Tot [illegible] 6020 Molybdenum [illegible] 6020 Sodium Tot 6010B

Preservation Check Performed by: CLH

Field data collected by: Phillip Hill Date (mm/dd/yy) 4/7/20 Time (24 hr) 1150

pH _____ Cond (umho) _____ Res Cl (mg/L) _____ Tot Cl (mg/L) _____ Free Cl (mg/L) _____

Temp (oC) _____ or (oF) _____ Static Water Level _____ DO (mg/L) _____ Turb. (NTU) _____

Flow (MGD) _____ or (CFS) _____ or (g/min) _____

Relinquished by: (Signature)	Received by: (Signature)	Date (mm/dd/yy)	Time (24 hr)
		4/7/20	1443
		4-7-20	1549

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Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

April 30, 2020

Rob Whittington
Pace Analytical Madisonville
825 Industrial Rd
Madisonville, KY 42431

RE: Project: 41376
Pace Project No.: 30358430

Dear Rob Whittington:

Enclosed are the analytical results for sample(s) received by the laboratory on April 10, 2020. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Greensburg

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carin A. Ferris

Carin Ferris
carin.ferris@pacelabs.com
724-850-5615
Project Manager

Enclosures

cc: Doug Wolfe, Pace Analytical Madisonville

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: 41376
Pace Project No.: 30358430

Pace Analytical Services Pennsylvania
1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: 41376
Pace Project No.: 30358430

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30358430001	**0041376-01**	Water	04/06/20 13:05	04/10/20 09:15
30358430002	**0041376-02**	Water	04/07/20 11:40	04/10/20 09:15
30358430003	**0041376-03**	Water	04/07/20 13:55	04/10/20 09:15
30358430004	**0041376-04**	Water	04/07/20 09:55	04/10/20 09:15
30358430005	**0041376-05**	Water	04/07/20 10:10	04/10/20 09:15
30358430006	**0041376-06**	Water	04/06/20 14:20	04/10/20 09:15
30358430007	**0041376-07**	Water	04/07/20 10:20	04/10/20 09:15
30358430008	**0041376-08**	Water	04/07/20 11:50	04/10/20 09:15

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Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: 41376
Pace Project No.: 30358430

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30358430001	**0041376-01**	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
30358430002	**0041376-02**	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
30358430003	**0041376-03**	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
30358430004	**0041376-04**	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
30358430005	**0041376-05**	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
30358430006	**0041376-06**	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
30358430007	**0041376-07**	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
30358430008	**0041376-08**	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA

PASI-PA = Pace Analytical Services - Greensburg

Pace Analytical Services, LLC
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Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 41376
Pace Project No.: 30358430

Sample: 0041376-01 **Lab ID: 30358430001** Collected: 04/06/20 13:05 Received: 04/10/20 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection dates and times were not present on the sample containers.
• Upon receipt at the laboratory, 5 mls of nitric acid were added to the sample to meet the sample preservation requirement of pH <2 for radiochemistry analysis.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
		Pace Analytical Services - Greensburg				
Radium-226	EPA 903.1	**0.340 ± 0.473 (0.799) C:NA T:94%**	pCi/L	04/30/20 11:27	13982-63-3	
		Pace Analytical Services - Greensburg				
Radium-228	EPA 904.0	**0.468 ± 0.409 (0.828) C:72% T:87%**	pCi/L	04/28/20 11:04	15262-20-1	
		Pace Analytical Services - Greensburg				
Total Radium	Total Radium Calculation	**0.808 ± 0.882 (1.63)**	pCi/L	04/30/20 14:19	7440-14-4	

Sample: 0041376-02 **Lab ID: 30358430002** Collected: 04/07/20 11:40 Received: 04/10/20 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection dates and times were not present on the sample containers.
• Upon receipt at the laboratory, 5 mls of nitric acid were added to the sample to meet the sample preservation requirement of pH <2 for radiochemistry analysis.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
		Pace Analytical Services - Greensburg				
Radium-226	EPA 903.1	**0.513 ± 0.402 (0.472) C:NA T:88%**	pCi/L	04/30/20 11:27	13982-63-3	
		Pace Analytical Services - Greensburg				
Radium-228	EPA 904.0	**0.0161 ± 0.343 (0.794) C:70% T:88%**	pCi/L	04/28/20 11:04	15262-20-1	
		Pace Analytical Services - Greensburg				
Total Radium	Total Radium Calculation	**0.529 ± 0.745 (1.27)**	pCi/L	04/30/20 14:19	7440-14-4	

Sample: 0041376-03 **Lab ID: 30358430003** Collected: 04/07/20 13:55 Received: 04/10/20 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection dates and times were not present on the sample containers.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
		Pace Analytical Services - Greensburg				
Radium-226	EPA 903.1	**0.603 ± 0.577 (0.878) C:NA T:77%**	pCi/L	04/30/20 11:27	13982-63-3	
		Pace Analytical Services - Greensburg				
Radium-228	EPA 904.0	**0.460 ± 0.444 (0.914) C:68% T:85%**	pCi/L	04/28/20 11:04	15262-20-1	
		Pace Analytical Services - Greensburg				
Total Radium	Total Radium Calculation	**1.06 ± 1.02 (1.79)**	pCi/L	04/30/20 14:19	7440-14-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 41376
Pace Project No.: 30358430

Sample: 0041376-04 **Lab ID: 30358430004** Collected: 04/07/20 09:55 Received: 04/10/20 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection dates and times were not present on the sample containers.
• Upon receipt at the laboratory, 5 mls of nitric acid were added to the sample to meet the sample preservation requirement of pH <2 for radiochemistry analysis.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
		Pace Analytical Services - Greensburg				
Radium-226	EPA 903.1	**0.476 ± 0.455 (0.693) C:NA T:95%**	pCi/L	04/30/20 11:27	13982-63-3	
		Pace Analytical Services - Greensburg				
Radium-228	EPA 904.0	**0.787 ± 0.428 (0.770) C:74% T:84%**	pCi/L	04/28/20 11:04	15262-20-1	
		Pace Analytical Services - Greensburg				
Total Radium	Total Radium Calculation	**1.26 ± 0.883 (1.46)**	pCi/L	04/30/20 14:19	7440-14-4	

Sample: 0041376-05 **Lab ID: 30358430005** Collected: 04/07/20 10:10 Received: 04/10/20 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection dates and times were not present on the sample containers.
• Upon receipt at the laboratory, 5 mls of nitric acid were added to the sample to meet the sample preservation requirement of pH <2 for radiochemistry analysis.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
		Pace Analytical Services - Greensburg				
Radium-226	EPA 903.1	**0.302 ± 0.371 (0.605) C:NA T:95%**	pCi/L	04/30/20 11:27	13982-63-3	
		Pace Analytical Services - Greensburg				
Radium-228	EPA 904.0	**1.18 ± 0.498 (0.824) C:71% T:90%**	pCi/L	04/28/20 11:05	15262-20-1	
		Pace Analytical Services - Greensburg				
Total Radium	Total Radium Calculation	**1.48 ± 0.869 (1.43)**	pCi/L	04/30/20 14:19	7440-14-4	

Sample: 0041376-06 **Lab ID: 30358430006** Collected: 04/06/20 14:20 Received: 04/10/20 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection dates and times were not present on the sample containers.
• Upon receipt at the laboratory, 5 mls of nitric acid were added to the sample to meet the sample preservation requirement of pH <2 for radiochemistry analysis.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
		Pace Analytical Services - Greensburg				
Radium-226	EPA 903.1	**0.0612 ± 0.279 (0.166) C:NA T:90%**	pCi/L	04/30/20 11:27	13982-63-3	
		Pace Analytical Services - Greensburg				
Radium-228	EPA 904.0	**0.683 ± 0.478 (0.939) C:68% T:88%**	pCi/L	04/28/20 11:05	15262-20-1	

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 41376
Pace Project No.: 30358430

Sample: 0041376-06 **Lab ID: 30358430006** Collected: 04/06/20 14:20 Received: 04/10/20 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection dates and times were not present on the sample containers.
• Upon receipt at the laboratory, 5 mls of nitric acid were added to the sample to meet the sample preservation requirement of pH <2 for radiochemistry analysis.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
		Pace Analytical Services - Greensburg				
Total Radium	Total Radium Calculation	**0.744 ± 0.757 (1.11)**	pCi/L	04/30/20 14:19	7440-14-4	

Sample: 0041376-07 **Lab ID: 30358430007** Collected: 04/07/20 10:20 Received: 04/10/20 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection dates and times were not present on the sample containers.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
		Pace Analytical Services - Greensburg				
Radium-226	EPA 903.1	**0.371 ± 0.345 (0.455) C:NA T:83%**	pCi/L	04/30/20 11:27	13982-63-3	
		Pace Analytical Services - Greensburg				
Radium-228	EPA 904.0	**1.10 ± 0.486 (0.817) C:74% T:84%**	pCi/L	04/28/20 11:05	15262-20-1	
		Pace Analytical Services - Greensburg				
Total Radium	Total Radium Calculation	**1.47 ± 0.831 (1.27)**	pCi/L	04/30/20 14:19	7440-14-4	

Sample: 0041376-08 **Lab ID: 30358430008** Collected: 04/07/20 11:50 Received: 04/10/20 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Upon receipt at the laboratory, 5 mls of nitric acid were added to the sample to meet the sample preservation requirement of pH <2 for radiochemistry analysis.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
		Pace Analytical Services - Greensburg				
Radium-226	EPA 903.1	**0.224 ± 0.515 (0.933) C:NA T:94%**	pCi/L	04/30/20 11:40	13982-63-3	
		Pace Analytical Services - Greensburg				
Radium-228	EPA 904.0	**0.262 ± 0.427 (0.928) C:74% T:84%**	pCi/L	04/28/20 11:05	15262-20-1	
		Pace Analytical Services - Greensburg				
Total Radium	Total Radium Calculation	**0.486 ± 0.942 (1.86)**	pCi/L	04/30/20 14:19	7440-14-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: 41376
Pace Project No.: 30358430

QC Batch: 392089 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 30358430001, 30358430002, 30358430003, 30358430004, 30358430005, 30358430006, 30358430007, 30358430008

METHOD BLANK: 1898525 Matrix: Water
Associated Lab Samples: 30358430001, 30358430002, 30358430003, 30358430004, 30358430005, 30358430006, 30358430007, 30358430008

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.230 ± 0.329 (0.705) C:78% T:76%	pCi/L	04/28/20 11:05	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
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QUALITY CONTROL - RADIOCHEMISTRY

Project: 41376
Pace Project No.: 30358430

QC Batch: 392088 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 30358430001, 30358430002, 30358430003, 30358430004, 30358430005, 30358430006, 30358430007, 30358430008

METHOD BLANK: 1898523 Matrix: Water
Associated Lab Samples: 30358430001, 30358430002, 30358430003, 30358430004, 30358430005, 30358430006, 30358430007, 30358430008

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.176 ± 0.366 (0.660) C:NA T:95%	pCi/L	04/30/20 11:27	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: 41376
Pace Project No.: 30358430

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty: For Safe Drinking Water Act (SDWA) analyses, the reported Unc. Is the calculated Count Uncertainty (95% confidence interval) using a coverage factor of 1.96. For all other matrices (non-SDWA), the reported Unc. is the calculated Expanded Uncertainty (aka Combined Standard Uncertainty, CSU), reported at the 95% confidence interval using a coverage factor of 1.96.

Gamma Spec: The Unc. reported for all gamma-spectroscopy analyses (EPA 901.1), is the calculated Expanded Uncertainty (CSU) at the 95.4% confidence interval, using a coverage factor of 2.0.

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

SAMPLE QUALIFIERS

Sample: 30358430007

[2] Upon receipt at the laboratory, 5 mls of nitric acid were added to the sample to meet the sample preservation requirement of pH <2 for radiochemistry analysis.

Sample: 30358430008

[1] Sample collection dates and times were not present on the sample containers.

Chain of Custody

Pace Analytical
www.pacelabs.com

Workorder: 41376 Workorder Name: Green Landfill Semiannual Owner Received Date: 4/7/2020 Results Requested By:

Report To:	Subcontract To:	Requested Analysis

McCoy & McCoy Labs
P.O. Box 907
Madisonville, KY 42409
270-821-7375
r.whittington@mccoylabs.com

Pace Analytical Services LLC Greensburg PA
1638 Rosey Town Rd Suite 2,3,4
Greensburg, PA 15601
(724) 850-5615

WO# : 30358430

30358430

Item	Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix ~~Drinking~~	Preserved Containers					EPA 903.1	EPA 904.0 Radium Sum Calc	LAB USE ONLY
1													
2	0041376-01		04/06/20 13:05	IR44-McCoy	Water						X	X	001
3	0041376-02		04/07/20 11:40	IR44-McCoy	Water						X	X	002
4	0041376-03		04/07/20 13:55	IR44-McCoy	Water						X	X	003
5	0041376-04		04/07/20 09:55	IR44-McCoy	Water						X	X	004
6	0041376-05		04/07/20 10:10	IR44-McCoy	Water						X	X	005
7	0041376-06		04/06/20 14:20	IR44-McCoy	Water						X	X	006
8	0041376-07		04/07/20 10:20	IR44-McCoy	Water						X	X	007
9	0041376-08		04/07/20 11:50	IR44-McCoy	Water						X	X	008
10													

Transfers	Released By	Date/Time	Reveived By	Date/Time	Comments
1			Nicole Rund	4/10/2020 0915	
2					
3					

Cooler Temperature on Receipt 4.7 °C	Custody Seal Y or (N)	Received on Ice (Y) or N	Sample Intact (Y) or N

***In order to maintain client confidentiality, location/name of the sampling site, sampler's name and signature may not be provided on this COC
This chain of custody is considered complete as is since this information is available in the owner laboratory.

SUBCONTRACT ORDER

Pace Analytical Services, LLC Kentucky

0041376

30358430

SENDING LABORATORY:

Pace Analytical Services, LLC Kentucky
PO BOX 907
Madisonville, KY 42431
Phone: (270) 821-7375
Fax: 844-270-7904
Project Manager: Rob Whittington

RECEIVING LABORATORY:

Pace Analytical Services LLC Greensburg PA
1638 Rosey Town Rd Suite 2,3,4
Greensburg, PA 15601
Phone :(724) 850-5615
Fax:

Please return shipping cooler to return address on shipping label.

Analysis		Expires	Laboratory ID	Comments
Sample ID: 0041376-01	**Water**	**Sampled:04/06/2020 13:05**	**Specific Method**	
Radium 228 (sub)		10/03/2020 13:05	EPA 904.0 Radium Sum C	
Radium Total (sub)		10/03/2020 13:05	EPA 904.0 Radium Sum C	
Radium 226 (sub)		10/03/2020 13:05	EPA 903.1	
Sample ID: 0041376-02	**Water**	**Sampled:04/07/2020 11:40**	**Specific Method**	
Radium 226 (sub)		10/04/2020 11:40	EPA 903.1	
Radium 228 (sub)		10/04/2020 11:40	EPA 904.0 Radium Sum C	
Radium Total (sub)		10/04/2020 11:40	EPA 904.0 Radium Sum C	
Sample ID: 0041376-03	**Water**	**Sampled:04/07/2020 13:55**	**Specific Method**	
Radium Total (sub)		10/04/2020 13:55	EPA 904.0 Radium Sum C	
Radium 226 (sub)		10/04/2020 13:55	EPA 903.1	
Radium 228 (sub)		10/04/2020 13:55	EPA 904.0 Radium Sum C	
Sample ID: 0041376-04	**Water**	**Sampled:04/07/2020 09:55**	**Specific Method**	
Radium 226 (sub)		10/04/2020 09:55	EPA 903.1	
Radium 228 (sub)		10/04/2020 09:55	EPA 904.0 Radium Sum C	
Radium Total (sub)		10/04/2020 09:55	EPA 904.0 Radium Sum C	
Sample ID: 0041376-05	**Water**	**Sampled:04/07/2020 10:10**	**Specific Method**	
Radium 228 (sub)		10/04/2020 10:10	EPA 904.0 Radium Sum C	
Radium Total (sub)		10/04/2020 10:10	EPA 904.0 Radium Sum C	
Radium 226 (sub)		10/04/2020 10:10	EPA 903.1	
Sample ID: 0041376-06	**Water**	**Sampled:04/06/2020 14:20**	**Specific Method**	
Radium 226 (sub)		10/03/2020 14:20	EPA 903.1	
Radium 228 (sub)		10/03/2020 14:20	EPA 904.0 Radium Sum C	
Radium Total (sub)		10/03/2020 14:20	EPA 904.0 Radium Sum C	

Released By	Date	Received By	Date
[signature]	04.09.20		
Released By	Date	Received By	Date

SUBCONTRACT ORDER

Pace Analytical Services, LLC Kentucky # 30358430

0041376

Analysis		Expires	Laboratory ID	Comments
Sample ID: 0041376-07	**Water**	**Sampled:04/07/2020 10:20**	**Specific Method**	
Radium 226 (sub)		10/04/2020 10:20	EPA 903.1	
Radium 228 (sub)		10/04/2020 10:20	EPA 904.0 Radium Sum C	
Radium Total (sub)		10/04/2020 10:20	EPA 904.0 Radium Sum C	
Sample ID: 0041376-08	**Water**	**Sampled:04/07/2020 11:50**	**Specific Method**	
Radium Total (sub)		10/04/2020 11:50	EPA 904.0 Radium Sum C	
Radium 226 (sub)		10/04/2020 11:50	EPA 903.1	
Radium 228 (sub)		10/04/2020 11:50	EPA 904.0 Radium Sum C	

Released By	Date	Received By	Date
[signature]	04.09.20		
Released By	Date	Received By	Date

Sample Custody

30358430

By Nancy Yeager

Printed 04/09/2020 09:05

Lab ID	Container	Cooler	Last Own	Departme	Location	Home Locat	Status	Disposition	Custody Date
0041376-01	Plastic 1L pH<2 w/HNO3 Rad 226 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-01	Plastic 1L pH<2 w/HNO3 Rad 228 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-02	Plastic 1L pH<2 w/HNO3 Rad 226 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-02	Plastic 1L pH<2 w/HNO3 Rad 228 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-03	Plastic 1L pH<2 w/HNO3 Rad 226 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-03	Plastic 1L pH<2 w/HNO3 Rad 228 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-04	Plastic 1L pH<2 w/HNO3 Rad 226 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-04	Plastic 1L pH<2 w/HNO3 Rad 228 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-05	Plastic 1L pH<2 w/HNO3 Rad 226 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-05	Plastic 1L pH<2 w/HNO3 Rad 228 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-06	Plastic 1L pH<2 w/HNO3 Rad 226 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-06	Plastic 1L pH<2 w/HNO3 Rad 228 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-07	Plastic 1L pH<2 w/HNO3 Rad 226 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-07	Plastic 1L pH<2 w/HNO3 Rad 228 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-08	Plastic 1L pH<2 w/HNO3 Rad 226 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05
0041376-08	Plastic 1L pH<2 w/HNO3 Rad 228 (Sefa	Default Coole	NDY		Wet Chem In-Transit		Batched Active (Out)		04/09/2020 09:05

Relinquished By _____ Date _____ Received By _____ Date _____

Relinquished By _____ Date _____ Received By _____ Date _____

Pittsburgh Lab Sample Condition Upon Receipt

Pace Analytical

Client Name: McCoy & McCoy Project # # 30358430

Courier: ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Label BUM
LIMS Login BUM

Tracking #: 110733861178

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Thermometer Used 11 Type of Ice: (Wet) Blue None

Cooler Temperature Observed Temp 5.1 °C Correction Factor: -0.4 °C Final Temp: 4.7 °C

Temp should be above freezing to 6°C

pH paper Lot# 10D0391 Date and Initials of person examining contents: NMR 4/10/2020

Comments:	Yes	No	N/A	
Chain of Custody Present:	✓			1.
Chain of Custody Filled Out:	✓			2.
Chain of Custody Relinquished:	✓			3.
Sampler Name & Signature on COC:		✓		4.
Sample Labels match COC: -Includes date/time/ID Matrix: WT		✓		5. no date & time on labels
Samples Arrived within Hold Time:	✓			6.
Short Hold Time Analysis (<72hr remaining):		✓		7.
Rush Turn Around Time Requested:		✓		8.
Sufficient Volume:	✓			9.
Correct Containers Used: -Pace Containers Used:	✓			10.
Containers Intact:	✓			11.
Orthophosphate field filtered			✓	12.
Hex Cr Aqueous sample field filtered			✓	13.
Organic Samples checked for dechlorination:			✓	14.
Filtered volume received for Dissolved tests			✓	15.
All containers have been checked for preservation. exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix	✓			16. added 5.0mL HNO_3 to each sample
All containers meet method preservation requirements.		✓		Initial when completed: NMR Date/time of preservation: 4/10/2020 1610
				Lot # of added preservative: DL20-0362
Headspace in VOA Vials (>6mm):			✓	17.
Trip Blank Present:		✓		18.
Trip Blank Custody Seals Present			✓	
Rad Samples Screened < 0.5 mrem/hr	✓			Initial when completed: NMR Date: 4/10/2020

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

☐ **A check in this box indicates that additional information has been stored in ereports.**

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

***PM review** is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

Appendix E
Remedy Selection Evaluation Criteria

TABLE E-1. Summary of Evaluation Criteria
Groundwater Remedy Selection
Big Rivers Electric Corporation - Green Landfill

40 CFR 257.97 Reference	Corrective Measure Evaluation Criteria under 40 CFR 257.97	Corrective Measure Alternative			
		Alt 2a	Alt 3	Alt 4	Alt 5
	Threshold Criteria				
(b)(1)	Be protective of human health and the environment	1	3	3	3
(b)(2)	Attain the Groundwater Protection Standards	1	3.5	2	3.5
(b)(3)	Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of Appendix IV constituents into the environment	1	3	2	4
(b)(4)	Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems	1	3	2	4
(b)(5)	Comply with standards for management of wastes as specified in Section 257.98(d)	2.5	2.5	2.5	2.5
	Balancing Criteria				
(c)(1)	The long and short-term effectiveness of the potential remedy(s), along with the degree of certainty that the remedy will prove successful based on a consideration of the following:				
(c)(1)(i)	Magnitude of reduction of existing risks	1	4	3	2
(c)(1)(ii)	Magnitude of residual risks in terms of likelihood of further releases due to CCR remaining following implementation of a remedy	1	3.5	3.5	2
(c)(1)(iii)	The type and degree of long-term management required, including monitoring, operation, and maintenance	1	2.5	2.5	4
(c)(1)(iv)	Short-term risks that might be posed to the community or the environment during implementation of such a remedy, including potential threats to human health and the environment associated with excavation, transportation, and re-disposal of contaminant	1	3	2	4
(c)(1)(v)	Time until full protection is achieved	1	3	2	4
(c)(1)(vi)	Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, or containment;	1	3	2	4
(c)(1)(vii)	Long-term reliability of the engineering and institutional controls	1	3	2	4
(c)(1)(viii)	Potential need for replacement of the remedy	4	2	1	3
(c)(2)	The effectiveness of the remedy in controlling the source to reduce further releases based on consideration of the following factors:				
(c)(2)(i)	The extent to which containment practices will reduce further releases	1	3	2	4
(c)(2)(ii)	The extent to which treatment technologies may be used	1	4	3	2
(c)(3)	The ease or difficulty of implementing a potential remedy(s) based on consideration of the following types of factors				
(c)(3)(i)	Degree of difficulty associated with constructing the technology	4	2	1	3
(c)(3)(ii)	Expected operational reliability of the technologies	4	2	1	3
(c)(3)(iii)	Need to coordinate with and obtain necessary approvals and permits from other agencies	2.5	2.5	2.5	2.5
(c)(3)(iv)	Availability of necessary equipment and specialists	4	2	1	3
(c)(3)(v)	Available capacity and location of needed treatment, storage, and disposal services	1	2	3	4
	Modifying Criteria				
(c)(4)	The degree to which community concerns are addressed by a potential remedy(s)				
NA (Agreed Order)	State Acceptance	1	3.5	3.5	2
(c)(4)	Community Acceptance	1	3.5	3.5	2
	Total Score =	**37**	**63.5**	**50**	**69.5**

TABLE E-2. Threshold Criteria Evaluation
Groundwater Remedy Selection
Big Rivers Electric Corporation - Green Landfill

40 CFR 257.97 Reference	Corrective Measure Evaluation Criteria under 40 CFR 257.97	Corrective Measure Alternative				Benefit Analysis
		Alt 2a	Alt 3	Alt 4	Alt 5	
Threshold Criteria						
(b)(1)	Be protective of human health and the environment (HH&E)	1	3	3	3	All 4 alternatives are expected to be protective of HH&E. **Alt 2a** is considered to be the minimum corrective action that would be required to achieve the CAOs, with the other 3 alternatives building to some degree upon Alt 2a. However Alt 2a relies upon natural attenuation to achieve and ultimately meet the CAOs and therefore has been scored lower for this criteria. The other 3 alternatives are expected to be protective of HH&E to the same degree and have been scored equally.
(b)(2)	Attain the Groundwater Protection Standards (GWPS)	1	3.5	2	3.5	All 4 alternatives are expected to meet the GWPS, however the time frame for attainment is expected to vary based upon the degree to which the alternative employs an active component and how long the active component will take to design and implement. **Alt 2a** employs no active remedial component and has been scored lowest. Implementation of other source control measures (included with Alt 3 and Alt 5) is viewed as the corrective measure likely to provide a benefit in the shortest time frame. Addition of hydraulic/physical containment technologies combined with ex-situ treatment associated with **Alt 3** and **Alt 4** will required additional engineering and pilot testing, likely extending the time required for implementation. **Alt 4** would require enhanced engineering and testing compared to **Alt 3** so it was ranked lower than **Alt 3**. The **Alt 3** and **Alt 5** alternatives are likely to attain the GWPS in the shortest time frame and have been scored highest.
(b)(3)	Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of Appendix IV constituents into the environment	1	3	2	4	All 4 alternatives are expected to reduce or eliminate further releases of Appendix IV constituents. Alt 2a is considered to be the minimum corrective action that would be required to achieve the CAOs, with the other 3 alternatives building to some degree upon Alt 2a. However Alt 2a relies upon natural attenuation to achieve ultimately meet the CAOs and therefore has been scored lowest for this criteria. Alt 3 and Alt 4 incorporate active remedial components to remove COCs from the environment. Given that Alt 3 and Alt 4 incorporate an ex-situ component, both represent slightly higher potential for furthers releases into the environment compared with Alt 5. Given that Alt 3 contains a source control component it scores higher than Alt 4. Alt 5 will prevent further releases by removing source material from the South Sediment Basin and is not seen to represent as much of a environmental risk via a release to surface water receptors as Alt 3 and Alt 4.
(b)(4)	Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems	1	3	2	4	All 4 alternatives are expected to remove contamination from the environment. Alt 2a employs no active remedial component and has been scored lowest of all. Both Alt 3 and Alt 4 incorporate an active remedial component to remove COCs from the environment, but incorporate engineering and ex-situ components, representing a slight probability of impacting sensitive ecosystems and have been scored lower compared to Alt 5. Both Alt 3 and Alt 5 incorporate removing source material from the South Sediment Basin and other source control measures, in addition to addressing groundwater impacts. Due to the lack of an ex-situ component, Alt 5 has been scored highest of all.
(b)(5)	Comply with standards for management of wastes as specified in Section 257.98(d) [See Notes]	2.5	2.5	2.5	2.5	All 4 alternatives are expected to comply with waste management standards to the same degree and have been scored equally.
	SUBTOTALS	**6.5**	**15**	**11.5**	**17**	

notes:

1) Alternative #2a (A2a): CiP, ICs, and Groundwater Monitoring
2) Alternative #3 (A3): CiP, Hydraulic Containment, Other Source Control (consisting of seepage collection and treatment), Ex-Situ Treatment, ICs, and Groundwater Monitoring
3) Alternative #4 (A4): CiP, Physical Containment, Ex-Situ Treatment, ICs, and Groundwater Monitoring
4) Alternative #5 (A5): CiP, Other Source Control, ICs, and Groundwater Monitoring
5) Ranking scores range from 1 to 4; 1 = lowest ranking score; 4 = highest ranking score
6) When alternatives are all equivalent the ranking is assigned as the average value of all possible ranking (i.e., (1+2+3+4)/4 = 2.5)

TABLE E-3. Balancing Criteria Evaluation
Groundwater Remedy Selection
Big Rivers Electric Corporation - Green Landfill

40 CFR 257.97 Reference	Corrective Measure Evaluation Criteria under 40 CFR 257.97	Corrective Measure Alternative Alt 2a	Alt 3	Alt 4	Alt 5	Benefit Analysis
	Balancing Criteria					
(c)(1)	The long and short-term effectiveness of the potential remedy(s), along with the degree of certainty that the remedy will prove successful based on a consideration of the following:					
(c)(1)(i)	Magnitude of reduction of existing risks	1	4	3	2	All 4 alternatives are expected to result in a reduction of existing risks. Alt 2a is considered to be the minimum corrective action that would be required to achieve the CAOs, with the other 3 alternatives building to some degree upon Alt 2a. However Alt 2a relies upon natural attenuation to ultimately achieve the CAOs and therefore has been scored lowest for this criteria. Alt 3 and Alt 4 incorporate an active remedial component to remove COCs from the environment, which is considered to be effective at reducing existing risks. Given that Alt 4 incorporates an ex-situ component, it does represent slightly higher existing risk than Alt 3. Alt 5 on itis own provides for some reduction of existing risks by removing source material from the South Sediment Basin, but scores lower than Alt 3 and Alt 4.
(c)(1)(ii)	Magnitude of residual risks in terms of likelihood of further releases due to CCR remaining following implementation of a remedy [See Note]	1	3.5	3.5	2	All 4 alternatives are expected to result in a reduction of residual risks due to further releases but allow for CCR to remain in place indefinitely. **Alt 2a** employs no active component for containing further releases and has been scored lowest of all. **Alt 3** will reduce further releases due to the hydraulic containment provided by a groundwater extraction system and the ability of treatment to remove COCs from the environment. **Alt 4** will reduce further releases due to the implementation of physical containment and treatment of groundwater to remove COCs from the environment. **Alt 5** would also reduce further releases to the environment, but due to the uncertainty with regard to the impacts observed at MW-3A scored slightly lower. **Alt 3** and **Alt 4** are considered to be equal with regard to this criteria.
(c)(1)(iii)	The type and degree of long-term management required, including monitoring, operation, and maintenance [See Note]	1	2.5	2.5	4	**Alt 2a** will only achieve the established CAO at the end of the Unit operational lifecycle after cap construction, which estimated to be at least 100 years after CiP construction. As a result, **Alt 2a** will require the most long-term management and has been scored lowest of all. Although the source control component included with **Alt 5** will require some longer term maintenance, both **Alt 3** and **Alt 4** incorporate treatment components requiring considerable expenditure of resources and energy during construction, implementation, and long-term operation. Therefore, **Alt 5** has been scored highest of all the alternatives. **Alt 3** and **Alt 4** are considered to be equal with regard to this criteria.
(c)(1)(iv)	Short-term risks that might be posed to the community or the environment during implementation of such a remedy, including potential threats to human health and the environment associated with excavation, transportation, and re-disposal of contaminant	1	3	2	4	All 4 alternatives contain some level of short-term risk. Alt 2a employs no active remedial component and has been scored lowest of all. Given that Alt 3 and Alt 4 incorporate an ex-situ component, both represent slightly higher potential for furthes releases into the environment compared with Alt 5. Given that Alt 3 contains a source control component it scores higher than Alt 4. Alt 5 does require removing source material from the South Sediment Basin but is not seen to represent as much risk to the environment during excavation compared to Alt 3 and Alt 4.
(c)(1)(v)	Time until full protection is achieved	1	3	2	4	Alt 2a will achieve the established CAO at the end of the Unit operational lifecycle after cap construction, which would hault source loading to groundwater, and further allow unimpacted groundwater to flush through the aquifer. The time period for attainment of Alt 2a is estimated to be at least 100 years after CiP construction. Alt 3 would attain the established CAO for the Unit after hydraulic containment eliminates the offsite migration of impacted groundwater, thereby eliminating the exposure pathway. The time period for attainment is relatively short (i.e., <30 years). In the long term, Alt 3 will maintain compliance with the established CAO after cap construction at the end of the Unit operational lifecycle, and removing sourcce material of the South Sediment Basin which will end the source loading to groundwater, as unimpacted groundwater flushes through the aquifer. Alt 4 would attain the established CAO for the landfill after physical containment and extraction eliminates the offsite migration of impacted groundwater, thereby eliminating the exposure pathway. The time period for attainment is based on construction of the grout curtain and groundwater extraction system and is expected to be protracted. In the long term, Alt 4 will maintain compliance with the established CAO after cap construction at the end of the Unit operational lifecycle, which will end the source loading to the groundwater, as unimpacted groundwater flushes through the aquifer. Alt 5 would attain the established CAO for the Unit after removing sourcce material from the South Sediment Basin which will end the source loading to groundwater, as unimpacted groundwater flushes through the aquifer, thereby eliminating the exposure pathway. The time period for attainment via Alt 5 is relatively short. In the long term, Alt 5 will maintain compliance with the established CAO after cap construction at the end of the Unit operational lifecycle. Alt 5 has been scored higher than Alt 3, as design of the source control measures is underway as required by the AO.

TABLE E-3. Balancing Criteria Evaluation
Groundwater Remedy Selection
Big Rivers Electric Corporation - Green Landfill

40 CFR 257.97 Reference	Corrective Measure Evaluation Criteria under 40 CFR 257.97	Corrective Measure Alternative Alt 2a	Alt 3	Alt 4	Alt 5	Benefit Analysis
Balancing Criteria						
(c)(1)(vi)	Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, or containment;	1	3	2	4	All 4 alternatives allow for CCR to remain in place indefinitely. Alt 2a employs no active remedial component and has been scored lowest of all. Given that Alt 3 and Alt 4 incorporate an ex-situ component, both represent slightly higher potential for furthers releases into the environment compared with Alt 5. Given that Alt 3 contains a source control component it scores higher than Alt 4. Alt 5 does require removing source material from the South Sediment Basin but is not seen to represent as much risk to the environment during excavation compared to Alt 3 and Alt 4.
(c)(1)(vii)	Long-term reliability of the engineering and institutional controls	1	3	2	4	All 4 alternatives incorporate institutional controls. **Alt 2a** is considered to be the minimum corrective action that would be required to achieve the CAOs, relying upon natural attenuation to achieve ultimately meet the CAOs and therefore has been scored lowest for this criteria. Given that **Alt 3 and Alt 4** incorporate an engineering component, both represent slightly higher reliability concerns compared with **Alt 5**. Given that **Alt 3** contains a source control component it scores higher than **Alt 4**.
(c)(1)(viii)	Potential need for replacement of the remedy	4	2	1	3	With the exception of **Alt 2a**, each alternative employs treatment technologies. **Alt 2a** employs no active remedial component requiring replacement, and has been scored highest of all. Both **Alt 3** and **Alt 4** incorporate an active remedial component to remove COCs from the environment, including engineering and ex-situ components, and have been scored lower than **Alt 5**. **Alt 3** incorporates source control measures, and has been scored higher than **Alt 4**.
(c)(2)	The effectiveness of the remedy in controlling the source to reduce further releases based on consideration of the following factors:					
(c)(2)(i)	The extent to which containment practices will reduce further releases	1	3	2	4	All 4 alternatives are expected to reduce or eliminate further releases of Appendix IV constituents. Alt 2a is considered to be the minimum corrective action that would be required to achieve the CAOs, with the other 3 alternatives building to some degree upon Alt 2a. However Alt 2a relies upon natural attenuation to achieve ultimately meet the CAOs and therefore has been scored lowest for this criteria. Alt 3 and Alt 4 incorporate active remedial components to remove COCs from the environment. Given that Alt 3 and Alt 4 incorporate an Ex-Situ component, both represent slightly higher potential for furthers releases into the environment than Alt 5. Given that Alt 3 contains a source control component it scores higher than Alt 4. Alt 5 will prevent further releases by removing source material from the South Sediment Basin and is not seen to represent as much risk to the environment as Alt 3 and Alt 4.
(c)(2)(ii)	The extent to which treatment technologies may be used	1	4	3	2	With the exception of **Alt 2a**, each alternative employs treatment technologies. **Alt 2a** employs no active remedial component and has been scored lowest of all. Both **Alt 3** and **Alt 4** incorporate an active remedial component to remove COCs from the environment, including engineering and ex-situ components, and have been scored higher than **Alt 5**. **Alt 3** incorporates source control measures, and has been scored highest of all.
(c)(3)	The ease or difficulty of implementing a potential remedy(s) based on consideration of the following types of factors					
(c)(3)(i)	Degree of difficulty associated with constructing the technology	4	2	1	3	With the exception of Alt 2a, each alternative employs treatment technologies. Alt 2a employs no active remedial component and has been scored highest of all. Alt 3 would pose some challenges to the installation and operation of the extraction wells. The proximity to the river will require substantially higher extraction rates in order to provide hydraulic containment. The proximity to the river may pose accessibility issues and result in inflated costs. Alt 4 would be very difficult to implement and is expected to pose some challenges with respect to the installation of the grout curtain and extraction system along the perimeter of the Landfill. The proximity to the river may pose accessibility issues and result in inflated costs. Trenching equipment may be able to meet the depth required for an effective Physical Containment barrier. Alt 4 has been scored lowest of all options with regard to the criteria. Draining and lining the South Sediment Basin requires nominal engineering and construction efforts. Both Alt 3 and Alt 4 incorporate an active remedial component to remove COCs from the environment, including engineering and ex-situ components, and have been scored lower than Alt 5.
(c)(3)(ii)	Expected operational reliability of the technologies	4	2	1	3	With the exception of **Alt 2a**, each alternative employs treatment technologies. **Alt 2a** employs no active remedial component requiring operation, and has been scored highest of all. Both **Alt 3** and **Alt 4** incorporate an active remedial component to remove COCs from the environment, including engineering and ex-situ components, and have been scored lower than **Alt 5**. **Alt 3** incorporates source control measures, and has been scored higher than **Alt 4**.
(c)(3)(iii)	Need to coordinate with and obtain necessary approvals and permits from other agencies [See Note]	2.5	2.5	2.5	2.5	All 4 alternatives are expected to require permitting and approval from KDWM to the same degree and have been scored equally.

TABLE E-3. Balancing Criteria Evaluation
Groundwater Remedy Selection
Big Rivers Electric Corporation - Green Landfill

40 CFR 257.97 Reference	Corrective Measure Evaluation Criteria under 40 CFR 257.97	Corrective Measure Alternative				Benefit Analysis
		Alt 2a	Alt 3	Alt 4	Alt 5	
Balancing Criteria						
(c)(3)(iv)	Availability of necessary equipment and specialists	4	2	1	3	With the exception of **Alt 2a**, each alternative employs treatment technologies. **Alt 2a** employs no active remedial component requiring operation, and has been scored highest of all. Both **Alt 3** and **Alt 4** incorporate an active remedial component to remove COCs from the environment, including engineering and ex-situ components, and have been scored lower than **Alt 5**. **Alt 4** would be very difficult to implement and is expected to pose some challenges with respect to the installation of the grout curtain and extraction system along the perimeter of the Landfill. **Alt 4** is expected to require the most equipment and specialists and has been scored lowest of all.
(c)(3)(v)	Available capacity and location of needed treatment, storage, and disposal services	1	2	3	4	With the exception of **Alt 2a**, each alternative employs treatment technologies. **Alt 2a** employs no active remedial component requiring operation, and has been scored lowest of all. Both **Alt 3** and **Alt 4** incorporate an active remedial component to remove COCs from the environment, including engineering and ex-situ components, and have been scored lower than **Alt 5** due to the need for treatment. **Alt 3** is expected to require the most treatment requirements and has been scored lower than **Alt 4**.
	SUBTOTALS	**28.5**	**41.5**	**31.5**	**48.5**	

notes:

1) Alternative #2a (A2a): CiP, ICs, and Groundwater Monitoring
2) Alternative #3 (A3): CiP, Hydraulic Containment, Other Source Control (consisting of seepage collection and treatment), Ex-Situ Treatment, ICs, and Groundwater Monitoring
3) Alternative #4 (A4): CiP, Physical Containment, Ex-Situ Treatment, ICs, and Groundwater Monitoring
4) Alternative #5 (A5): CiP, Other Source Control, ICs, and Groundwater Monitoring
5) Ranking scores range from 1 to 4; 1 = lowest ranking score; 4 = highest ranking score
6) When alternatives are all equivalent the ranking is assigned as the average value of all possible ranking (i.e., (1+2+3+4)/4 = 2.5)

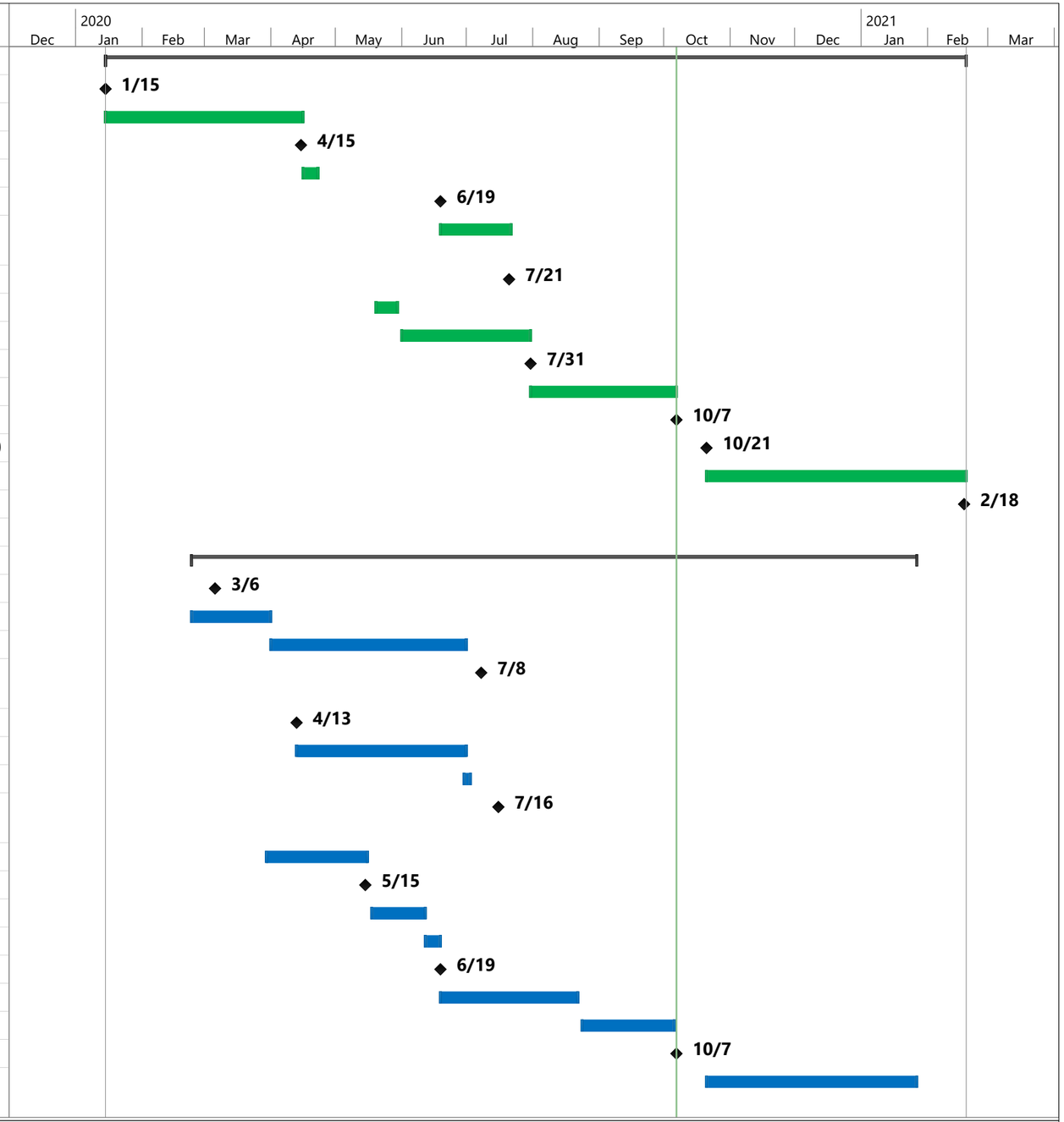
TABLE E-4. Modifying Criteria Evaluation
Groundwater Remedy Selection
Big Rivers Electric Corporation - Green Landfill

40 CFR 257.97 Reference	Corrective Measure Evaluation Criteria under 40 CFR 257.97	Corrective Measure Alternative Alt 2a	Alt 3	Alt 4	Alt 5	Benefit Analysis
Modifying Criteria						
(c)(4)	The degree to which community concerns are addressed by a potential remedy(s)					
NA (Agreed Order)	State Acceptance [See Notes]	1	3.5	3.5	2	**Alt 2a** is expected to be met with limited state acceptance due to the protracted remedy time frame. **Alt 3** and **Alt 4** will both minimize the potential impacts to the receptors upon implementation of the extraction system, and the potential for permitting would be relatively straightforward following the completion of the design, thus increasing the regulatory acceptance of the overall remedy. **Alt 5** is expected to receive moderate acceptance from the state with respect to additional control of other potential sources of groundwater contamination.
(c)(4)	Community Acceptance [See Notes]	1	3.5	3.5	2	**Alt 2a** is expected to be met with limited community acceptance due to the protracted remedy time frame. **Alt 3** leaves waste in place but provides for active, short-term effective measures that would likely meet with moderate acceptance from the community. **Alt 4** would likely meet with moderate acceptance from the community with respect to the established CAO and the addition of the grout curtain and extraction system; however, the remedy timeframe and the discharge of treated groundwater may be an issue. **Alt 5** would potentially meet with limited acceptance from the community due to the remedy time frame, which will be complete only after completion of the Landfill's operational lifecycle. However **Alt 5** is expected to be more acceptable to the community compared to **Alt 2a** due to the inclusion of an active corrective measure component.
	SUBTOTALS	**2**	**7**	**7**	**4**	

notes:
1) Alternative #2a (A2a): CiP, ICs, and Groundwater Monitoring
2) Alternative #3 (A3): CiP, Hydraulic Containment, Other Source Control (consisting of seepage collection and treatment), Ex-Situ Treatment, ICs, and Groundwater Monitoring
3) Alternative #4 (A4): CiP, Physical Containment, Ex-Situ Treatment, ICs, and Groundwater Monitoring
4) Alternative #5 (A5): CiP, Other Source Control, ICs, and Groundwater Monitoring
5) Ranking scores range from 1 to 4; 1 = lowest ranking score; 4 = highest ranking score
6) When alternatives are all equivalent the ranking is assigned as the average value of all possible ranking (i.e., (1+2+3+4)/4 = 2.5)

Appendix F
Remedy Implementation Schedule

ID	Task Mode	Task Name	Start	Finish
1		**Green Landfill - Perimeter Seepage Control Design**	**Wed 1/15/20**	**Thu 2/18/21**
2		AEC-000: Purchase Order Received by AECOM	Wed 1/15/20	Wed 1/15/20
3		AEC-010: Develop 60% Civil Design	Wed 1/15/20	Wed 4/15/20
4		AEC-40: Submit 60% Draft Civil Design and Specifications	Wed 4/15/20	Wed 4/15/20
5		CLI-10: Client Review of 60% Civil Design	Thu 4/16/20	Wed 4/22/20
6		AEC-020: Submit Perimeter Seepage Design to Agency	Fri 6/19/20	Fri 6/19/20
7		AEC-30: Develop 90% Draft Civil Design and Specifications	Fri 6/19/20	Tue 7/21/20
8		AEC-40: Submit 90% Draft Civil Design and Specifications	Tue 7/21/20	Tue 7/21/20
9		CLI-020: Prepare Bid Documents	Wed 5/20/20	Fri 5/29/20
10		CLI-030: Bid Period	Mon 6/1/20	Thu 7/30/20
11		CLI-040: Bids Due	Fri 7/31/20	Fri 7/31/20
12		CLI-050: Negotiate Award	Fri 7/31/20	Tue 10/6/20
13		CLI-060: Award Contract	Wed 10/7/20	Wed 10/7/20
14		CLI-070: Construction Start	Wed 10/21/20	Wed 10/21/20
15		CLI-080: Construction	Wed 10/21/20	Thu 2/18/21
16		CLI-090: Construction Complete	Thu 2/18/21	Thu 2/18/21
17				
18		**Green Landfill - Groundwater Remedy Selection**	**Mon 2/24/20**	**Tue 1/26/21**
19		1: Receive Big Rivers concurrence on tasks/schedule	Fri 3/6/20	Fri 3/6/20
20		2: Data Gap Evaluation	Mon 2/24/20	Tue 3/31/20
21		3: Preparation for Public Meeting	Wed 4/1/20	Tue 6/30/20
22		4: Notice for Public Meeting in local newspaper and on BREC CCR website	Wed 7/8/20	Wed 7/8/20
23		5: Submit PowerPoint Presentation for client review	Mon 4/13/20	Mon 4/13/20
24		6: Client review of PowerPoint Presentation	Mon 4/13/20	Tue 6/30/20
25		7: Revise PowerPoint Presentation	Tue 6/30/20	Thu 7/2/20
26		8: Public Meeting to present ACM results (40 CFR 257.96(e))	Thu 7/16/20	Thu 7/16/20
27		9: Develop Final Remedy Selection Report (FRSR)	Mon 3/30/20	Fri 5/15/20
28		10: Submit FRSR for client review	Fri 5/15/20	Fri 5/15/20
29		11: Client review of FRSR	Mon 5/18/20	Thu 6/11/20
30		12: Incorporate client comments in FRSR	Fri 6/12/20	Thu 6/18/20
31		13: Submit FRSR for KDEP Review	Fri 6/19/20	Fri 6/19/20
32		14: KDEP Review of FRSR	Fri 6/19/20	Fri 8/21/20
33		15: Address KDEP comments on FRSR	Mon 8/24/20	Mon 10/5/20
34		16: Post Final FRSR to CCR Website	Wed 10/7/20	Wed 10/7/20
35		17: Groundwater Remedy Implementation (within 90 days of selecting a remedy under 40 CFR 257.97)	Wed 10/21/20	Tue 1/26/21



Project: Green LF_Peri Seep+GW
Date: Wed 10/7/20

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone	

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Semi-Annual Remedy Selection Progress Report

Reid/HMP&L Surface Impoundment
Sebree Generating Station
Webster County, Kentucky

Prepared for:

Big Rivers Electric Corporation
Sebree Generating Station
9000 Highway 2096
Robards, KY 42452

Prepared by:

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December 2021

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	12-10-21				

Distribution List

# Hard Copies	PDF Required	Association / Company Name
	1	Big Rivers Electric Corporation

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Executive Summary

Title 40 of the Code of Federal Regulations Part 257.97(a) requires that progress reports be prepared on a semi-annual basis describing progress made in selecting and designing a remedy to address groundwater impacts resulting from a release of coal combustion residuals (CCR) into the environment. Big Rivers Electric Corporation (BREC) is in the process of selecting a remedy for groundwater impacts at the Reid/Henderson Municipal Power & Light Surface Impoundment (the Unit) at the Sebree Generating Station located in Webster County, Robards, Kentucky.

BREC performed an Assessment of Corrective Measures (ACM) to identify applicable remedial technologies to address lithium impacts in groundwater in 2019. A report summarizing the results of the ACM was posted to BREC's publicly-accessible CCR reporting website on July 11, 2019. Currently, BREC is evaluating three (3) potential corrective action alternatives as options to address groundwater impacts at the Unit. To evaluate each alternative, additional data collection will be required.

BREC anticipates that Alternative #2a (Closure-in-place, institutional controls, and groundwater monitoring) will be selected as the preferred remedy and is working to establish a comprehensive list of data collection needs to proceed forward with remedy evaluation and selection in 2022. BREC anticipates providing additional information in future semi-annual remedy selection progress reports.

1. Introduction

In accordance with provisions of the United States Environmental Protection Agency's (USEPA) coal combustion residual (CCR) rule, Title 40 of the Code of Federal Regulations (CFR) Part 257.97, Big Rivers Electric Corporation (BREC) is in the process of selecting a remedy for groundwater impacts at the Reid/Henderson Municipal Power & Light (Reid/HMP&L) Surface Impoundment (the Unit) at the Sebree Generating Station located in Webster County, Kentucky **(Figure 1)**.

Assessment monitoring results indicate the presence of lithium at a Statistically Significant Level (SSL) above the Ground Water Protection Standard (GWPS) in one monitoring well (MW-10) at the Unit. A map illustrating the site with locations of all program monitoring wells is presented as **Figure 2**.

In response to the SSL exceedance, BREC evaluated the nature and extent of groundwater impacts as required by Title 40 CFR Part 257.95(g) for characterization monitoring. In addition, BREC performed an Assessment of Corrective Measures (ACM) to identify applicable remedial technologies to address lithium impacts in groundwater pursuant to Tile 40 CFR Part 257.96. A notice of ACM initiation dated January 14, 2019 was posted to BREC's publicly-accessible CCR reporting website. A report summarizing the results of the ACM (AECOM, June 2019) was posted to BREC's publicly-accessible CCR reporting website on June 14, 2019.

Title 40 CFR Part 257.97(a) requires that progress reports be prepared on a semi-annual basis describing progress made in selecting and designing a remedy. The fourth semi-annual *Remedy Selection Progress Report* (AECOM, June 2021) was posted to BREC's publicly-accessible CCR reporting website in July, 2021. In alignment with the CCR rule requirement, the following sections included within this semi-annual progress report provide an overview of BREC's activities previously performed, currently underway, and planned in the future to select a remedy that meets the requirement of Title 40 CFR Part 257.97 (b) as follows:

(1) Be protective of human health and the environment;

(2) Attain the GWPS as specified pursuant to Section 257.95(h);

(3) Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of Appendix IV constituents into the environment;

(4) Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems;

(5) Comply with standards for management of wastes as specified in Section 257.98(d).

2. Site Background

2.1 Site Description

BREC operates the Sebree Station, which is a coal-fired power generating facility located on the Green River northeast of Sebree, Kentucky. Sebree Station is composed of Green Station and Reid/HMP&L Station. BREC owns Green and Reid Stations, while the City of Henderson owns HMP&L Station 2. The Sebree Station is bounded by Interstate-69 to the west and the Green River to the east (see **Figure 1**). Reid Unit 1 began commercial operation in 1966 and was retired on September 30, 2020. HMP&L Station 2, Units 1 and 2 began commercial operation in 1973 and 1974 respectively. Both HMP&L units were retired as of February 1, 2019. Green Station Units 1 and 2 began commercial operation in 1979 and 1981, respectively.

The location of the Reid/HMP&L Station Surface Impoundment is illustrated in **Figure 2**. The Surface Impoundment has been in place for more than 40 years and was used previously for the placement of CCR material. As stated in the published CCR monitoring well network certification, available on the BREC website, the Reid/HMP&L Station Surface Impoundment is a combined incised/dike earthen embankment structure. It is diked on the west, south and east sides, while the north side is incised. The south dike has the greatest height, reaching approximately 20 feet. Most of the central portion of the south dike was constructed on a subdued ridge.

2.2 Groundwater Investigation Summary

Monitoring wells were installed around the perimeter of the Unit in December 2015 prior to the implementation of the CCR Rule. These wells meet the requirements of Title 40 CFR Part 257.90 of the CCR Rule for installation of a groundwater monitoring system. Under these requirements monitoring wells must adequately represent the quality of background groundwater and groundwater representing the downgradient waste boundary. The existing wells are located along the perimeter of the footprint for the Unit. One upgradient monitoring well (MW-7) and three downgradient monitoring wells (MW-8, MW-9, and MW-10) were installed adjacent to the Unit to determine the general direction of groundwater movement and to monitor groundwater impacts. The monitoring wells were installed in the uppermost saturated portion of the sandstone bedrock aquifer.

Nine rounds of Baseline groundwater sampling for Appendix III constituents were conducted between March 2016 and October 2017. Statistical evaluation of Appendix III constituents monitored for Detection monitoring indicated that statistically significant increases (SSIs) over background have occurred, and therefore, Assessment monitoring was triggered. Monitoring activities and data are presented in the annual reports that have been prepared to date (AECOM 2018, 2019, and 2020).

As part of Assessment monitoring, upgradient and downgradient wells for the Unit were sampled for Appendix IV constituents in April, July, and September 2018. GWPS were established for the Appendix IV constituents occurring at SSIs (lithium only), and statistical evaluation of the lithium concentrations indicated exceedances of GWPSs at SSLs, as detailed in **Table 1** below.

Table 1 – Reid/HMP&L Surface Impoundment Constituents of Concern

Monitoring Well (Date)	Parameter Lithium GWPS 0.04 (mg/L)
MW-10 (Apr 2018)	**0.694**
MW-10 (Jul 2018)	**0.630**
MW-10 (Sep 2018)	**0.570**

GWPSs are the greater of the site-specific background concentrations, the USEPA primary drinking water standard maximum contaminant limits (MCL), or GWPS provided in 40 CFR 257.95(3)(h)(2)

An additional characterization well, MW-110, was subsequently installed to estimate the downgradient extent of impacted groundwater. Sample collection for Appendix III and IV parameters took place from 2019 through 2021. The analytical results for lithium in MW-110 were below the GWPS. The additional characterization data are summarized in **Table 2** below.

Table 2 – Reid/HMP&L Surface Impoundment Characterization Sample Results

Monitoring Well (Date)	Parameter Lithium GWPS 0.04 (mg/L)
MW-110 (March 2019)	0.0299
MW-110 (April 2019)	0.0303
MW-110 (October 2019)	0.02
MW-110 (April 2020)	0.02
MW-110 (October 2020)	0.02
MW-110 (May 2021)	0.02
MW-110 (October 2021)	0.02

The results from these characterization sampling events helped to confirm the downgradient (southwestern) extent of COC impacts above GWPS at the Unit.

Semi-annual Assessment monitoring continued at the Unit in 2019 through 2021 in accordance with 40 CFR Part 257.95.

2.3 Conceptual Site Model

Development and refinement of a Conceptual Site Model (CSM) is necessary to support remedy selection for the Unit. A CSM is based on a set of working hypotheses regarding how contaminants of concern (COCs) entered the environment at a site, how they were and continue to be transported to various media, what the potential routes of exposure are, and who may be exposed, including both human and ecological receptors. As such, the CSM is a “living” model. As new data become available or site conditions change, a CSM should be evaluated and updated as necessary.

The CSM for the Unit was first provided in the June 2019 ACM for the Unit (AECOM 2019). The CSM presents the physical setting of the Unit (adjacent to the Green River), the unconsolidated and bedrock geologic strata underlying the Unit, the occurrence and movement of groundwater, the distribution of COCs in groundwater, and the potential receptors (or lack thereof) for impacted groundwater. These

elements are described in detail below and have been updated with new information for this report as appropriate.

2.3.1 Physical Setting

The Unit is located within the Interior Low Plateaus physiographic province. The province is part of the Interior Plains division of the United States. Characteristic features of the province include unglaciated rolling limestone plains with alluvial valleys and entrenched rivers and streams. Several large rivers are in the region, including the Green, Ohio, Kentucky, Tennessee, and the Cumberland Rivers. The geology underlying the Unit consists of unconsolidated materials, including loess and alluvial deposits, underlain by Upper to Middle Pennsylvanian-age clastic and carbonate bedrock consisting primarily of sandstone and shale. The unconsolidated materials also include fill, silty and clayey residuum, and minor amounts of sandy, clayey channel fill alluvium.

The Unit is located on upland area near the west bank of the Green River. The uppermost edge of the earthen embankment is situated at an elevation of approximately 429 feet above mean sea level (amsl). Although the Green River is located less than 0.5 miles from the site, the structure does not extend significantly into the floodplain. Underlying preconstruction soils consisted of Loring-Grenada, Loring-Zanesville-Wellston (Henderson County) and Loring-Wellston-Zanesville (Webster County) soil associations which are generally characterized as well drained to moderately well drained soils on nearly level to sloping uplands (Associated Engineers 2016, Hydrologic and Hydraulic Capacity Assessment and Initial Inflow Design Flood Control System Plan). The immediate watershed that drains to the unit, and in which the unit is considered to be located, is unnamed and 25.45 acres in size. The unnamed watershed discharges from the Unit outflow structure and is routed, under a Kentucky Pollution Discharge and Elimination System permit, to the Green River.

2.3.2 Geology

The Unit lies in the Western Kentucky Coalfields section, characterized by rolling uplands underlain by coal-bearing bedrock of the Pennsylvanian Period. Near the Unit, maximum topographic relief is on the order of 80 feet. The geologic quadrangle (Geologic map of the Robards quadrangle, Henderson and Webster Counties, Kentucky, 1973) for the area published by the Kentucky Geologic Survey (KGS) shows the surficial material in portions of the western half of the Unit to be unconsolidated loess representing the Pleistocene geologic epoch. The loess consists of sandy and clayey silt. Underlying the loess deposits and exposed at the surface on the eastern half of the Unit are broadly distributed Pleistocene and Holocene alluvium deposits consisting of intermixed and interlensing clay, silt, sand, and gravel. In close proximity to the Unit, the alluvium is generally a low permeability unit that forms terraces along the Green River at elevations of roughly 380 and 395 ft., amsl. The unconsolidated surficial materials range from approximately 24 feet (MW-7) to 47 feet (MW-110) in thickness surrounding the Unit.

The unconsolidated materials are underlain by bedrock of the Upper Pennsylvanian Shelburn Formation [formerly identified as the Lisman Formation (Fairer, 1973)] and the Middle Pennsylvanian Carbondale Formation. The Shelburn and Carbondale formations consist of cyclic sequences of sandstones, shales, siltstones and coals. These sediments were deposited in a fluvial-deltaic system. As a result of this depositional environment, the lithologic units tend to be lenticular bodies rather than continuous sheet-like strata. Gradational and abrupt horizontal changes in lithology are often encountered.

2.3.3 Groundwater Hydrogeology

For purposes of compliance with the CCR Rule groundwater monitoring requirements, the interbedded sandstone and shale of the Shelburn Formation is considered the uppermost aquifer underlying the Unit. The uppermost aquifer is hydraulically confined and first encountered at an elevation of approximately 428 ft., amsl at the northeast end (at MW-7), and 389 ft. amsl at the west end of the Unit (at MW-9).

Groundwater elevation data collected during the 2nd semi-annual monitoring event of 2021 are summarized on **Table 3** below. These data were utilized to construct a piezometric surface map illustrating groundwater flow conditions for the uppermost aquifer (see **Figure 3**). Flow direction beneath

the Unit is to the southwest towards an unnamed tributary to Groves Creek located west-southwest of the impoundment.

Table 3. Reid/HMP&L Surface Impoundment – September/October 2021 Groundwater Elevation Data

Monitoring Well	Top of Casing Elevation (ft) [1]	Depth to Groundwater (ft)	Groundwater Elevation (ft, amsl)
MW-7	444.43	19.70	424.73
MW-8	394.29	5.97	388.32
MW-9	395.40	7.73	387.67
MW-10	422.27	30.67	391.60
MW-110	388.70	6.04	382.66

1 Reference elevation of monitoring wells surveyed by Associated Engineers, Inc., Madisonville, Kentucky, January 2015. Survey coordinates were based on the Kentucky State Plane, Kentucky Southern Zone, NAD27 datum.

Slug tests were performed between April 24, 2019 and April 25, 2019 at monitoring wells MW-10, and MW-110 to assess the hydraulic characteristics of the uppermost aquifer. The estimated hydraulic conductivity of the monitoring wells tested ranged from 3×10^{-6} to 5×10^{-4} centimeters per second (cm/sec).

Although previous site-specific investigations have noted the presence of perched zones of saturation in the overlying unconsolidated materials, these discontinuous zones do not qualify as an uppermost aquifer under the CCR Rule because they do not produce usable quantities of groundwater.

2.3.4 Constituents of Concern

Current groundwater analytical data and statistical analysis indicate that the only COC detected at SSLs above its GWPS in groundwater at the Unit is lithium. Lithium has been detected at SSLs in the monitoring well MW-10 southwest of the Unit.

2.3.5 Impacted Media

Groundwater is the single impacted media of concern identified as requiring corrective measures at the Unit.

2.3.6 Distribution of COCs

Groundwater sampling was performed at the Unit most recently from September 29 through October 1, 2021. The additional lithium data collected during this event are summarized below in **Table 4**.

Table 4. Reid/HMP&L Surface Impoundment – September/October 2021 Lithium Analytical Results

Monitoring Well (Date)	Parameter
	Lithium GWPS 0.04 (mg/L)
MW-7	0.03
MW-8	0.04
MW-9	0.005
MW-10	0.49
MW-110	0.02

Figure 4 illustrates the distribution of COCs and other groundwater quality constituents in groundwater at the Unit. This distribution of COCs in groundwater suggests that impacts to groundwater likely originate as seepage from beneath the surface impoundment, however there is currently no feasible means of directly tracing that potential under the footprint of the Unit.

2.3.7 Potential Receptors/Exposure Pathways

Contact with water (e.g., shallow groundwater or surface water) impacted by COCs at levels above GWPS or Water Quality Criteria is regarded as the potential pathway for exposure of potential receptors. Based on data published by KGS, there are no known groundwater wells used for drinking water within a 1-mile radius of the Unit, thus limiting the potential receptors to the surface water, i.e., the Green River and its tributary, Groves Creek. The pathways to these receptors include seepage of water from the Unit through manmade and natural hydraulic conduits.

Other potential exposure pathways (e.g., soil or vapor) are not considered complete as the CCR material is isolated in the Unit. This isolation prevents direct access by individuals that might result in direct contact or ingestion. In addition, the inherent non-volatile nature of the Unit-specific COCs eliminates the potential for a complete vapor pathway (i.e., vapor intrusion to indoor air).

2.4 Interim Corrective Measures

No interim corrective measures have been performed at the Unit for groundwater impacts.

2.5 Assessment of Corrective Measures Summary

In June 2019, BREC performed an ACM for the Unit to identify remedial alternatives to address groundwater impacts. Title 40 CFR Part 257.96(c) requires that the ACM include an analysis of the effectiveness of potential corrective measures in meeting the objectives for remedies identified under Section 257.97(b), by addressing at least the following:

1) The performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination;
2) The time required to begin and complete the remedy; and
3) The institutional requirements, such as state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy(s).

As part of the groundwater ACM, several potential corrective measures technologies were evaluated to identify which ones could be carried forward as components of corrective measures alternatives. The results of the corrective measures technology evaluation are presented below in **Table 5**.

Table 5 – Potential Corrective Measures Options for Groundwater Impacts

Potentially Applicable Technology	Status	Description/Overview
No Action	Not retained as standalone technology, but carried forward for baseline comparisons	This technology has been included in the preliminary evaluation/screening but is not retained because it will not meet the established CAOs.
Institutional Controls (ICs)	Retained as supplement to corrective measures alternatives	The use of ICs (i.e., Environmental Covenants, groundwater use restrictions, etc.) is retained as a useful technology. However, it is noted the ICs are not anticipated to be used as a stand-alone technology. Environmental Covenants, groundwater use restrictions, etc., are expected to be combined with other applicable technologies as part of corrective measures alternatives.
Groundwater Monitoring (Assessment and Detection modes)	Retained as supplement to corrective measures alternatives	The use of groundwater monitoring (Assessment and/or Detection modes as appropriate) when combined with other applicable technologies as part of any proposed corrective measures alternative is retained to address the CAO and to track the effectiveness of the overall remedy. However, it is not retained as a stand-alone technology.
Hydraulic Containment	Retained	The use of hydraulic containment is retained because it is an effective means of preventing off-site migration of soluble contaminants. Hydraulic containment requires management and potential ex-situ treatment of extracted groundwater, so it is not a stand-alone technology. The CSM will guide the design of any groundwater extraction system to optimize the total discharge of groundwater needed to provide hydraulic containment.
Physical Containment	Retained	The use of physical containment is retained because it can be an effective means of managing groundwater flow. Physical containment often requires pairing with hydraulic containment and/or in-situ treatment (funnel and gate style) to manage the flux of groundwater flow into the system. The CSM will guide the design of any physical barrier system, but technology limitations may increase implementation difficulty with scale.
Ex-situ Physical/Chemical/Biological Treatment	Retained	Ex-situ treatment technologies are retained as a way of removing contaminants from extracted groundwater from a hydraulic containment system. Ex-situ treatment may be paired with wastewater treatment, non-groundwater release treatment systems, or with permitted discharge to manage groundwater contamination. The CSM and data gaps investigations will guide the design of any ex-situ treatment.
Closure in Place (CiP) (of the regulated unit)	Retained	The use of CiP as a source control technology and is amenable with respect to CAO attainment.

Potentially Applicable Technology	Status	Description/Overview
Closure by Removal (CbR) (of the regulated unit)	Retained	The use of CbR as a source control technology is amenable with respect to CAO attainment.
Other Source Control Technologies	Retained	Control of source area non-groundwater related releases. For the purposes of this groundwater ACM, management of non-groundwater releases are not included in the alternatives evaluation. Engineering measures, including leachate collection, lining of trenches and/or ponds, and other isolation methods are regarded as part of closure technologies selected by other means.

Note: Technologies that were retained may be used as components of a corrective action alternative, but when evaluated in conjunction with other available technologies any single technology may not be utilized.

Preliminary assembly of corrective measures alternatives was performed based on site-specific and regional geology and groundwater conditions. For the Reid/HMP&L Station Surface Impoundment, five corrective measures alternatives were developed from this list of applicable corrective measures technologies:

- Alternative #1 – No Action, and Groundwater Monitoring
- Alternative #2a – Closure in Place (CiP), Institutional Controls (ICs), and Groundwater Monitoring
- Alternative #2b – Closure by Removal (CbR), ICs, and Groundwater Monitoring
- Alternative #3 – CiP, ICs, Hydraulic Containment, Other Source Control, Ex-Situ Treatment, and Groundwater Monitoring
- Alternative #4 – CiP, ICs, Physical Containment, Ex-Situ Treatment, and Groundwater Monitoring

The assembly of corrective measures alternatives presented in the ACM was considered preliminary and subject to revision following additional evaluation during the remedy selection process and/or following comment from the regulatory community and public. Further evaluation of the alternatives is discussed in the following sections.

3. Remedy Selection Progress

The ACM performed for the Unit in June 2019 identified a total of five (5) corrective measures alternatives to be carried forward into the remedy selection process. In December 2019, BREC provided a *Semi-annual Remedy Selection Progress Report* (AECOM, December 2019) as required under 40 CFR Part 257.97(a). As part of this submittal, two (2) corrective measures alternatives were eliminated from further consideration, including:

- Alternative #1 (No Action and Groundwater Monitoring) – This alternative does not control or remove COCs from the environment and therefore does not achieve the RAOs.
- Alternative #2b – (CbR, ICs, and Groundwater Monitoring) – Implementing a CbR approach is considered cost prohibitive. In addition, any CbR approach would require relocating waste to an existing disposal unit or construction of a new waste disposal unit, which does not align with the one of the fundamental goals of RCRA (conserving energy and natural resources).

Three (3) potential corrective measures alternatives have been identified by BREC as viable options to address lithium impacts in groundwater at the Unit, including:

- Alternative #2a: CiP, ICs, and Groundwater Monitoring
- Alternative #3: CiP, ICs, Hydraulic Containment, Ex-Situ Treatment, and Groundwater Monitoring
- Alternative #4: CiP, ICs, Physical Containment, Ex-Situ Treatment, and Groundwater Monitoring

Each of the remaining 3 corrective measures alternatives is discussed in more detail below.

3.1 Potential Corrective Action Alternatives

3.1.1 Alternative #2a – CiP, ICs, and Groundwater Monitoring

Alternative #2a as currently envisioned would employ a combination of three corrective measures technologies:

- CiP source control, which consists of Reid/HMP&L Surface Impoundment closure activities;
- Implementation of ICs designed to restrict the property to industrial use and to prohibit groundwater use for potable purposes; and
- Groundwater monitoring (Assessment) to document the effectiveness of the corrective measures.

Alternative #2a is recommended for further evaluation.

3.1.2 Alternative #3 – CiP, ICs, Hydraulic Containment, Ex-Situ Treatment, and Groundwater Monitoring

Alternative #3 builds on Alternative #2a to also include the addition of Hydraulic Containment and Ex-Situ Treatment of groundwater:

- CiP source control, which consists of Surface Impoundment closure activities;
- Implementation of ICs designed to restrict the property to industrial use and to prohibit groundwater use for potable purposes;
- Hydraulic Containment using one or more vertical wells designed to prevent the movement of impacted groundwater past the limits of the unit to the downgradient groundwater environment and potential points of exposure;

- Ex-Situ Treatment of groundwater extracted for hydraulic containment, which involves above-ground physical/chemical treatment methods and/or permitted discharge until the CAOs are achieved;
- Implementation of ICs designed to restrict the property to industrial use and to prohibit groundwater use for potable purposes; and
- Groundwater Monitoring (Assessment mode) to track the effectiveness of the corrective measures and to identify conditions that allow the return to Detection-mode monitoring and ultimately to cessation of corrective measures.

Alternative #3 is recommended for further evaluation.

3.1.3 Alternative #4 – CiP, ICs, Physical Containment, Ex-Situ Treatment, and Groundwater Monitoring

Alternative #4 consists of BREC's unit closure activities, physical containment of impacted groundwater via installation of a funnel-gate system, and ex-situ treatment of contained groundwater via an extraction well installed at the containment gate. Impacted groundwater would be contained by grout curtain constructed in a funnel-and-gate arrangement that directs the flow of groundwater to an extraction point. The grout curtain would be installed by drilling two lines of grout injection points that extend northwestward and northeastward from the southeast corner of the unit. The length of each limb of the barrier would be 500 feet, and the target depth would be approximately 325 ft-amsl. A single extraction well would be installed at the "gate" with a screened interval of 50 to 100 ft-bgs and a pumping capacity of up to 20 gpm. Groundwater will be pumped and conveyed to an existing surface water impoundment at the Sebree Station, which will allow for compliance with discharge permits through an established NPDES outfall.

CiP via ash stabilization and capping would control the source of COCs and thereby reduce contaminant loading to the extraction system. Concentrations downgradient of the physical barrier would be expected to decrease over time through several natural attenuation mechanisms including advection, dilution, and dispersion. Groundwater Monitoring (Assessment) would continue to track the effectiveness of the corrective measures and to identify conditions that allow the return to Detection monitoring and ultimately closure.

Alternative #4 is recommended for further evaluation.

3.2 Remedy Evaluation

Currently BREC considers the (3) potential corrective action alternatives as viable options to address groundwater impacts at the Unit, including:

- Alternative #2a;
- Alternative #3; and
- Alternative #4

To evaluate each alternative, additional data collection will likely be required. BREC is currently evaluating data collection needs in the following areas to assist with remedy selection:

1) Nature and Extent – groundwater trends, influence of non-groundwater remedies, etc.
2) Physical Characteristics – available data on the physical characteristics of the retention pond
3) Engineering – feasibility, cost estimates, etc.

BREC anticipates that Alternative #2a (Closure-in-place, institutional controls, and groundwater monitoring) will be selected as the preferred remedy and is working to establish a comprehensive list of

data collection needs to proceed forward with remedy evaluation and selection in 2022. BREC anticipates providing additional information in future semi-annual remedy selection progress reports.

4. Conclusion

Additional updates regarding remedy selection, including any additional corrective measures being considered, will be presented twice a year in future remedy selection progress reports. Once sufficient data has been collected to select an effective comprehensive remedy for the Unit, a public meeting will be held 30 days prior to formal remedy selection, followed by a detailed Remedy Selection Report describing the remedy and proposed schedule for implementation.

The next remedy selection progress report for the Unit is expected in June 2022.

5. References

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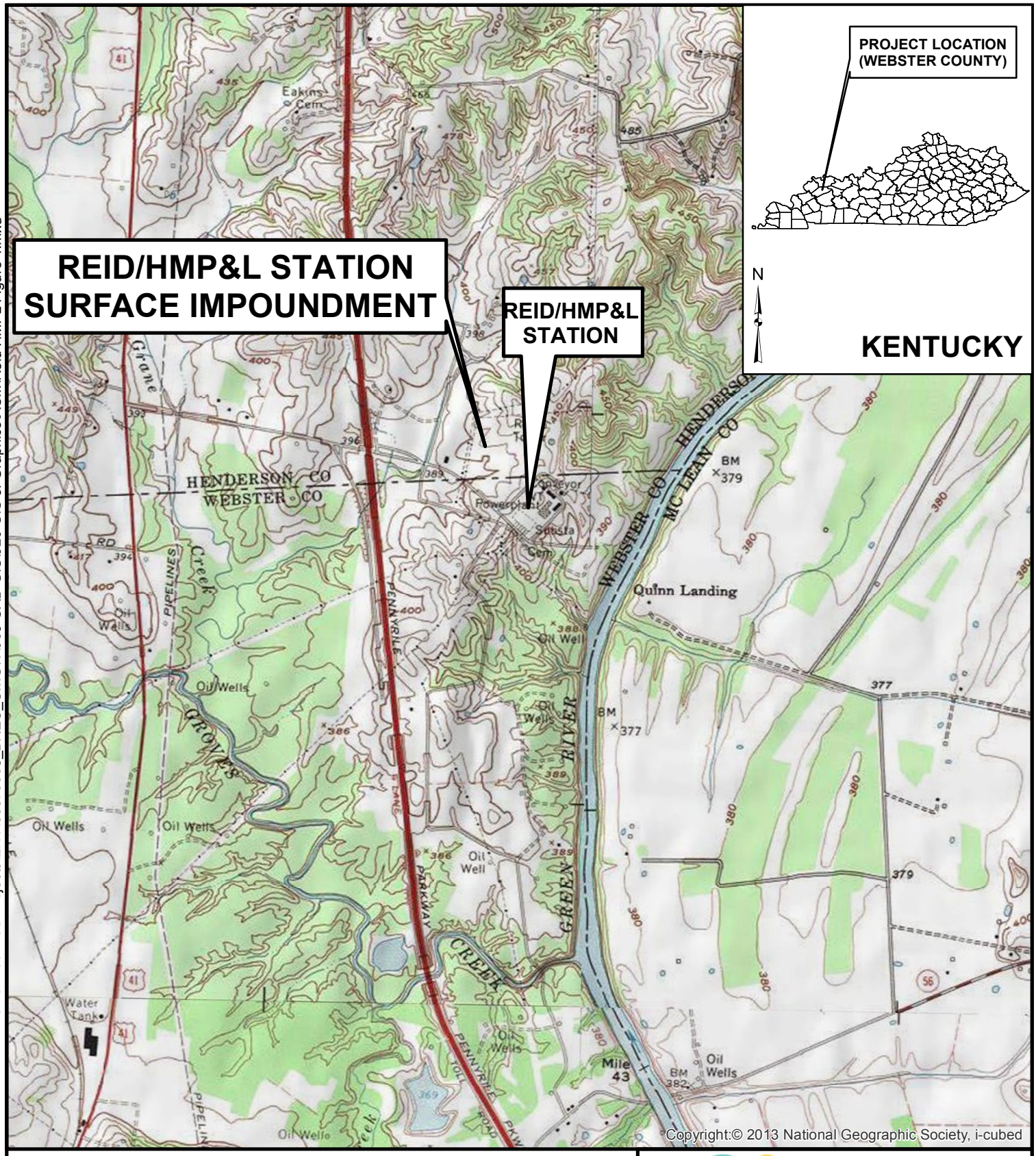
Figures



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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

ROBARDS QUADRANGLE
DELAWARE QUADRANGLE
(FROM ARCGIS ONLINE Copyright:© 2011 National Geographic Society, i-cubed)

0 2,000 4,000 Feet

N

Big Rivers ELECTRIC CORPORATION

Reid/HMPL Station
Webster County, Kentucky

FIGURE 1
SITE LOCATION MAP

DATE: 4/30/2019	SCALE: 1IN = 2,000 FEET
CREATED BY: ALW	
JOB NO. 60602365	

N

MW-7

*MW-8

MW-110

MW-9

MW-10

MW-11

bing

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Legend

- Downgradient Monitoring Well
- Upgradient Monitoring Well
- Characterization Well
- Unit Boundary
- Property Line

0 300 600

Feet

Big Rivers Electric Corporation

Reid/HMPL Surface Impoundment
Webster County, Kentucky

FIGURE 2
MONITORING WELL
LOCATION MAP

DATE: 11/30/2021	SCALE: 1IN = 200 FEET
CREATED BY: TCC	
JOB NO. 60579939	

N

390

400

410

420

MW-7
424.73

*MW-8
388.32

*MW-110
382.66

MW-9
387.67

MW-10
391.60

MW-11

bing

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Legend

- Proposed Assessment Well
- Downgradient Monitoring Well
- Upgradient Monitoring Well
- Unit Boundary
- Property Line
- Bedrock Valley
- 5 ft Water Table Contour (Inferred from Available Monitoring Data)
- 10 ft Water Table Contour (Inferred from Available Monitoring Data)
- Groundwater Flow Direction
- 391.60 Groundwater Elevation (Feet, MSL) Measured September 29, 2021

*** Monitoring wells with artesian conditions are shown on this map with green labels**

MW-110 data was collected on 10-1-2021

0 300 600
Feet

Big Rivers Electric Corporation

Reid/HMPL Surface Impoundment
Webster County, Kentucky

FIGURE 3
GROUNDWATER SURFACE MAP
SEPTEMBER 2021

DATE: 11/30/2021	SCALE: 1IN = 200 FEET
CREATED BY: TCC	
JOB NO. 60579939	

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MW-8					
APPENDIX III	**GWPS**	**4/16/2020**	**9/24/2020**	**4/21/2021**	**9/29/2021**
Boron	NA	1.56	1.41	1.42	1.50
Calcium	NA	292	257	281	267
Chloride	NA	47.3	49.2	45.8	61.4
Fluoride	4	0.4	0.4	0.3	0.4
Sulfate	NA	1130	1400	1090	2320
pH (SU)	NA	6.78	6.58	6.64	6.12
Total Dissolved Solids	NA	1930	1940	2000	2090
APPENDIX IV					
Antimony	0.006	<0.005	<0.005	<0.005	<0.005
Arsenic	0.01	<0.0010	<0.0010	<0.0010	<0.0010
Barium	2	0.017	0.016	0.018	0.020
Beryllium	0.004	<0.0020	<0.0020	<0.0020	<0.0020
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010
Chromium	0.1	<0.0020	<0.0020	<0.0020	<0.0020
Cobalt	0.006	<0.004	<0.004	<0.004	<0.004
Fluoride	4	0.4	0.4	0.3	0.4
Lead	0.015	<0.002	<0.002	<0.002	<0.002
Lithium	0.040	0.03	0.03	0.03	0.04
Mercury	0.002	<0.0005	<0.0005	<0.0005	<0.0005
Molybdenum	0.1	0.01	0.01	0.01	0.01
Radium 226 (pCi/L) + Radium 228 (pCi/L)	5 pCi/L	1.93	0.366	1.94	1.72
Selenium	0.05	<0.003	<0.003	<0.003	<0.003
Thallium	0.002	<0.0020	<0.0020	<0.0020	<0.0020

MW-7					
APPENDIX III	**GWPS**	**4/16/2020**	**9/24/2020**	**4/21/2021**	**9/29/2021**
Boron	NA	0.34	0.33	0.34	1.77
Calcium	NA	45.7	41.8	43.4	27.0
Chloride	NA	4.1	3.3	4.9	6.5
Fluoride	4	0.3	0.3	0.3	0.5
Sulfate	NA	15	12	15	34
pH (SU)	NA	6.86	6.56	7.75	7.08
Total Dissolved Solids	NA	1930	114	280	610
APPENDIX IV					
Antimony	0.006	<0.005	<0.005	<0.005	<0.005
Arsenic	0.01	0.0025	0.0015	0.0026	<0.0010
Barium	2	0.087	0.075	0.082	0.074
Beryllium	0.004	<0.0020	<0.0020	<0.0020	<0.0020
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010
Chromium	0.1	<0.0020	<0.0020	0.0007	<0.0020
Cobalt	0.006	<0.004	<0.004	<0.004	<0.004
Fluoride	4	0.3	0.3	0.3	0.5
Lead	0.015	<0.002	<0.002	<0.002	<0.002
Lithium	0.04	0.007	0.008	0.008	0.03
Mercury	0.002	<0.0005	0.0005	<0.0005	<0.0005
Molybdenum	0.1	0.006	0.006	0.005	<0.01
Radium 226 (pCi/L) + Radium 228 (pCi/L)	5 pCi/L	1.83	0.968	0.703	0.912
Selenium	0.05	<0.003	0.003	<0.003	<0.003
Thallium	0.002	<0.0020	<0.0020	<0.0020	<0.0020

MW-9					
APPENDIX III	**GWPS**	**4/16/2020**	**9/24/2020**	**4/21/2021**	**9/29/2021**
Boron	NA	0.32	0.22	0.23	<0.10
Calcium	NA	71.2	65.3	66.9	59.4
Chloride	NA	22.8	19.9	22.5	7.2
Fluoride	4	0.3	0.3	0.2	0.2
Sulfate	NA	<1	<1	<1	<1
pH (SU)	NA	7.04	6.67	7.12	6.23
Total Dissolved Solids	NA	320	308	422	264
APPENDIX IV					
Antimony	0.006	<0.005	<0.005	<0.005	<0.005
Arsenic	0.01	<0.0010	<0.0010	<0.0010	<0.0010
Barium	2	1.06	0.730	0.782	0.248
Beryllium	0.004	<0.0020	<0.0020	<0.0020	<0.0020
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010
Chromium	0.1	<0.0020	<0.0020	<0.0020	<0.0020
Cobalt	0.006	<0.004	<0.004	<0.004	<0.004
Fluoride	4	0.3	0.3	0.2	0.2
Lead	0.015	<0.002	<0.002	<0.002	<0.002
Lithium	0.040	0.01	0.009	0.01	0.005
Mercury	0.002	<0.0005	<0.0005	<0.0005	<0.0005
Molybdenum	0.1	<0.01	<0.01	<0.01	<0.01
Radium 226 (pCi/L) + Radium 228 (pCi/L)	5 pCi/L	2.9	3.44	3.99	1.13
Selenium	0.05	<0.003	<0.003	<0.003	<0.003
Thallium	0.002	<0.0020	<0.0020	<0.0020	<0.0020

MW-110					
APPENDIX III	**GWPS**	**4/17/2020**	**10/1/2020**	**5/26/2021**	**10/1/2021**
Boron	NA	0.54	0.53	0.54	0.52
Calcium	NA	181	162	163	155
Chloride	NA	22.1	19.9	21.8	21.1
Fluoride	4	0.3	0.3	0.3	0.3
Sulfate	NA	460	411	428	853
pH (SU)	NA	7.17	7.56	7.25	6.69
Total Dissolved Solids	NA	1150	1060	1140	1090
APPENDIX IV					
Antimony	0.006	<0.005	<0.005	<0.005	<0.005
Arsenic	0.01	0.0012	0.0004	<0.0010	<0.0010
Barium	2	0.065	0.056	0.055	0.049
Beryllium	0.004	<0.0020	<0.0020	<0.0020	<0.0020
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010
Chromium	0.1	0.0047	0.0016	0.0009	<0.0020
Cobalt	0.006	<0.004	<0.004	<0.004	<0.004
Fluoride	4	0.3	0.3	0.3	0.3
Lead	0.015	0.002	0.0008	<0.002	<0.002
Lithium	0.040	0.02	0.02	0.02	0.02
Mercury	0.002	0.0002	<0.0005	<0.0005	<0.0005
Molybdenum	0.1	<0.01	<0.01	<0.01	<0.01
Radium 226 (pCi/L) + Radium 228 (pCi/L)	5 pCi/L	1.371	0.941	-	0.652
Selenium	0.05	<0.003	<0.003	<0.003	<0.003
Thallium	0.002	<0.0020	<0.0020	<0.0020	<0.0020

MW-10					
APPENDIX III	**GWPS**	**4/16/2020**	**9/24/2020**	**4/21/2021**	**9/29/2021**
Boron	NA	0.54	0.51	0.54	0.54
Calcium	NA	12.5	8.80	7.95	8.25
Chloride	NA	21.5	21.4	21.4	20.7
Fluoride	4	0.5	0.5	0.5	0.5
Sulfate	NA	58	62	52	61
pH (SU)	NA	8.87	8.74	9.88	8.26
Total Dissolved Solids	NA	466	436	530	514
APPENDIX IV					
Antimony	0.006	<0.005	<0.005	<0.005	<0.005
Arsenic	0.01	0.0019	0.0019	0.0018	0.0017
Barium	2	0.093	0.084	0.089	0.096
Beryllium	0.004	<0.0020	<0.0020	<0.0020	<0.0020
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010
Chromium	0.1	<0.0020	0.0006	0.0007	0.0006
Cobalt	0.006	<0.004	<0.004	<0.004	<0.004
Fluoride	4	0.5	0.5	0.5	0.5
Lead	0.015	<0.002	<0.002	<0.002	<0.002
Lithium	0.040	0.49	0.56	0.57	0.49
Mercury	0.002	0.0002	0.0002	0.0003	0.0002
Molybdenum	0.1	0.006	0.007	0.007	0.007
Radium 226 (pCi/L) + Radium 228 (pCi/L)	5 pCi/L	1.24	0.594	0.769	0.692
Selenium	0.05	<0.003	<0.003	<0.003	<0.003
Thallium	0.002	<0.0020	<0.0020	<0.0020	<0.0020

MW-8
MW-110
MW-9
MW-7
MW-10
MW-11

bing

Legend

- Unit Boundary
- Property Line
- Downgradient CCR Monitoring Well
- Upgradient CCR Monitoring Well
- Proposed Characterization Well

All results listed in milligrams per liter (mg/L) unless otherwise noted.
Yellow highlighted values indicate GWPS exceedance.
Orange highlighted analyte indicate SSL above GWPS.
SSL = Statistically Significant Level
GWPS = Groundwater Protection Standard
NA = Not Applicable
ND = Not Detected at or above Method Detection Limit
pCi/L = picoCuries per Liter

0 300 600
Feet

N

Big Rivers ELECTRIC CORPORATION

Reid/HMPL Surface Impoundment
Webster County, Kentucky

FIGURE 4.
GROUNDWATER CONDITIONS MAP
2020-2021 ANALYTICAL RESULTS

DATE: 12/8/2021	SCALE: 1IN = 200 FEET
CREATED BY: SEL	
JOB NO. 60656816	

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