July 30, 2024 ***TRANSMITTAL VIA EMAIL 07/30/2024***

Ms. Lori Babcock
Michigan Department of Environment, Great Lakes, and Energy
Materials Management Division
Bay City District Office
401 Ketchum St, Suite B
Bay City, Michigan 48708

SUBJECT: Semiannual Progress Report – Selection of Final Remedy pursuant to §257.97(a)
DE Karn Bottom Ash Pond Coal Combustion Residuals (CCR) Unit

Dear Ms. Babcock:

This Semiannual Progress Report, prepared as a requirement of §257.97(a) of the Federal Coal Combustion Residual (CCR) Rule and describes progress towards selecting and implementing the final remedy for the Karn Bottom Ash Pond after the completion of the *Assessment of Corrective Measures, DE Karn Bottom Ash Pond Coal Combustion Residual Unit*[1], dated September 11, 2019 (Karn Bottom Ash Pond ACM). Groundwater management alternatives considered to be technically feasible following source removal activities that could potentially address the residual arsenic under *known* groundwater conditions were identified in the report as: 1) Source removal with post-remedy monitoring, 2) Source removal with groundwater capture/control, 3) Source removal with impermeable barrier, 4) Source removal with active geochemical sequestration, and 5) Source removal with passive geochemical sequestration.

Karn Bottom Ash Pond Closure Activities

Consumers Energy prepared and submitted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) a closure work plan for the Karn Bottom Ash Pond (Karn Bottom Ash Pond Work Plan) and a Response Action Plan developed in accordance with Part 115 dated April 9, 2018 and March 15, 2019, respectively. These plans were developed in anticipation of supporting the Assessment of Corrective Measures that would be necessary for evaluating and selecting a final remedy for the Karn Bottom Ash Pond after Consumers Energy provided notification of exceeding Groundwater Protection Standard (GWPS) per §257.95(g) that arsenic was present at statistically significant levels above the federal GWPS in five of six downgradient wells at the Karn Bottom Ash Pond.

EGLE approved the Karn Bottom Ash Pond Work Plan on December 20, 2018 based on expectation that a report documenting the removal activities and certifying solid waste has

[1] TRC. 2019. Assessment of Corrective Measures – DE Karn Bottom Ash Pond Coal Combustion Residual Unit. Prepared for Consumers Energy Company. September 11.

been removed in accordance with the work plan would be submitted at the completion of activities. Subsequently, EGLE approved the Response Action Plan on May 14, 2019 based on the anticipated submittal of the Assessment of Corrective Measures. Consumers Energy submitted for review and approval, *D.E. Karn Generating Facility Bottom Ash Pond CCR Removal Documentation Report* (Karn Bottom Ash Pond Closure Report) on October 30, 2019 to satisfy requirements for completing the removal of solid waste so that obtaining a solid waste operating license was unnecessary. The certification of solid waste removal was approved by EGLE on December 1, 2020.

Closure by removal has been achieved pursuant to 324.11519b(9)(b) by documenting the removal of sources of contamination under the response action plan. However, concentrations of arsenic in groundwater exceeding the GWPS pursuant to 40 CFR 257.95(h) have persisted within the compliance monitoring well network after the source removal activities were completed. EGLE has approved a remedy consistent with R 299.4444 and R 299.4445 of the Part 115 rules through the approval of the DE Karn Hydrogeological Monitoring Plan, Rev. 03 that includes the determination of Groundwater Not in an Aquifer and groundwater mixing zone authorization. Additional steps needed to address residual groundwater contamination are discussed in the observations and results sections below.

Karn Bottom Ash Pond Assessment Activities for this Period

Consumers Energy instrumented the six new monitoring wells constructed within the former Karn Bottom Ash Pond area during the first week of March 2022 and the existing, certified Groundwater Monitoring System with mini-Troll™ pressure transducers that started collecting high-resolution groundwater elevation data starting on April 7, 2023. These data will be summarized in the 2024 Annual Groundwater Monitoring and Corrective Action Progress Report to be submitted in January 2024. Based on the evaluation of data from the May 2024 sampling event, the following general observations were noted:

- Groundwater flow and direction was found to confirm the lack of radial flow within the former bottom ash pond area and helped to refine the extent of the new potentiometric high;
- The Karn 1&2 Electrical Generating Units that contributed process water discharges to the unlined ditch located immediately northeast of the former bottom ash pond ceased operation on May 30, 2023; and
- The distribution of arsenic was confirmed to be below the site-specific chronic concentration of 100 ug/L at all six well locations located within the former Karn Bottom Ash Pond footprint; however, several monitoring wells had arsenic observed at concentrations above the site-specific GWPS of 21 ug/L.

Results of May 2024 Event

Statistical analysis from the May 2024 semiannual groundwater monitoring events verified that the only constituent of concern that is present at statistically significant levels above the established GWPS is arsenic. Results are presented in *May 2024 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, DE Karn Site, Bottom Ash Pond CCR Unit* (Enclosure 1). Additionally, monitoring performed under the Karn Groundwater Surface-Water Interface (GSI) Compliance Plan demonstrates protection of human health and the environment with criteria determined to be protective at the point of exposure. These results are presented in the *First Semiannual 2024 Nature and Extent Data Summary, DE Karn Bottom Ash Pond, Consumers Energy* (N&E Summary) (Enclosure 2).

Significant observations from the event summaries are as follows:

- Groundwater potentiometric surface within the area of the former Karn Bottom Ash Pond exhibits flow primarily moving west towards the intake channel, or south towards the Karn Generating Plant rather than radially from within the pond area;
- Regionally, radial flow is observed with a new "high" point shifted to the east of the former Karn Bottom Ash Pond geographically centered between monitoring wells DEK-MW-15003 and OW-12;
- In late 2023, the Karn Generating Facility stopped operating and consequently stopped routine discharge to the discharge ditch north of the Karn Lined Impoundment[2]. This operational change triggered a decrease in groundwater elevation at DEK-MW-15003 and an overall flattening of the mounded groundwater;
- No additional Appendix IV constituents have been observed at statistically significant levels above GWPS for the Karn Bottom Ash Pond groundwater monitoring system;
- In addition to the groundwater flow direction changes mentioned above, redox conditions which also affect contaminant transport, are still stabilizing in the Bottom Ash Pond Area following removal activities and will continue to be evaluated further ; and
- The mean arsenic concentration at DEK-MW-15002 is significantly lower than concentrations observed while the pond was in operation (prior to June 2018), indicating that the discontinuation of hydraulic loading to the Karn Bottom Ash Pond and the completed source removal of CCR was successful in removing a source of arsenic.
- Although arsenic is present in site wells at concentrations above the GWPS, the

[2] Discharge to this ditch was completed under authorization of the National Pollutant Discharge Elimination System (NPDES) permit.

drinking water pathway is not complete. Monitoring performed under the Michigan-approved GSI Compliance Monitoring Program demonstrates protection of human health and the environment with criteria determined to be protective at the potential point of exposure (Enclosure 4: Figures 1 & 2).

- Groundwater monitoring locations along the DE Karn Intake Channel and boundary between the coal ash management areas and the power plant complex (DEK-MW-15002, DEK-MW-15005, DEK-MW-15006) document contaminant concentrations of arsenic are less than the authorized mixing zone-based chronic concentration of 100 ug/L.
- Total chronic loading (i.e., mass flux), calculated from concentrations observed in transect groundwater samples collected from push-point samplers advanced at locations T1-3GSI through T6-3GSI, remains below the chronic mixing zone GSI criterion, indicating current conditions are protective of the GSI pathway.

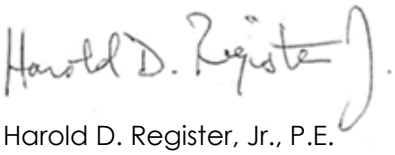
Conclusions

Source removal activities for the Karn Bottom Ash Pond have been completed and documented in the Karn Bottom Ash Pond Closure Report submitted to EGLE on October 30, 2019. Improvements in groundwater quality have been observed in the groundwater monitoring system, but observations of ongoing changes in groundwater potentiometric surface that may influence groundwater flow characteristics and/or alter groundwater redox conditions at monitoring locations that could influence constituent concentrations, still require further evaluation before a final remedy can be selected. To aid in the further evaluation, Consumers Energy installed six additional monitoring wells within the former Karn Bottom Ash Pond area that were integrated into the 2022 sampling schedule. Additionally, these groundwater monitoring wells have been instrumented with mini-Trolls™ that measure the groundwater elevation to a calibrated datum on frequent basis to better understand the relationships between groundwater elevation and potential flux. Subsequent sampling events to include the additional monitoring wells will inform the on-going improvements and retention of monitoring-only, passive, or active remedial options following the source removal. As conditions continue to be evaluated post-source removal, the drinking water and groundwater-surface water interface (GSI) pathway are protected by quarterly monitoring performed under the Michigan-approved hydrogeological monitoring plan that includes a GSI Compliance Monitoring Program.

The final remedy for the Karn Bottom Ash Pond will be formally selected per §257.97 and Michigan Solid Waste requirements once the selected option is reviewed and commented on by EGLE and a public meeting is conducted at least 30-days prior to the final selection as required under §257.96(e).

The next semiannual progress report will be submitted in six months by January 31, 2024. Please feel free to contact me with any questions or clarifications.

Sincerely,



Harold D. Register, Jr., P.E.

Sr. Principal Environmental Engineer
Risk Management
Phone: (517) 788-2982
Email: harold.registerjr@cmsenergy.com

cc: Mr. Jim Ferritto, EGLE Bay City District Office
Mr. John Ozoga, EGLE Bay City District Office
Mr. Mike Quigg, EGLE Bay City District Office
Ms. Margie Ring, EGLE Lansing Office
Mr. Jim Arduin, EGLE Lansing Office
Mr. Joe Firlit, Consumers Energy
Ms. Darby Litz, TRC
Ms. Kristin Lowery, TRC
Mr. Andrew Whaley, TRC

Enclosures:

1) May 2024 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, DE Karn Site, Bottom Ash Pond CCR Unit. (TRC, July 30, 2024).
2) First Semiannual 2024 Nature and Extent Data Summary, DE Karn, Consumers Energy, Essexville, Michigan. (TRC, July 30, 2024).

Enclosure 1

May 2024 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, DE Karn Site, Bottom Ash Pond CCR Unit. (TRC, July 30, 2024).

May 2024 Assessment Monitoring Data Summary and Statistical Evaluation

DE Karn, Bottom Ash Pond CCR Unit

Essexville, Michigan

July 2024

Prepared For:

Consumers Energy Company

Prepared By:

TRC
1540 Eisenhower Place
Ann Arbor, Michigan 48108

Darby Litz
Hydrogeologist/Project Manager

Andrew Whaley
Project Geologist

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 Introduction

On April 17, 2015, the United States Environmental Protection Agency (USEPA) published the final rule for the regulation and management of Coal Combustion Residuals (CCR) under the Resource Conservation and Recovery Act (RCRA) (the CCR Rule), as amended. Standards for groundwater monitoring and corrective action codified in the CCR Rule (40 CFR 257.90 – 257.98) apply to the DE Karn Bottom Ash Pond CCR Unit (Karn Bottom Ash Pond).

Consumers Energy is continuing semiannual assessment monitoring in accordance with §257.95 of the CCR Rule for the Karn Bottom Ash Pond located in Essexville, Michigan. This report has been prepared to provide the summary of the May 2024 assessment groundwater monitoring results, data quality review, and statistical data evaluation for the Karn Bottom Ash Pond groundwater monitoring system.

1.1 Program Summary

Groundwater monitoring for the Karn Bottom Ash Pond commenced after the installation of the monitoring well network in December 2015 to establish background conditions. Detection monitoring was initiated on October 17, 2017 in conformance with the self-implementing schedule in the CCR Rule.

Consumers Energy first reported the potential for statistically significant increases (SSIs) for Appendix III constituents in the *Annual Groundwater Monitoring Report DE Karn Power Plant Bottom Ash Pond CCR Unit* (TRC, January 2018). The statistical evaluation of the Appendix III indicator parameters confirming statistically significant increases (SSIs) over background were as follows:

- Boron at DEK-MW-15001, DEK-MW-15002, DEK-MW-15003, DEK-MW-15004, DEK-MW-15005, DEK-MW-15006;
- Fluoride at DEK-MW-15001;
- Field pH at DEK-MW-15001, DEK-MW-15002, DEK-MW-15003, DEK-MW-15005, DEK-MW-15006; and
- Sulfate at DEK-MW-15006.

On April 25, 2018, Consumers Energy entered assessment monitoring upon determining that an Alternate Source Demonstration for the Appendix III constituents was not successful. After subsequent sampling for Appendix IV constituents, Consumers Energy provided notification that arsenic was present at statistically significant levels above the Ground Water Protection Standards (GWPS) established at 21 ug/L (Consumers Energy, January 2019) in five of the six downgradient monitoring wells at the Karn Bottom Ash Pond as follows:

- Arsenic at DEK-MW-15001, DEK-MW-15002, DEK-MW-15003, DEK-MW-15004, and DEK-MW-15005.

The notification of the GWPS exceedance on January 14, 2019 was followed up with a Response Action Plan submitted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) on March 15, 2019 laying out the preliminary understanding of water quality and

actions that were underway to mitigate or eliminate unacceptable risk associated with the identified release from the CCR unit. The *Assessment of Corrective Measures* (ACM) (TRC, September 2019) was initiated on April 14, 2019 and submitted on September 11, 2019 in accordance with the schedule in §257.96 and the requirements of the Response Action Plan.

The ACM documents that the groundwater nature and extent has been defined, as required in §257.95(g)(1). Although arsenic concentrations exceed the GWPS in on-site groundwater monitoring locations, arsenic is delineated within the limits of the property owned by Consumers Energy and there are **currently no adverse effects on human health or the environment** from either surface water or groundwater due to CCR management at the Karn Bottom Ash Pond. Per §257.96(b), Consumers Energy is continuing to monitor groundwater in accordance with the assessment monitoring program as specified in §257.95.

Evaluation of groundwater under the CCR Rule focused on the following constituents that were collected *unfiltered* in the field:

CCR Rule Monitoring Constituents

Appendix III	Appendix IV	
Boron	Antimony	Mercury
Calcium	Arsenic	Molybdenum
Chloride	Barium	Radium 226/228
Fluoride	Beryllium	Selenium
pH	Cadmium	Thallium
Sulfate	Chromium	
Total Dissolved Solids (TDS)	Cobalt	
	Fluoride	
	Lead	
	Lithium	

Prior to remedy selection, Consumers Energy will also collect a sufficient number of samples to evaluate Michigan state-specific constituents as follows:

Additional Monitoring Constituents (Michigan Part 115/PA 640)

Detection Monitoring	Assessment Monitoring
Iron	Copper
	Nickel
	Silver
	Vanadium
	Zinc

Consumers Energy will continue to evaluate corrective measures for the Karn Bottom Ash Pond per §257.96 and §257.97 and is continuing semiannual assessment monitoring in accordance with §257.95.

1.2 Site Overview

The Karn Bottom Ash Pond is located within the DE Karn Power Plant site, which is located north of the JC Weadock Power Plant, east of the Saginaw River, south and west of Saginaw Bay (Figure 1). Two coal-fired power generating units (Karn Units 1 & 2) began generating electricity in 1958 and 1959, respectively. Karn Units 3 & 4, co-located with the coal-fired generating units, are oil- and natural gas-fueled. Two other areas of coal ash management within the Karn site are the Karn Landfill and the Karn Lined Impoundment. The Karn Landfill has been certified closed and is now in post-closure care and is being monitored in accordance with the EGLE-approved *Hydrogeological Monitoring Plan, Rev. 3, DE Karn Solid Waste Disposal Area* (December 19, 2017). The Karn Lined Impoundment has been licensed to operate by the EGLE under Part 115 (License Number 9629) and is being monitored in accordance with the EGLE-approved *Karn Lined Impoundment Hydrogeological Monitoring Plan* (November 13, 2020). The locations of the Karn Landfill, the Karn Lined Impoundment, and the Karn Bottom Ash Pond are shown on Figure 2.

Previously, the Karn Bottom Ash Pond was used for wet ash dewatering and was the primary settling/detention structure for the National Pollutant Discharge Elimination System (NPDES) treatment system prior to discharge. Consumers Energy provided notification of initiation of closure on October 12, 2018 to implement the certified closure plan by removal of CCR under the self-implementing requirements and schedule of the CCR Rule. In preparation for removal of the Karn Bottom Ash Pond, a new lined impoundment (Karn Lined Impoundment) was constructed meeting the requirements of the CCR Rule and the operational needs at the Karn Power Plant. The Karn Lined Impoundment began receipt of CCR and non-CCR on June 7, 2018 when it replaced the Karn Bottom Ash Pond operations.

[1] On December 28, 2018, the State of Michigan enacted Public Act No. 640 of 2018 (PA 640) to amend the Natural Resources and Environmental Protection Act, also known as Part 115 of PA 451 of 1994, as amended (a.k.a., Michigan Part 115 Solid Waste Management). The December 2018 amendments to Part 115 were developed to provide the State of Michigan oversight of CCR impoundments and landfills and to better align existing state solid waste management rules and statutes with the CCR Rule.

Consumers Energy has completed the removal of CCR consistent with the timeline for closure of the Karn Bottom Ash Pond under the *DE Karn Bottom Ash Pond Closure Plan* (Golder, January 2018; Revised April 2018) and the CCR Rule's closure by removal provisions in §257.102(c). Consumers Energy ceased hydraulic loading to the Karn Bottom Ash Pond in June 2018 and allowed the area to dewater by gravity. Consumers Energy then operated a construction dewatering system to allow for excavation of the vertical and lateral extent of CCR that commenced on March 20, 2019 and has operated through the construction and restoration period. The excavation extended to six inches below known CCR elevations established from previous investigations. Excavated CCR has been placed in the neighboring Weadock Landfill that is constructed with of a fully encapsulation soil-bentonite slurry wall keyed into a competently confining clay unit. The Karn Bottom Ash Pond has been restored by backfilling and grading the surface with clean fill in accordance with the plan to promote stormwater drainage, minimize ponding of surface water, and to reduce the potential of infiltration and migration of residual arsenic and any future constituents of concern (COCs). With the CCR removal complete, Consumers Energy submitted the *DE Karn Generating Facility Bottom Ash Pond CCR Removal Documentation Report* (Golder, October 2019) on October 30, 2019. EGLE approved the documentation removal report on December 1, 2020. Groundwater conditions post-CCR removal continue to be monitored.

1.3 Geology/Hydrogeology

The majority of the Karn Bottom Ash Pond area is comprised of surficial CCR and sand fill. USGS topographic maps and aerial photographs dating back to 1938, in addition to field descriptions of subsurface soil at the site, indicate that the site was largely developed by reclaiming low-lands through construction of perimeter dikes and subsequent ash filling (AECOM, 2009).

The surficial fill consists of a mixture of varying percentages of ash, sand, and clay-rich fill ranging from 5 to 15 feet thick. Below the surficial fill, native alluvium and lacustrine soils are present at varying depths. Generally, there is a well graded sand unit present to depths of 10 to 30 feet below ground surface (ft bgs) overlying a clay till which is observed at depths ranging from 25 to 75 ft bgs. In general, the alluvium soils (sands) are deeper along the Saginaw River and there are shallower lacustrine deposits (clays, silts and sands deposited in or on the shores of glacial lakes) at other areas. The clay till acts as a hydraulic barrier that separates the shallow groundwater from the underlying sandstone. A sandstone unit, which is part of the Saginaw formation, is generally encountered at 80 to 90 ft bgs.

The DE Karn Power Plant site is bounded by several surface water features (Figure 1): the Saginaw River to the west, Saginaw Bay (Lake Huron) to the north and east, and a discharge channel to the south. In general, shallow groundwater is encountered at a similar or slightly higher elevation relative to the surrounding surface water features. Groundwater flow in the upper aquifer is largely controlled by the surface water elevations of Saginaw River and Saginaw Bay. In the vicinity of the Karn Bottom Ash Pond, the shallow groundwater flow is generally to the west, toward the intake channel.

2.0 Groundwater Monitoring

2.1 Monitoring Well Network

In accordance with 40 CFR 257.91, Consumers Energy established a groundwater monitoring system for the Karn Bottom Ash Pond, which consists of 10 monitoring wells (four background monitoring wells and six downgradient monitoring wells) that are screened in the uppermost aquifer. The monitoring well locations are shown on Figure 2.

Groundwater around the Karn Bottom Ash Pond was initially characterized as radial based on the eight initial background sampling events prior to commencing detection monitoring; therefore, the six downgradient wells (DEK-MW-15001 through DEK-MW-15006) that were installed and spaced along the circumference of the Karn Bottom Ash Pond continued to accurately represent the quality of groundwater passing the waste boundary that ensures detection of groundwater contamination such that all potential contaminant pathways are monitored. Monitoring well DEK-MW-15001 was decommissioned on April 18, 2018 due to the installation of the new Karn Lined Impoundment, which is a new double composite lined CCR unit constructed as a replacement to the Karn Bottom Ash Pond. Monitoring well DEK-MW-18001 was installed on May 21, 2018 approximately 80 feet southeast of DEK-MW-15001 to maintain the perimeter downgradient monitoring well network.

Groundwater flow direction near the former pond has changed as a result of the pond decommissioning and monitoring wells DEK-MW-15003 and DEK-MW-15004 are no longer located downgradient of the unit (Figure 3). These two wells were removed from the certified downgradient monitoring well network. The recertification was included in Appendix D of the *October 2021 Assessment Monitoring Data Summary and Statistical Evaluation* (TRC, January 2022).

Four monitoring wells located south of the Karn Bottom Ash Pond on the JC Weadock Power Plant site provide data on background groundwater quality that has not been affected by the CCR unit (MW-15002, MW-15008, MW-15016, and MW-15019). Analysis for the establishment of these wells as background is detailed in the *Groundwater Statistical Evaluation Plan* for the Karn Bottom Ash Pond, dated October 17, 2017.

2.2 May 2024 Assessment Monitoring

Per §257.95, all wells in the CCR unit groundwater monitoring program must be sampled semiannually. TRC conducted the first semiannual assessment monitoring event of 2024 for Appendix III and IV constituents at the Karn Bottom Ash Pond CCR Unit in accordance with the *DE Karn Monitoring Program Sample Analysis Plan* (ARCADIS, May 2016) (SAP). The semiannual assessment monitoring event was performed on May 6 through 9, 2024.

The May 2024 sampling event included collection of static water level measurements from the Karn Bottom Ash Pond groundwater monitoring system and other site wells to support preparation of a groundwater contour map. Static water elevation data are summarized in Table 1 and groundwater elevation data are shown on Figure 3. The Karn Bottom Ash Pond monitoring wells (DEK-MW-15002, DEK-MW-15005, DEK-MW-15006 and DEK-MW-18001) and

background monitoring wells (MW-15002, MW-15008, MW-15016, and MW-15019) were purged with peristaltic pumps utilizing low-flow sampling methodology. Field parameters were stabilized at each monitoring well prior to collecting groundwater samples. Stabilized field parameters for each monitoring well are summarized in Table 2.

The groundwater samples were analyzed by the Consumers Energy Trail Street Laboratory for Appendix III and IV constituents in accordance with the SAP. Radium analyses were completed by Eurofins Environment Testing. The analytical results for the background wells are summarized in Table 3, and the analytical results for the downgradient monitoring wells are summarized in Table 4. Analytical results from the May 2024 monitoring event are included in the attached laboratory reports (Appendix C).

2.2.1 Groundwater Flow Rate and Direction

Groundwater elevation data collected during the May 2024 assessment monitoring event are provided in Table 1. These data were used to construct the groundwater contour map (Figure 3). Groundwater elevations measured at the site in May 2024 are generally within the range of 579 to 585 feet above mean sea level (ft NAVD88) and groundwater is typically encountered at equal elevation relative to the surrounding surface water features measured by the NOAA gauging station or within approximately 6 feet higher, flowing toward the bounding surface water features.

Although historically the point source discharge of sluiced bottom ash into the Karn Bottom Ash Pond created localized mounding of the potentiometric surface, the new Karn Lined Impoundment went into service on June 7, 2018 and has been continuously collecting the process water and bottom ash that went into the former bottom ash pond. Since the former bottom ash pond is no longer being hydraulically loaded with sluiced ash and has been dewatered by gravity, the characteristic groundwater mound centered within the former surface pool area is no longer present. The groundwater elevation data collected from the groundwater monitoring system of the former Karn Bottom Ash Pond in May 2024demonstrate a reduction in groundwater elevation measurements by several feet when compared to groundwater elevations measured prior to June 2018. Due to the operational changes of the bottom ash pond and the completion of the landfill capping activities, the gradient between the bottom ash pond area and the surrounding surface water bodies is flattening out as compared to previous quarters as the groundwater elevations are reaching a new equilibrium, as expected. Groundwater at the Site is locally influenced by incidental infiltration from precipitation over the uncovered acreage and the unlined low volume miscellaneous wastewater conveyance associated with the permitted NPDES discharge system, which is located just north of the Karn Lined Impoundment. Monitoring Wells OW-11, OW-12, and DEK-MW-15003 delineate the newly established groundwater elevation high point with porewater flow generally flowing radially towards the adjacent surface water features from this newly established potentiometric “high”, as illustrated in Figure 3. As such, the groundwater flow across the footprint of the former bottom ash pond is generally to the west.

The average hydraulic gradient observed on May 6, 2024 in the Karn Bottom Ash Pond area during these events is estimated at 0.0036 ft/ft. The gradient was calculated using the monitoring well pairs DEK-MW-15004/DEK-MW-15005 and DEK-MW-15003/DEK-MW-15006. Using the mean hydraulic conductivity of 15 ft/day (ARCADIS, 2016) and an assumed effective porosity of 0.3, the estimated average seepage velocity was 0.18 ft/day or 66 ft/year.

2.2.2 Data Quality

Analytical data were found to be usable for assessment monitoring and were generally consistent with previous sampling events. The Data Quality Reviews are included as Appendix A.

3.0 Assessment Monitoring Statistical Evaluation

Assessment monitoring is continuing at the Karn Bottom Ash Pond while Consumers Energy further evaluates corrective measures in accordance with §257.96 and §257.97 as outlined in the ACM. The following section summarizes the statistical approach applied to assess the May 2024 groundwater data in accordance with the assessment monitoring program.

3.1 Establishing Groundwater Protection Standards

The GWPSs are used to assess whether Appendix IV constituent concentrations are present in groundwater at unacceptable levels as a result of CCR Unit operations by statistically comparing concentrations in the downgradient wells to the GWPSs for each Appendix IV constituent. In accordance with §257.95(h) and the Stats Plan, GWPSs were established for the Appendix IV constituents following the preliminary assessment monitoring event as documented in the Groundwater Protection Standards technical memorandum (Appendix C of the *2018 Annual Groundwater Monitoring Report,* TRC, January 2019). The GWPS is established as the higher of the EPA Maximum Contaminant Level (MCL) or statistically derived background level for constituents with MCLs and the higher of the EPA Regional Screening Levels (RSLs) or background level for constituents without an established MCL.

3.2 Data Comparison to Groundwater Protection Standards

The compliance well groundwater concentrations for Appendix IV constituents were compared to the GWPSs to determine if a statistically significant exceedance had occurred in accordance with §257.95. Consistent with the *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (Unified Guidance) (USEPA, 2009), the preferred method for comparisons to a fixed standard are confidence limits. An exceedance of the standard occurs when the 99 percent lower confidence level of the downgradient monitoring well data exceeds the GWPS of any Appendix IV constituent. As documented in the January 14, 2019 *Notification of Appendix IV Constituent Exceeding Groundwater Protection Standard per §257.95(g)*, arsenic was present at statistically significant levels above the federal GWPS in five of the six downgradient wells at the Karn Bottom Ash Pond.

Confidence intervals were established per the statistical methods detailed in the *Statistical Evaluation of May 2024 Assessment Monitoring Sampling Event* technical memorandum provided in Appendix B. For each Appendix IV constituent, the concentrations were first compared directly to their respective GWPS. Constituent-well combinations that included a direct exceedance of the GWPSs were retained for further statistical analysis using confidence limits.

Due to changes in groundwater flow direction on site, monitoring wells DEK-MW-15003 and DEK-MW-15004 are no longer located downgradient of the unit and were determined to be no longer indicative of groundwater conditions influenced by the Karn Bottom Ash Pond. Therefore, monitoring wells DEK-MW-15003 and DEK-MW-15004 are no longer included for assessment monitoring statistical analysis. The monitoring well network for statistical evaluation consists of the four monitoring wells located downgradient of the bottom ash pond (DEK-MW-15002, DEK-MW-15005, DEK-MW-15006, and DEK-MW-18001). Overall, the assessment

monitoring statistical evaluations have confirmed that arsenic is the only Appendix IV constituent present at statistically significant levels above the GWPS. The statistical evaluation of the May 2024 semiannual assessment monitoring event data indicate that arsenic is present at statistically significant levels exceeding the GWPS in downgradient monitoring wells at the Karn Bottom Ash Pond:

Constituent	GWPS	#Downgradient Wells Observed
Arsenic	21 ug/L	2 of 4

Previously, arsenic was present in downgradient well DEK-MW-15002 and DEK-MW-15006 at a statistically significant level; however, arsenic concentrations have declined since sluicing to the Karn Bottom Ash Pond ceased in June 2018 and the bottom ash and transport water was diverted to the Karn Lined Impoundment (Appendix B: Attachment 1). The statistical evaluation of the October 2020 through May 2024 data show that the lower confidence limit for arsenic is below the GWPS at DEK-MW-15002 and DEK MW-15006.

Arsenic concentrations at DEK-MW-15005 and DEK-MW-18001 remain above the GWPS at a statistically significant level (i.e., lower confidence limit is above the GWPS) and arsenic concentrations at DEK-MW-18001 have recently been increasing. A summary of the confidence intervals for May 2024 is provided in Table 5. Although arsenic is present above the GWPS, the drinking water pathway is not complete as there are no drinking water wells on-site. Redox conditions, which affect contaminant transport, are still stabilizing in the Bottom Ash Pond Area following removal activities and will continue to be evaluated further.

4.0 Conclusions and Recommendations

Corrective action has been triggered and assessment monitoring is ongoing at the Karn Bottom Ash Pond CCR unit. A summary of the May 2024 assessment monitoring event is presented in this report.

Overall, the statistical assessments have confirmed that arsenic is the only Appendix IV constituent present at statistically significant levels above the GWPS. Consumers Energy has completed the removal of CCR consistent with the timeline for closure of the Karn Bottom Ash Pond under the *DE Karn Bottom Ash Pond Closure Plan* (Golder, January 2018; Revised April 2018) and the CCR Rule's closure by removal provisions in §257.102(c).

The ACM Report provided a high-level assessment of groundwater remediation technologies that could potentially address site-specific COCs (i.e., arsenic) under known groundwater conditions. Groundwater chemistry appears to be improving in some areas as a result of discontinuing the hydraulic loading to the Karn Bottom Ash Pond and the completed source removal of CCR, as shown by the decrease in concentration of arsenic at DEK-MW-15002; however, attainment of the GWPS at all of the Bottom Ash Pond compliance wells may not be feasible due to influences other than the former pond, such as the presence and former operation of the nearby Karn Landfill. Redox conditions, which affect contaminant transport, are still stabilizing following pond removal and will continue to be evaluated further.

Consumers Energy will continue assessment monitoring and evaluate corrective measures in accordance with §257.96 and §257.97 as outlined in the Karn Bottom Ash Pond ACM. The groundwater management remedy for the Karn Bottom Ash Pond will be selected as soon as feasible to meet the federal standards of §257.96(b) of the CCR Rule. Consumers Energy will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98. The next semiannual monitoring event is tentatively scheduled for the fourth calendar quarter of 2024.

5.0 References

AECOM. 2009. Potential Failure Mode Analysis (PFMA) Report. DE Karn Electric Generation Facility Ash Dike Risk Assessment Essexville, Michigan. Prepared for Consumers Energy Company. October 30.

ARCADIS. 2016. Summary of Monitoring Well Design, Installation, and Development. DE Karn Electric Generation Facility – Essexville, Michigan. Prepared for Consumers Energy Company. May 13.

ARCADIS. 2016. Electric Generation Facilities RCRA CCR Detection Monitoring Program. DE Karn Monitoring Program Sample Analysis Plan, Essexville, Michigan. Prepared for Consumers Energy Company. May 18.

Consumers Energy Company. 2017. Hydrogeological Monitoring Plan Rev. 3: DE Karn Solid Waste Disposal Area. December 19.

Consumers Energy Company. 2019. Notification of Appendix IV Constituent Exceeding Groundwater Protection Standards per §257.95(g). January.

Golder Associates Inc. 2018. D.E. Karn Generating Facility Bottom Ash Pond Closure Plan, Essexville, Michigan. Prepared for Consumers Energy Company. January.

Golder Associates Inc. 2018. D.E. Karn Generating Facility Revised Bottom Ash Pond Closure Work Plan, Essexville, Michigan. Prepared for Consumers Energy Company. April.

Golder Associates Inc. 2019. D.E. Karn Generating Facility Bottom Ash Pond CCR Removal Documentation Report. Prepared for Consumers Energy Company. October.

TRC. 2017. Groundwater Statistical Evaluation Plan – DE Karn Power Plant, Bottom Ash Pond, Essexville, Michigan. Prepared for Consumers Energy Company. October.

TRC. 2018. Annual Groundwater Monitoring Report – DE Karn Power Plant, Bottom Ash Pond CCR Unit. Prepared for Consumers Energy Company. January.

TRC. 2019. 2018 Annual Groundwater Monitoring Report – DE Karn Power Plant, Bottom Ash Pond CCR Unit. Prepared for Consumers Energy Company. January.

TRC. 2019. Assessment of Corrective Measures – DE Karn Bottom Ash Pond Coal Combustion Residual Unit. Prepared for Consumers Energy Company. September.

TRC. 2020. Karn Lined Impoundment Hydrogeological Monitoring Plan for the DE Karn Power Plant Lined Impoundment, Essexville, Michigan. Prepared for Consumers Energy Company. November.

TRC. 2022. October 2021 Assessment Monitoring Data Summary and Statistical Evaluation – DE Karn Power Plant, Bottom Ash Pond CCR Unit. Prepared for Consumers Energy Company. January.

USEPA. 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance. Office of Conservation and Recovery. EPA 530/R-09-007.

USEPA. 2015. 40 CFR Parts 257 and 261. Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. 80 Federal Register 74 (April 17, 2015), pp. 21301-21501 (80 FR 21301). April.

USEPA. 2018. 40 CFR Part 257. Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; Amendments to the National Minimum Criteria (Phase One, Part One); Final Rule. 83 Federal Register 146 (July 30, 2018), pp. 36435-36456 (83 FR 36435). July.

USEPA. 2018. Barnes Johnson (Office of Resource Conservation and Recovery) to James Roewer (c/o Edison Electric Institute) and Douglas Green, Margaret Fawal (Venable LLP). Re: Coal Combustion Residuals Rule Groundwater Monitoring Requirements. April 30, 2018. United States Environmental Protection Agency, Washington, D.C. 20460. Office of Solid Waste and Emergency Response, now the Office of Land and Emergency Management. April.

Tables

Table 1
Summary of Groundwater Elevation Data
DE Karn – RCRA CCR Monitoring Program
Essexville, Michigan

Well Location	TOC Elevation (ft)	Geologic Unit of Screen Interval	Screen Interval Elevation (ft)	May 6, 2023	
				Depth to Water (ft BTOC)	Groundwater Elevation (ft)
DEK Bottom Ash Pond					
DEK-MW-15002	590.87	Sand	578.3 to 575.3	7.00	583.87
DEK-MW-15005	589.72	Sand	572.3 to 567.3	9.88	579.84
DEK-MW-15006	589.24	Sand	573.0 to 568.0	9.30	579.94
DEK Bottom Ash Pond & Karn Lined Impoundment					
DEK-MW-18001	593.47	Sand	579.2 to 574.2	9.48	583.99
Karn Lined Impoundment					
DEK-MW-15003	602.74	Sand	578.8 to 574.8	18.95	583.79
OW-10	591.58	Silty Sand and Silty Clay	576.0 to 571.0	7.8	583.78
OW-11	607.90	Silt/Fly Ash	587.5 to 582.5	24.30	583.60
OW-12	603.10	Silty Sand	584.2 to 579.2	18.25	584.85
DEK Nature and Extent					
DEK-MW-15004	611.04	Sand	576.6 to 571.6	29.04	582.00
MW-01	597.02	Sand	573.0 to 570.0	17.25	579.77
MW-03	597.30	Sand	569.8 to 566.8	17.55	579.75
MW-06	589.44	Sand and Silty Sand	578.5 to 563.5	9.54	579.90
MW-08	598.78	Sand and Silty Clay	580.9 to 570.9	17.92	580.86
MW-10	596.97	Sand	582.5 to 572.5	17.00	579.97
MW-12	598.60	Sand	583.9 to 573.9	18.61	579.99
MW-14	594.37	Sand and Silty Clay	584.7 to 574.7	14.40	579.97
MW-16	595.80	Sand and Sand/Bottom Ash	584.1 to 574.1	16.05	579.75
MW-22	598.99	Ash/Sand	571.4 to 568.4	17.35	581.64
MW-23	595.57	Ash/Sand	576.9 to 571.9	14.78	580.79
DEK Static Water Level					
MW-02	597.34	Sand and Silty Clay	572.5 to 567.5	17.59	579.75
MW-04	598.01	NR	569.5 to 564.5	18.28	579.73
MW-17	597.91	Sand	577.0 to 574.0	14.22	583.69
MW-18	609.22	Silty Sand and Silty Clay	575.8 to 573.8	26.84	582.38
MW-19	597.28	NR	572.1 to 567.1	17.18	580.10
MW-20	632.75	Sand	582.3 to 579.3	53.00	579.75
MW-21	632.91	Sand	587.1 to 584.1	51.90	581.01
OW-01	631.33	NR	572.5 to 567.5	51.58	579.75
OW-02	598.01	Fly Ash	579.4 to 576.4	16.29	581.72
OW-03	597.94	Fly Ash and Sand	573.6 to 568.6	17.48	580.46
OW-04	590.21	Sand and Bottom/Fly Ash	579.1 to 574.1	10.30	579.91
OW-05	593.53	Sand	576.9 to 571.9	13.50	580.03
OW-06	603.95	NR	580.9 to 575.9	22.85	581.10
OW-07	596.41	Ash	583.3 to 580.3	15.60	580.81
OW-08	593.93	NR	581.0 to 576.0	11.10	582.83
OW-09	593.45	NR	585.5 to 580.5	10.45	583.00
OW-13	588.52	NR	579.5 to 574.5	3.91	584.61
OW-15	587.75	NR	572.8 to 567.8	3.85	583.90

Notes:

Survey data from: Rowe Professional Services Company (Nov. 2015) and Consumers Energy Company drawings: SG-21733, Sheet 1, Rev. G (Karn, 11/27/18); and SG-21733, Sheet 2, Rev. C (Weadock, 11/27/18).

Elevation in feet relative to North American Vertical Datum 1988 (NAVD 88).

TOC: Top of well casing.

ft BTOC: Feet below top of well casing.

NR: Not Recorded

Table 2
Summary of Field Parameters
DE Karn Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (°C)	Turbidity (NTU)
Background							
MW-15002	5/8/2024	1.25	-111.5	7.7	495	12.7	8.5
MW-15008	5/8/2024	0.70	-125.5	7.0	1,760	11.5	10.0
MW-15016	5/8/2024	0.69	-117.5	7.1	1,762	12.5	9.9
MW-15019	5/8/2024	0.77	-104.5	7.0	2,044	10.0	5.8
Karn Bottom Ash Pond							
DEK-MW-15002	5/9/2024	0.18	-193.3	7.4	780	11.1	5.4
DEK-MW-15005	5/9/2024	0.58	-87.4	7.4	1,166	10.7	4.8
DEK-MW-15006	5/9/2024	0.13	-107.0	7.7	1,095	11.8	3.2
DEK-MW-18001	5/8/2024	0.12	-94.1	7.4	747	12.3	3.0

Notes:

mg/L - Milligrams per Liter.

mV - Millivolts.

SU - Standard units.

umhos/cm - Micromhos per centimeter.

°C - Degrees Celsius

NTU - Nephelometric Turbidity Unit.

Table 3
Summary of Groundwater Sampling Results (Analytical)
DE Karn JC Weadock Background - RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	**MW-15002**	**MW-15008**	**MW-15016**	**MW-15019**
					Sample Date:	5/8/2024	5/8/2024	5/8/2024	5/8/2024
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Background			
Appendix III[(1)]									
Boron	ug/L	NC	500	500	4,000	21	142	398	241
Calcium	mg/L	NC	NC	NC	500[EE]	55.9	121	243	173
Chloride	mg/L	**250****	**250[E]**	**250[E]**	**50**	28.3	**395**	**175**	**374**
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250**	250[E]	250[E]	500[EE]	7.53	2.57	194	93.8
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	358	**1,280**	**1,190**	**1,340**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	7.7	7.0	7.1	7.0
Appendix IV[(1)]									
Antimony	ug/L	6	6.0	6.0	2.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	< 1	3	**17**	2
Barium	ug/L	2,000	2,000	2,000	1,200	43	93	157	364
Beryllium	ug/L	4	4.0	4.0	33	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	< 1	1	1	< 1
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	14	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	< 10	22	68	14
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	120	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NC	NC	NC	< 0.0742	0.589	< 0.149	0.332
Radium-228	pCi/L	NC	NC	NC	NC	< 0.512	< 0.847	< 0.715	< 0.638
Radium-226/228	pCi/L	5	NC	NC	NC	< 0.512	1.03	< 0.715	0.822
Selenium	ug/L	50	50	50	5.0	< 1	< 1	1	< 1
Thallium	ug/L	2	2.0	2.0	2.0	< 2	< 2	< 2	< 2
Additional MI Part 115[(2)]									
Iron	ug/L	**300****	**300[E]**	**300[E]**	500,000[EE]	**526**	**16,900**	**21,900**	**23,100**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	2	1	2	< 1
Nickel	ug/L	NC	100	100	120	2	4	10	5
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	62	27	< 2	**9**	2	3
Zinc	ug/L	5,000**	2,400	5,000[E]	260	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
pCi/L - picocuries per liter; SU - standard units; pH is a field parameter.
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April, 2012.
NC - no criteria; -- - not analyzed.
* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 30, 2013, updated October 12, 2023.
** - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR) April, 2012.
^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018) per footnote {G} of Michigan Part 201 criteria tables. Chromium GSI criterion based on hexavalent chromium per footnote {H}. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}. GSI criterion for chloride is 50 mg/L when the discharge is to the Great Lakes or connecting waters per footnote {FF}
# - If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and MDEQ policy and procedure 09-014 dated June 20, 2012.
[E] - Criterion is the aesthetic drinking water value per footnote {E}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
(1) 40 CFR Part 257 Appendix III Detection Monitoring Constituents and Appendix IV Assessment Monitoring Constituents.
(2) Per Michigan Part 115 Amendment - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection monitoring constituent (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.
BOLD value indicates an exceedance of one or more of the listed criteria.
RED value indicates an exceedance of the MCL.
All metals were analyzed as total unless otherwise specified.

Table 4
Summary of Groundwater Sampling Results (Analytical)
DE Karn Bottom Ash Pond - RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	DEK-MW-15002	DEK-MW-15005	DEK-MW-15006	DEK-MW-18001
					Sample Date:	5/9/2024	5/9/2024	5/9/2024	5/8/2024
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^				
Appendix III[(1)]									
Boron	ug/L	NC	**500**	**500**	4,000	**1,310**	**1,030**	**1,110**	**917**
Calcium	mg/L	NC	NC	NC	500[EE]	94.3	158	196	52.5
Chloride	mg/L	250**	250[E]	250[E]	**50**	**76.3**	**147**	49.5	**66.1**
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	**500[EE]**	60.3	**358**	**545**	226
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	**694**	**1,400**	**1,220**	**670**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	7.4	7.4	7.7	7.4
Appendix IV[(1)]									
Antimony	ug/L	6	6.0	6.0	2.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	3	**32**	**19**	**484**
Barium	ug/L	2,000	2,000	2,000	1,200	129	341	159	147
Beryllium	ug/L	4	4.0	4.0	33	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	14	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	31	32	21	19
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	120	< 5	6	8	17
Radium-226	pCi/L	NC	NC	NC	NC	0.292	0.653	0.497	0.238
Radium-228	pCi/L	NC	NC	NC	NC	< 0.511	0.898	0.593	< 0.623
Radium-226/228	pCi/L	5	NC	NC	NC	0.541	1.55	1.09	< 0.623
Selenium	ug/L	50	50	50	5.0	< 1	< 1	< 1	< 1
Thallium	ug/L	2	2.0	2.0	2.0	< 2	< 2	< 2	< 2
Additional MI Part 115[(2)]									
Iron	ug/L	**300****	**300[E]**	**300[E]**	500,000[EE]	33	**836**	**1,770**	**458**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	2	2	1	< 1
Nickel	ug/L	NC	100	100	120	4	3	4	2
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	4.5	62	27	3	3	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000[E]	260	< 10	< 10	< 10	19

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
pCi/L - picocuries per liter; SU - standard units; pH is a field parameter.
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April, 2012.
NC - no criteria; -- - not analyzed.
* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 30, 2013, updated October 12, 2023.
** - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR) April, 2012.
^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018) per footnote {G} of Michigan Part 201 criteria tables. Chromium GSI criterion based on hexavalent chromium per footnote {H}. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}. GSI criterion for chloride is 50 mg/L when the discharge is to the Great Lakes or connecting waters per footnote {FF}
# - If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and MDEQ policy and procedure 09-014 dated June 20, 2012.
[E] - Criterion is the aesthetic drinking water value per footnote {E}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
(1) 40 CFR Part 257 Appendix III Detection Monitoring Constituents and Appendix IV Assessment Monitoring Constituents.
(2) Per Michigan Part 115 Amendment - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection monitoring constituent (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.
BOLD value indicates an exceedance of one or more of the listed criteria.
RED value indicates an exceedance of the MCL.
All metals were analyzed as total unless otherwise specified.

Table 5
Summary of Assessment Monitoring Statistical Evaluation – May 2024
DE Karn Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

Constituent	Units	GWPS	DEK-MW-15005		DEK-MW-15006		DEK-MW-18001	
			LCL	UCL	LCL	UCL	LCL	UCL
Arsenic	ug/L	21	34	60	19	27	110	690

Notes:

Only compliance well/constituent pairs with one or more concentrations exceeding the GWPS within the 8 most recent semiannual sampling events are included on this table.

ug/L - micrograms per Liter.

GWPS - Groundwater Protection Standard as established in TRC's Technical Memorandum dated October 15, 2018.

UCL - Upper Confidence Limit (α = 0.01) of the downgradient data set.

LCL - Lower Confidence Limit (α = 0.01) of the downgradient data set.

Indicates a statistically significant exceedance of the GWPS. An exceedance occurs when the LCL is greater than the GWPS.

Figures

0 1,500 3,000
FEET
1:36,000 1" = 3,000'

BASE MAP: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

PROJECT:
CONSUMERS ENERGY COMPANY
DE KARN AND JC WEADOCK POWER PLANTS
ESSEXVILLE, MICHIGAN

TITLE:
SITE LOCATION MAP

DRAWN BY:	A. ADAIR	PROJ. NO.:	553814.0001
CHECKED BY:	J. KRENZ	**FIGURE 1**	
APPROVED BY:	D. LITZ		
DATE:	JULY 2024		

TRC
1540 EISENHOWER PLACE
ANN ARBOR, MI 48108-3284
PHONE: 734.971.7080

FILE: 464095_DEKARN

LEGEND

- DEK BOTTOM ASH POND & LINED IMPOUNDMENT MONITORING WELL
- DEK BOTTOM ASH POND MONITORING WELL
- DEK LINED IMPOUNDMENT MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- NATURE AND EXTENT WELL
- SURFACE WATER GAUGING STATION
- BACKGROUND MONITORING WELL
- SLURRY WALL (APPROXIMATE)
- EXTENT OF GEOSYNTHETICS

NOTES

1. BASE MAP IMAGERY FROM NEARMAP, (5/4/2022).
2. WELL LOCATIONS SURVEYED BY ROWE PROFESSIONAL SERVICES COMPANY ON 11/4/2015.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).
4. A SINGLE WELL SYMBOL IS SHOWN FOR WELL PAIRS MW-01/MW-02 AND MW-03/MW-04 AS THE WELLS ARE LOCATED WITHIN 3-FT OF EACH OTHER.

1:9,600

1" = 800'

0 800 1,600 Feet

PROJECT: CONSUMERS ENERGY COMPANY
DE KARN AND JC WEADOCK POWER PLANTS
ESSEXVILLE, MICHIGAN

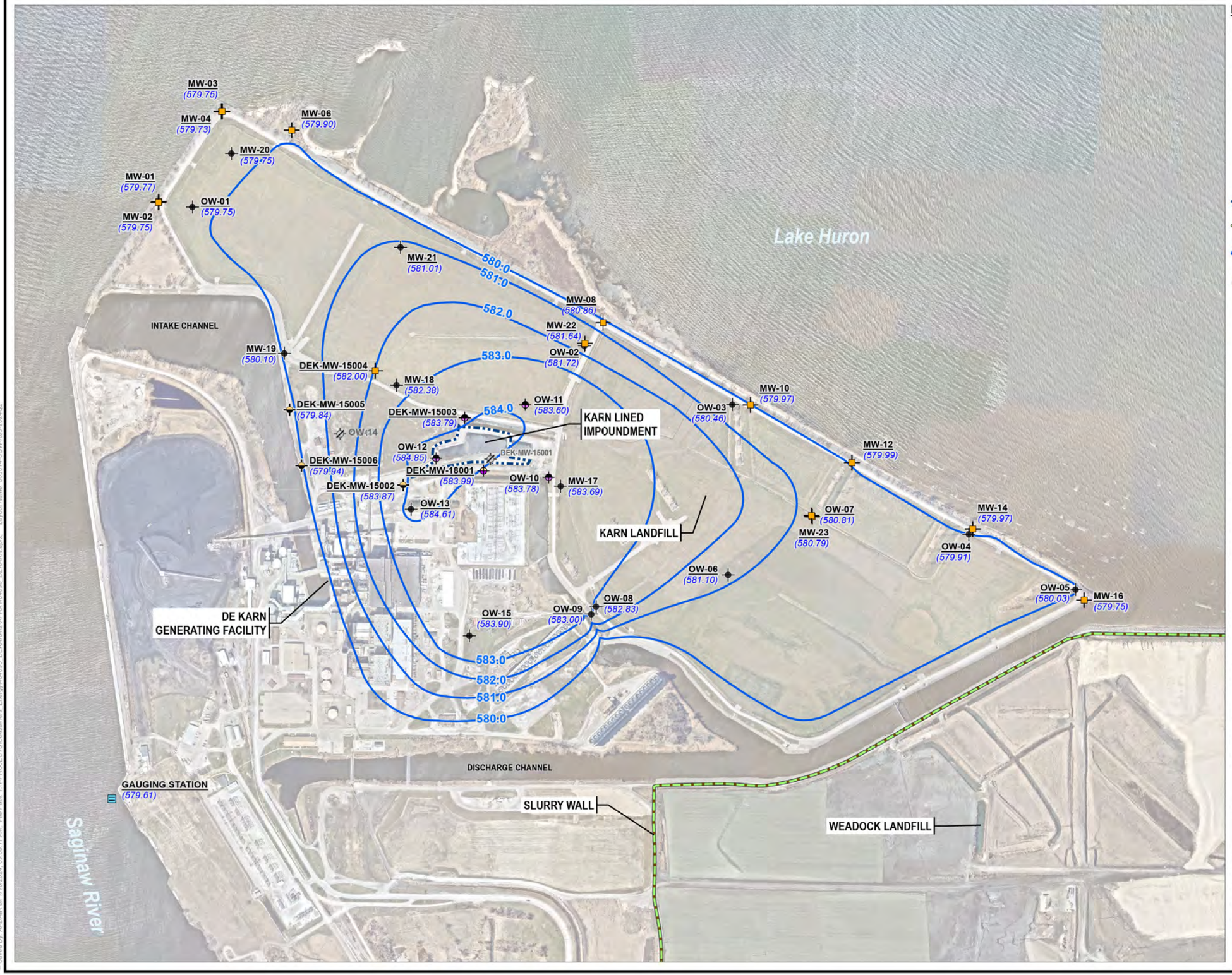
TITLE: **SITE LAYOUT MAP**

DRAWN BY:	A. ADAIR	PROJ. NO.:	553814.0001
CHECKED BY:	A. WHALEY		**FIGURE 2**
APPROVED BY:	D. LITZ		
DATE:	JULY 2024		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
www.trcompanies.com

FILE: 464095_DEKARN.aprx

Coordinate System: NAD 1983 UTM Zone 16N, Map Rotation: 0
Stored By: AADAIR on 7/10/2024 - 09:55:11 AM - File Path: T:\1 PROJECTS\Consumers_Energy\464095_DEKARN\2_ARCFM\464095_DEKARN.aprx - Layout Name: 553814-SL-002-203402



LEGEND

- DEK BOTTOM ASH POND & LINED IMPOUNDMENT MONITORING WELL
- DEK BOTTOM ASH POND MONITORING WELL
- DEK LINED IMPOUNDMENT MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- NATURE AND EXTENT WELL
- SURFACE WATER GAUGING STATION
- EXTENT OF GEOSYNTHETICS
- SLURRY WALL (APPROXIMATE)
- GROUNDWATER ELEVATION CONTOUR (1' INTERVAL, DASHED WHERE INFERRED)
- (580.21) GROUNDWATER ELEVATION (FEET)
- (NM) NOT MEASURED
- (NU) NOT USED

NOTES

1. BASE MAP IMAGERY FROM NEARMAP, (5/4/2022).
2. WELL LOCATIONS SURVEYED BY ROWE PROFESSIONAL SERVICES COMPANY ON 11/4/2015.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).
4. A SINGLE WELL SYMBOL IS SHOWN FOR WELL PAIRS MW-01/MW-02 AND MW-03/MW-04 AS THE WELLS ARE LOCATED WITHIN 3-FT OF EACH OTHER.
5. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.

N

1:7,200

1" = 600'

0 600 1,200 FEET

PROJECT: CONSUMERS ENERGY COMPANY
DE KARN POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE: SHALLOW GROUNDWATER CONTOUR MAP
MAY 2024

DRAWN BY:	A. ADAIR	PROJ. NO:	553814.0001
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		FIGURE 3
DATE:	JULY 2024		

TRC
1540 EISENHOWER PLACE
ANN ARBOR, MI 48108-3284
PHONE: 734.971.7080

FILE: 464095_DEKARN.aprx

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl; Map Rotation: 0
Saved By: AADAIR on 7/10/2024 @ 8:51 AM - For Path: T:\1_PROJECTS\Consumers_Energy\464095_DEKARN\2_APRX\464095_DEKARN.aprx - Layout Name: 553814-SGW-K03-20240

Appendix A
Data Quality Reviews

Laboratory Data Quality Review
Groundwater Monitoring Event May 2024
DE Karn Bottom Ash Pond

Groundwater samples were collected by TRC for the May 2024 sampling event. Samples were analyzed for total metals, anions, total dissolved solids, ammonia, and alkalinity by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The sulfide analyses were subcontracted to Merit Laboratories, Inc. (Merit) in East Lansing, Michigan. The laboratory analytical results were reported in laboratory sample delivery groups (SDGs) 24-0339R and S61970.01(01).

During the May 2024 sampling event, a groundwater sample was collected from each of the following wells:

- DEK-MW-15002
- DEK-MW-15005
- DEK-MW-15006

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Fluoride, Chloride, Sulfate, Nitrate, Nitrite)	EPA 300.0
Total Dissolved Solids (TDS)	SM 2540C
Total Metals	SW-846 6020B/7470A
Alkalinity (Bicarbonate, Carbonate, and Total)	SM 2320B
Ammonia	SM 4500 NH3(h)
Sulfide	SM 4500 S2D

TRC reviewed the laboratory data to assess data usability. The following sections summarize the data review procedure and the results of the review.

Data Usability Review Procedure

The analytical data were reviewed using the USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review (USEPA, 2020). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative;
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;
- Data for method blanks, equipment blanks, and field blanks, where applicable. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Field and equipment blanks are used to assess potential contamination arising from field procedures;
- Data for laboratory control samples (LCSs) and laboratory control sample duplicates (LCSDs), when performed. The LCSs and/or LCSDs are used to assess the accuracy of the analytical method using a clean matrix;

- Percent recoveries for matrix spike (MS) and matrix spike duplicates (MSD), when performed on project samples. Percent recoveries are calculated for each analyte spiked and used to assess bias due to sample matrix effects;
- Data for laboratory duplicates, when performed on project samples. The laboratory duplicates are replicate analyses of one sample and are used to assess the precision of the analytical method;
- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

It should be noted that results for method blanks and LCSs were not provided for review by CE Laboratory Services and Merit. Therefore, potential contamination arising from laboratory sample preparation and/or analytical procedures and the accuracy of the analytical method using a clean matrix could not be evaluated for the total metals, anions, alkalinity, TDS, ammonia, and sulfide analyses.

This data usability report addresses the following items:

- Usability of the data if quality control (QC) results suggest potential problems with all or some of the data;
- Actions regarding specific QC criteria exceedances.

Review Summary

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable for their intended purpose. A summary of the data quality review, including non-conformances and issues identified in this evaluation, are noted below.

- The reviewed Appendix III, IV, optional Piper diagram analyses, additional Part 115 constituents, and additional geochemistry parameters will be utilized for the purposes of the detection monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- One field blank (FB-DEK-BAP) and one equipment blank (EB-DEK-BAP) were collected with this data set. Target analytes were not detected above the RL in these blank samples with the following exception.
  - Nickel was detected in FB-DEK-BAP at a concentration of 2 µg/L. The positive results for nickel in all groundwater samples in this data set are likely false positives due to detection less than 10x the field blank, as summarized in attachment A.
- Laboratory duplicate and MS/MSD analyses were not performed on a sample from this data set.
- Samples DUP-DEK-BAP-01 and DEK-MW-15002 were submitted as the field duplicate pair with this data set; all criteria were met.

Attachment A
Summary of Data Non-Conformances for Groundwater Analytical Data
DE Karn Bottom Ash Pond – CCR Monitoring Program
Erie, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
DEK-MW-15002	5/9/2024	Nickel	Field blank contamination; potential false positive.
DEK-MW-15005	5/9/2024		
DEK-MW-15006	5/9/2024		
DUP-DEK-BAP-01	5/9/2024		

Laboratory Data Quality Review
Groundwater Monitoring Event May 2024
DE Karn Bottom Ash Pond and Lined Impoundment

A groundwater sample was collected by TRC for the May 2024 sampling event. The sample was analyzed for total metals, anions, total dissolved solids, ammonia, and alkalinity by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The sulfide analysis was subcontracted to Merit Laboratories, Inc. (Merit) in East Lansing, Michigan. The laboratory analytical results were reported in laboratory sample delivery groups (SDGs) 24-0340R and S61913.01(01).

During the May 2024 sampling event, a groundwater sample was collected from the following well:

- DEK-MW-18001

The sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Fluoride, Chloride, Sulfate, Nitrate, Nitrite)	EPA 300.0
Total Dissolved Solids (TDS)	SM 2540C
Total Metals	SW-846 6020B/7470A
Alkalinity (Bicarbonate, Carbonate, and Total)	SM 2320B
Ammonia	SM 4500 NH3(h)
Sulfide	SM 4500 S2D

TRC reviewed the laboratory data to assess data usability. The following sections summarize the data review procedure and the results of the review.

Data Usability Review Procedure

The analytical data were reviewed using the USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review (USEPA, 2020). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;
- Data for method blanks, equipment blanks, and field blanks, where applicable. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Field and equipment blanks are used to assess potential contamination arising from field procedures;
- Data for laboratory control samples (LCSs) and laboratory control sample duplicates (LCSDs), when performed. The LCSs and/or LCSDs are used to assess the accuracy of the analytical method using a clean matrix;

- Percent recoveries for matrix spike (MS) and matrix spike duplicates (MSD), when performed on project samples. Percent recoveries are calculated for each analyte spiked and used to assess bias due to sample matrix effects;
- Data for laboratory duplicates, when performed on project samples. The laboratory duplicates are replicate analyses of one sample and are used to assess the precision of the analytical method;
- Data for blind field duplicates, when collected. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

It should be noted that results for method blanks and LCSs were not provided for review by CE Laboratory Services and Merit. Therefore, potential contamination arising from laboratory sample preparation and/or analytical procedures and the accuracy of the analytical method using a clean matrix could not be evaluated for the total metals, anions, ammonia, TDS, alkalinity, and sulfide analyses.

This data usability report addresses the following items:

- Usability of the data if quality control (QC) results suggest potential problems with all or some of the data;
- Actions regarding specific QC criteria exceedances.

Review Summary

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable for their intended purpose. A summary of the data quality review, including non-conformances and issues identified in this evaluation, are noted below.

- The reviewed Appendix III, IV, optional Piper Diagram analyses, additional Part 115 constituents, and additional geochemistry parameters will be utilized for the purposes of a detection or assessment monitoring program.
- Data are usable for the purposes of the detection or assessment monitoring program.
- When the data are evaluated through a detection or assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- A field blank was not collected with this data set.
- An equipment blank was not collected with this data set.
- MS and MSD analyses were performed on sample DEK-MW-18001 for total metals, anions, ammonia, total alkalinity, and sulfide. The recoveries were within the acceptance limits. Relative percent differences (RPDs) were not provided by the laboratory for all parameters therefore were not evaluated; further, with the exception of sulfide, MS/MSD concentrations were not provided by the laboratory. However, since all recoveries were within the acceptance limits, there is no impact on data usability due to this issue.
- A field duplicate pair was not collected with this data set.
- Laboratory duplicate analyses were not performed on the sample from this data set.

Laboratory Data Quality Review
Groundwater Monitoring Event April 2024
JC Weadock/DE Karn Background

Groundwater samples were collected by TRC for the April 2024 sampling event. Samples were analyzed for total metals, anions, and total dissolved solids by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 24-0343.

During the April 2024 sampling event, a groundwater sample was collected from each of the following wells:

- MW-15002
- MW-15008
- MW-15016
- MW-15019

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Fluoride, Chloride, Sulfate)	EPA 300.0
Total Dissolved Solids (TDS)	SM 2540C
Total Metals	SW-846 6020B/7470A

TRC reviewed the laboratory data to assess data usability. The following sections summarize the data review procedure and the results of the review.

Data Usability Review Procedure

The analytical data were reviewed using the USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review (USEPA, 2020). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative;
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;
- Data for method blanks, equipment blanks, and field blanks. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Field and equipment blanks are used to assess potential contamination arising from field procedures;
- Data for laboratory control samples (LCSs) and laboratory control sample duplicates (LCSDs), when performed. The LCSs and/or LCSDs are used to assess the accuracy of the analytical method using a clean matrix;
- Percent recoveries for matrix spike (MS) and matrix spike duplicates (MSD), when performed on project samples. Percent recoveries are calculated for each analyte spiked and used to assess bias due to sample matrix effects;

- Data for laboratory duplicates, when performed on project samples. The laboratory duplicates are replicate analyses of one sample and are used to assess the precision of the analytical method;
- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

It should be noted that results for method blanks and laboratory control samples were not provided for review by CE Laboratory Services. Therefore, potential contamination arising from laboratory sample preparation and/or analytical procedures and the accuracy of the analytical method using a clean matrix could not be evaluated for the metals, anions, and TDS analyses.

This data usability report addresses the following items:

- Usability of the data if quality control (QC) results suggest potential problems with all or some of the data;
- Actions regarding specific QC criteria exceedances.

Review Summary

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable for their intended purpose. A summary of the data quality review, including non-conformances and issues identified in this evaluation, are noted below.

- The reviewed Appendix III, IV, and additional Part 115 constituents, as well as magnesium, potassium, and sodium, will be utilized for the purposes of an assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- One field blank (FB-Background) was collected. Target analytes were not detected above the RL in this blank sample.
- Samples DUP-Background/MW-15008 were submitted as the field duplicate pair with this data set; all criteria were met.
- Laboratory duplicate and MS/MSD analyses were not performed on a sample from this data set.

Laboratory Data Quality Review
Groundwater Monitoring Event May 2024
DE Karn Bottom Ash Pond

Groundwater samples were collected by TRC for the May 2024 sampling event. Samples were analyzed for radium by Eurofins in St. Louis, Missouri. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 240-204357-1.

During the May 2024 sampling event, a groundwater sample was collected from each of the following wells:

- DEK-MW-15002
- DEK-MW-15005
- DEK-MW-15006

Each sample was analyzed for the following constituents:

Analyte Group	Method
Radium (Ra-226, Ra-228, Combined Ra-226 & Ra-228)	EPA 903.0, EPA 904.0

TRC reviewed the laboratory data to assess data usability. The following sections summarize the data review procedure and the results of the review.

Data Usability Review Procedure

The analytical data were reviewed using the Department of Energy Evaluation of Radiochemical Data Usability (USDOE, 1997). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;
- Data for method blanks, equipment blanks, and field blanks, where applicable. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Field and equipment blanks are used to assess potential contamination arising from field procedures;
- Data for laboratory control samples (LCSs) and laboratory control sample duplicates (LCSDs), when performed. The LCSs and/or LCSDs are used to assess the accuracy of the analytical method using a clean matrix;
- Percent recoveries for matrix spike (MS) and matrix spike duplicates (MSD), when performed on project samples. Percent recoveries are calculated for each analyte spiked and used to assess bias due to sample matrix effects;
- Percent recoveries for carriers, where applicable, for radiochemistry only. Carriers are used to assess the chemical yield for the preparation and/or instrument efficiency;
- Data for laboratory duplicates, when performed on project samples. The laboratory duplicates are replicate analyses of one sample and are used to assess the precision of the analytical method;

- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

This data usability report addresses the following items:

- Usability of the data if quality control (QC) results suggest potential problems with all or some of the data;
- Actions regarding specific QC criteria exceedances.

Review Summary

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable for their intended purpose. A summary of the data quality review, including non-conformances and issues identified in this evaluation, are noted below.

- The reviewed constituents will be utilized for the purposes of an assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- Target analytes were not detected in the method blanks.
- One equipment blank (EB-DEK-BAP) was collected. Target analytes were not detected in the equipment blank sample.
- LCS recoveries for all target analytes were within laboratory control limits.
- MS/MSD duplicate analyses were not performed on a sample from this data set.
- Laboratory duplicate analyses were performed on sample EB-DEK-BAP for radium-226 and radium-228; all criteria were met.
- Samples DEK-MW-15002/DUP-DEK-BAP-01 were submitted as the field duplicate pair with this data set; all criteria were met.
- Carrier recoveries were within 40-110%.

Laboratory Data Quality Review
Groundwater Monitoring Event May 2024
DE Karn Bottom Ash Pond and Lined Impoundment

A groundwater sample was collected by TRC for the May 2024 sampling event. The sample was analyzed for radium by Eurofins in St. Louis, Missouri. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 240-204354-1.

During the May 2024 sampling event, a groundwater sample was collected from the following well:

- DEK-MW-18001

The sample was analyzed for the following constituents:

Analyte Group	Method
Radium (Ra-226, Ra-228, Combined Ra-226 & Ra-228)	EPA 903.0, EPA 904.0

TRC reviewed the laboratory data to assess data usability. The following sections summarize the data review procedure and the results of the review.

Data Usability Review Procedure

The analytical data were reviewed using the Department of Energy Evaluation of Radiochemical Data Usability (USDOE, 1997). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;
- Data for method blanks, equipment blanks, and field blanks, where applicable. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Field and equipment blanks are used to assess potential contamination arising from field procedures;
- Data for laboratory control samples (LCSs) and laboratory control sample duplicates (LCSDs), when performed. The LCSs and/or LCSDs are used to assess the accuracy of the analytical method using a clean matrix;
- Percent recoveries for matrix spike (MS) and matrix spike duplicates (MSD), when performed on project samples. Percent recoveries are calculated for each analyte spiked and used to assess bias due to sample matrix effects;
- Percent recoveries for carriers, where applicable, for radiochemistry only. Carriers are used to assess the chemical yield for the preparation and/or instrument efficiency;
- Data for laboratory duplicates, when performed on project samples. The laboratory duplicates are replicate analyses of one sample and are used to assess the precision of the analytical method;

- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

This data usability report addresses the following items:

- Usability of the data if quality control (QC) results suggest potential problems with all or some of the data;
- Actions regarding specific QC criteria exceedances.

Review Summary

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable for their intended purpose. A summary of the data quality review, including non-conformances and issues identified in this evaluation, are noted below.

- The reviewed constituents will be utilized for the purposes of an assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- Target analytes were not detected in the method blanks.
- No equipment or field blanks were collected.
- LCS recoveries for all target analytes were within laboratory control limits.
- MS/MSD and laboratory duplicate analyses were not performed on the sample from this data set.
- A field duplicate pair was not collected.
- Carrier recoveries were within 40-110%.

Laboratory Data Quality Review
Groundwater Monitoring Event May 2024
JC Weadock/Karn DEK Background

Groundwater samples were collected by TRC for the May 2024 sampling event. Samples were analyzed for radium by Eurofins in St. Louis, Missouri. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 240-204358-1.

During the May 2024 sampling event, a groundwater sample was collected from each of the following wells:

- MW-15002
- MW-15008
- MW-15016
- MW-15019

Each sample was analyzed for the following constituents:

Analyte Group	Method
Radium (Ra-226, Ra-228, Combined Ra-226 & Ra-228)	EPA 903.0, EPA 904.0

TRC reviewed the laboratory data to assess data usability. The following sections summarize the data review procedure and the results of the review.

Data Usability Review Procedure

The analytical data were reviewed using the Department of Energy Evaluation of Radiochemical Data Usability (USDOE, 1997). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;
- Data for method blanks, equipment blanks, and field blanks, where applicable. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Field and equipment blanks are used to assess potential contamination arising from field procedures;
- Data for laboratory control samples (LCSs) and laboratory control sample duplicates (LCSDs), when performed. The LCSs and/or LCSDs are used to assess the accuracy of the analytical method using a clean matrix;
- Percent recoveries for matrix spike (MS) and matrix spike duplicates (MSD), when performed on project samples. Percent recoveries are calculated for each analyte spiked and used to assess bias due to sample matrix effects;
- Percent recoveries for carriers, where applicable, for radiochemistry only. Carriers are used to assess the chemical yield for the preparation and/or instrument efficiency;

- Data for laboratory duplicates, when performed on project samples. The laboratory duplicates are replicate analyses of one sample and are used to assess the precision of the analytical method;
- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

This data usability report addresses the following items:

- Usability of the data if quality control (QC) results suggest potential problems with all or some of the data;
- Actions regarding specific QC criteria exceedances.

Review Summary

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable for their intended purpose. A summary of the data quality review, including non-conformances and issues identified in this evaluation, are noted below.

- The reviewed constituents will be utilized for the purposes of an assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- Target analytes were not detected in the method blanks.
- One equipment blank (EQ-BACKGROUND) was collected. Target analytes were not detected in the equipment blank sample.
- LCS recoveries for all target analytes were within laboratory control limits.
- MS/MSD and laboratory duplicate analyses were not performed on a sample from this data set.
- Samples DUP-BACKGROUND/MW-15008 were submitted as the field duplicate pair with this data set; all criteria were met.
- Carrier recoveries were within 40-110%.

Appendix B
Statistical Evaluation of May 2024 Assessment Monitoring Sampling Event

1540 Eisenhower Pl.
Ann Arbor, MI 48108
T 734.971.7080
TRCcompanies.com

Technical Memorandum

Date:	July 30, 2024
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Rebecca Paalanen, TRC
Project No.:	553814.0001.0000 Phase 002, Task 002
Subject:	Statistical Evaluation of May 2024 Assessment Monitoring Sampling Event DE Karn Bottom Ash Pond, Consumers Energy Company, Essexville, Michigan

During the statistical evaluation of the initial assessment monitoring event (May 2018), arsenic was present in one or more downgradient monitoring wells at statistically significant levels exceeding the Groundwater Protection Standard (GWPS). Therefore, Consumers Energy Company (Consumers Energy) initiated an Assessment of Corrective Measures (ACM) within 90 days from when the Appendix IV exceedance was determined. The ACM was completed on September 11, 2019. Currently, Consumers Energy is continuing semiannual assessment monitoring in accordance with §257.95 of the CCR Rule [1] at the DE Karn Power Plant Bottom Ash Pond (Karn Bottom Ash Pond).

An assessment monitoring event was conducted on May 8 through 9,2024. In accordance with §257.95, the assessment monitoring data must be compared to GWPSs to determine whether or not Appendix IV constituents are detected at statistically significant levels above the GWPSs. GWPSs were established in accordance with §257.95(h), as detailed in the October 15, 2018 Groundwater Protection Standards technical memorandum, which was also included in the 2018 Annual Groundwater Monitoring Report (TRC, January 2019).

The statistical evaluation of the assessment monitoring event data indicates the following constituent is present at statistically significant levels exceeding the GWPS in downgradient monitoring wells at the Karn Bottom Ash Pond:

Constituent	GWPS	#Downgradient Wells Observed
Arsenic	21 ug/L	2 of 4

The results of the assessment monitoring statistical evaluation for the downgradient wells are consistent with the results of the previous assessment monitoring data statistical evaluations, indicating that arsenic is the only constituent present at concentrations above the GWPS. Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97. Consumers Energy will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 -

[1] USEPA final rule for the regulation and management of Coal Combustion Residuals (CCR) under the Resource Conservation and Recovery Act (RCRA) published April 17, 2015, as amended per Phase One, Part One of the CCR Rule (83 FR 36435).

§257.98.

Assessment Monitoring Statistical Evaluation

When the initial assessment monitoring event was completed in May 2018, the compliance well network at the Karn Bottom Ash Pond included six wells encircling the unit (DEK-MW-15002 through DEK-MW-15006 and DEK-MW-18001). Due to changes in groundwater flow direction on site, monitoring wells DEK-MW-15003 and DEK-MW-15004 are no longer located downgradient of the unit and were determined to be no longer indicative of groundwater conditions influenced by the Karn Bottom Ash Pond. Therefore, monitoring wells DEK-MW-15003 and DEK-MW-15004 are no longer included for statistical analysis. Starting with the May 2021 statistical evaluation, the compliance well network includes DEK-MW-15002, DEK-MW-15005, DEK-MW-15006, and DEK-MW-18001.

Following the assessment monitoring sampling event, compliance well data for the Karn Bottom Ash Pond were evaluated in accordance with the Groundwater Statistical Evaluation Plan (Stats Plan) (TRC, October 2017). An assessment monitoring program was developed to evaluate concentrations of CCR constituents present in the uppermost aquifer relative to acceptable levels (i.e., GWPSs). To evaluate whether or not a GWPS exceedance is statistically significant, the difference in concentration observed at the downgradient wells during a given assessment monitoring event compared to the GWPS must be large enough, after accounting for variability in the sample data, that the result is unlikely to have occurred merely by chance. Consistent with the Unified Guidance [2], the preferred method for comparisons to a fixed standard is confidence limits. Based on the number of historical observations in the representative sample population, the sample mean, the sample standard deviation, and a selected confidence level (i.e., 99 percent), an upper and lower confidence limit is calculated. The true mean concentration, with 99 percent confidence, will fall between the lower and upper confidence limits.

The concentrations observed in the downgradient wells are deemed to be a statistically significant exceedance when the 99 percent lower confidence limit of the downgradient data exceeds the GWPS. If the confidence interval straddles the GWPS (i.e., the lower confidence level is below the GWPS, but the upper confidence level is above), the statistical test result indicates that there is insufficient confidence that the measured concentrations are different from the GWPS and thus no compelling evidence that the measured concentration is a result of a release from the CCR unit versus the inherent variability of the sample data. This statistical approach is consistent with the statistical methods for assessment monitoring presented in §257.93(f) and (g). Statistical evaluation methodologies built into the CCR Rule, and numerous other federal rules, are key in determining whether or not individually measured data points represent a concentration increase over the baseline or a fixed standard (such as a GWPS in an assessment monitoring program).

For each detected Appendix IV constituent, the concentrations from each well were first compared directly to the GWPS, as shown on Table 1. Parameter-well combinations that included a direct exceedance of the GWPS within the past eight sampling events (October 2020 through May 2024) were retained for further analysis. Arsenic in DEK-MW-15005, DEK-MW-15006, and DEK-MW-18001

[2] USEPA. 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance*. Office of Conservation and Recovery. EPA 530/R-09-007.

at the Karn Bottom Ash Pond had individual results exceeding the GWPS.

Groundwater data were then evaluated utilizing Sanitas™ statistical software. Sanitas™ is a software tool that is commercially available for performing statistical evaluation consistent with procedures outlined in the Unified Guidance. Within the Sanitas™ statistical program, confidence limits were selected to perform the statistical comparison of compliance data to a fixed standard. Parametric and non-parametric confidence intervals were calculated for each of the CCR Appendix IV constituents using a using a per test[3] 99 percent confidence level, i.e., a significance level (α) of 0.01. The following narrative describes the methods employed, the results obtained and the Sanitas™ output files are included as an attachment.

The statistical data evaluation included the following steps:

- Review of data quality checklists for the data sets;
- Graphical representation of the monitoring data as time versus concentration by well/constituent pair;
- Outlier testing of individual data points that appear from the graphical representations as potential outliers;
- Evaluation of visual trends apparent in the graphical representations for statistical significance;
- Evaluation of percentage of non-detects for each well/constituent pair;
- Distribution of the data; and
- Calculation of the confidence intervals for each cumulative dataset.

The results of these evaluations are presented and discussed below.

Data from each round were evaluated for completeness, overall quality, and usability and were deemed appropriate for the purposes of the CCR assessment monitoring program. Initially, the assessment monitoring results were visually assessed for potential outliers or trends. No outliers were identified. Arsenic concentrations at DEK-MW-18001 appear to exhibit an upward trend on the time-series chart over the eight most recent sampling events (Attachment 1). This data set was tested further in Sanitas™ utilizing Sen's Slope to estimate the average rate of change in concentration over time and utilizing the Mann-Kendall trend test to test for significance of the trend at the 98% confidence level. The trend test showed that arsenic concentration at DEK-MW-18001 is generally increasing with time, as evidenced by the positive Sen's Slope. Additionally, the increase in concentration at DEK-MW-18001 was shown to be statistically significant (Attachment 1). Confidence bands are identified by the UG as the appropriate method for calculating confidence intervals on trending data. A confidence band calculates upper and lower confidence limits at each point along the trend to reduce variability and create a narrower confidence interval. At least 8 to 10 measurements should be available when computing a confidence band around a linear regression.

The Sanitas™ software was used to test compliance at the downgradient monitoring wells using the confidence interval method for the most recent 8 sampling events. Eight independent sampling events provide the appropriate density of data as recommended per the UG yet are collected recently enough

[3] Confidence level is assessed for each individual comparison (i.e. per well and per constituent).

to provide an indication of current condition. The tests were run with a per-test significance of α = 0.01. The software outputs are included in Attachment 1 along with data reports showing the values used for the evaluation. The percentage of non-detect observations for well/constituent pairs with a direct GWPS exceedance are also included in Attachment 1. Non-detect data was handled in accordance with the Stats Plan for the purposes of calculating the confidence intervals.

The Sanitas™ software generates an output that includes graphs of the confidence bands and parametric or non-parametric confidence intervals for each well, along with notes on data transformations, as appropriate. Due to the increasing trend, a confidence band was calculated for the arsenic data set at DEK-MW-18001. The arsenic data set at DEK-MW-15006 and DEK-15005 was found to be normally distributed. The confidence bands and interval tests compare the lower confidence limit to the GWPS. The statistical evaluation of the Appendix IV parameters shows exceedances for arsenic at two of the four monitoring locations (DEK-MW-15005 and DEK-MW-18001). The results of the assessment monitoring statistical evaluation for the other downgradient wells are consistent with the results of the previous assessment monitoring data statistical evaluations, indicating that arsenic is the only constituent present at concentrations above the GWPS. Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97. Consumers Energy will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

Attachments

Table 1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards

Attachment 1 Sanitas™ Output Files

Table

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards
DE Karn Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	DEK-MW-15002											
					Sample Date:	10/6/2020	10/6/2020	5/3/2021	10/4/2021	5/3/2022	10/4/2022	10/4/2022	5/2/2023	10/4/2023	10/4/2023	5/9/2024	5/9/2024
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS	downgradient											
Appendix III							Field Dup					Field Dup		Field Dup		Field Dup	
Boron	ug/L	NC	NA	619	NA	1,580	1,600	1,420	1,530	1,100	1,340	1,370	1,270	1,330	1,280	1,240	1,310
Calcium	mg/L	NC	NA	302	NA	126	122	148	73.1	105	70.2	68	122	69.4	71.7	94.4	94.3
Chloride	mg/L	250*	NA	2,440	NA	106	102	148	102	99.3	105	103	81.7	88	86.3	75.1	76.3
Fluoride	ug/L	4,000	NA	1,000	NA	1,300	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA	142	139	216	58.3	172	33.7	33.2	225	50.2	50.2	60.6	60.3
Total Dissolved Solids	mg/L	500*	NA	4,600	NA	791	776	926	599	779	584	631	899	576	596	746	694
pH, Field	SU	6.5 - 8.5*	NA	6.5 - 7.3	NA	7.1	--	7.4	7.1	7.0	7.4	--	7.2	--	7.3	--	7.4
Appendix IV																	
Antimony	ug/L	6	NA	1	6	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**	8	8	2	2	2	3	4	< 1	1	1	3	3
Barium	ug/L	2,000	NA	1,300	2,000	133	131	211	102	134	92	95	176	111	110	126	129
Beryllium	ug/L	4	NA	1	4	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100	1	1	< 1	1	1	1	1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000	1,300	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	180	35	36	36	29	28	25	27	29	25	25	31	31
Mercury	ug/L	2	NA	0.2	2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NA	NA	NA	< 0.430	< 0.577	0.582	1.47	< 0.423	0.219	0.287	0.431	0.342	0.272	0.299	0.292
Radium-228	pCi/L	NC	NA	NA	NA	1.06	< 0.577	0.811	2.29	< 0.530	1.81	2.70	< 1.5	< 0.878	1.13	< 0.538	< 0.511
Radium-226/228	pCi/L	5	NA	3.32	5	0.642	< 0.460	< 0.537	0.827	0.636	2.03	2.99	< 1.5	< 0.878	1.41	< 0.538	0.541
Selenium	ug/L	50	NA	2	50	< 1	1	< 1	3	1	< 1	1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

pCi/L - picocuries per liter.

NA - not applicable.

NC - no criteria.

-- - not analyzed.

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL and UTL as established in TRC's Technical Memorandum dated October 15, 2018.

* - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR) April 2012.

Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules.

All metals were analyzed as total unless otherwise specified.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards
DE Karn Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

						Sample Location:	DEK-MW-15005									
						Sample Date:	10/7/2020	5/3/2021	5/3/2021	10/4/2021	5/3/2022	10/4/2022	5/2/2023	5/2/2023	10/5/2023	5/9/2024
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS		downgradient									
Appendix III									Field Dup					Field Dup		
Boron	ug/L	NC	NA	619	NA		847	926	948	991	787	911	856	864	957	1,030
Calcium	mg/L	NC	NA	302	NA		155	95.6	97.6	102	127	130	106	107	125	158
Chloride	mg/L	250*	NA	2,440	NA		52.7	65.2	65.1	82.3	141	138	86.7	87.4	89.2	147
Fluoride	ug/L	4,000	NA	1,000	NA		< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA		102	50.8	50.2	57.2	151	130	189	189	290	358
Total Dissolved Solids	mg/L	500*	NA	4,600	NA		687	534	561	546	909	894	767	764	892	1,400
pH, Field	SU	6.5 - 8.5*	NA	6.5 - 7.3	NA		7.7	7.6	--	7.1	7.1	7.5	7.4	--	7.7	7.4
Appendix IV																
Antimony	ug/L	6	NA	1	6		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**		**42**	**45**	**44**	**68**	**54**	**54**	**32**	**32**	**48**	**32**
Barium	ug/L	2,000	NA	1,300	2,000		248	173	170	192	305	312	228	224	267	341
Beryllium	ug/L	4	NA	1	4		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100		< 1	< 1	< 1	< 1	< 1	2	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	6	15	15		< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000		< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	180		45	38	39	41	36	36	27	28	27	32
Mercury	ug/L	2	NA	0.2	2		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100		< 5	8	8	7	12	8	8	8	7	6
Radium-226	pCi/L	NC	NA	NA	NA		0.621	0.291	< 0.187	1.12	0.620	0.544	0.355	0.417	0.512	0.653
Radium-228	pCi/L	NC	NA	NA	NA		0.875	0.722	0.650	2.06	1.08	3.11	< 0.755	< 0.785	1.11	0.898
Radium-226/228	pCi/L	5	NA	3.32	5		< 0.502	< 0.459	0.479	0.940	1.70	3.66	< 0.755	< 0.785	1.63	1.55
Selenium	ug/L	50	NA	2	50		< 1	1	1	2	1	1	1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

pCi/L - picocuries per liter.

NA - not applicable.

NC - no criteria.

-- - not analyzed.

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL and UTL as established in TRC's Technical Memorandum dated October 15, 2018.

* - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR) April 2012.

Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules.

All metals were analyzed as total unless otherwise specified.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards
DE Karn Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

						Sample Location:	DEK-MW-15006									
						Sample Date:	10/7/2020	5/3/2021	10/4/2021	10/4/2021	5/3/2022	5/3/2022	10/4/2022	5/2/2023	10/5/2023	5/9/2024
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS		downgradient									
Appendix III										Field Dup		Field Dup				
Boron	ug/L	NC	NA	619	NA		1,220	938	1,050	1,080	893	888	871	944	1,050	1,110
Calcium	mg/L	NC	NA	302	NA		106	115	117	117	65.0	65.5	83.8	127	143	196
Chloride	mg/L	250*	NA	2,440	NA		102	63.5	78.9	74.7	68.6	67.9	70.6	61.2	62.6	49.5
Fluoride	ug/L	4,000	NA	1,000	NA		1,060	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA		296	324	209	196	173	168	254	385	446	545
Total Dissolved Solids	mg/L	500*	NA	4,600	NA		1,010	790	712	708	597	609	720	847	926	1,220
pH, Field	SU	6.5 - 8.5*	NA	6.5 - 7.3	NA		7.7	7.5	7.3	--	7.4	--	7.8	7.5	7.7	7.7
Appendix IV																
Antimony	ug/L	6	NA	1	6		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**		**27**	**24**	**23**	**24**	**25**	**24**	**26**	16	**22**	19
Barium	ug/L	2,000	NA	1,300	2,000		141	139	125	126	68	67	94	137	150	159
Beryllium	ug/L	4	NA	1	4		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100		6	< 1	< 1	< 1	1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	6	15	15		< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000		1,060	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	180		22	21	19	19	16	15	18	19	18	21
Mercury	ug/L	2	NA	0.2	2		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100		11	9	7	7	6	6	7	7	7	8
Radium-226	pCi/L	NC	NA	NA	NA		0.629	0.353	0.797	0.832	< 0.449	0.395	0.242	0.324	0.452	0.497
Radium-228	pCi/L	NC	NA	NA	NA		1.12	1.16	1.50	1.35	0.870	< 0.502	1.43	< 0.894	< 0.666	0.593
Radium-226/228	pCi/L	5	NA	3.32	5		0.492	0.804	0.704	0.518	1.29	0.742	1.67	< 0.894	1.04	1.09
Selenium	ug/L	50	NA	2	50		< 1	< 1	2	2	< 1	1	1	1	< 1	< 1
Thallium	ug/L	2	NA	2	2		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

pCi/L - picocuries per liter.

NA - not applicable.

NC - no criteria.

-- - not analyzed.

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL and UTL as established in TRC's Technical Memorandum dated October 15, 2018.

* - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR) April 2012.

Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules.

All metals were analyzed as total unless otherwise specified.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards
DE Karn Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	DEK-MW-18001							
					Sample Date:	10/6/2020	5/3/2021	10/7/2021	5/3/2022	10/4/2022	5/3/2023	10/4/2023	5/8/2024
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS	downgradient							
Appendix III													
Boron	ug/L	NC	NA	619	NA	1,740	1,180	1,370	869	1,060	931	987	917
Calcium	mg/L	NC	NA	302	NA	71.7	65.2	71.0	63.7	58.3	54.6	52.5	52.5
Chloride	mg/L	250*	NA	2,440	NA	60.7	51.6	55.2	65.9	62.5	62.2	69.4	66.1
Fluoride	ug/L	4,000	NA	1,000	NA	1,240	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA	91.9	121	118	187	140	148	158	226
Total Dissolved Solids	mg/L	500*	NA	4,600	NA	476	486	494	555	551	575	551	670
pH, Field	SU	6.5 - 8.5*	NA	6.5 - 7.3	NA	7.6	7.3	7.4	7.6	7.6	7.6	7.4	7.4
Appendix IV													
Antimony	ug/L	6	NA	1	6	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**	**85**	**92**	**85**	**113**	**109**	**304**	**398**	**484**
Barium	ug/L	2,000	NA	1,300	2,000	136	135	135	164	135	152	155	147
Beryllium	ug/L	4	NA	1	4	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000	1,240	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	180	26	25	24	22	23	20	19	19
Mercury	ug/L	2	NA	0.2	2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100	< 5	< 5	< 5	< 5	< 5	11	9	17
Radium-226	pCi/L	NC	NA	NA	NA	< 0.473	0.189	0.873	0.294	0.264	0.268	0.148	0.238
Radium-228	pCi/L	NC	NA	NA	NA	0.591	0.828	1.85	0.592	1.67	0.599	< 0.581	< 0.623
Radium-226/228	pCi/L	5	NA	3.32	5	0.463	0.639	0.979	0.885	1.93	0.868	< 0.581	< 0.623
Selenium	ug/L	50	NA	2	50	1	< 1	2	2	< 1	1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

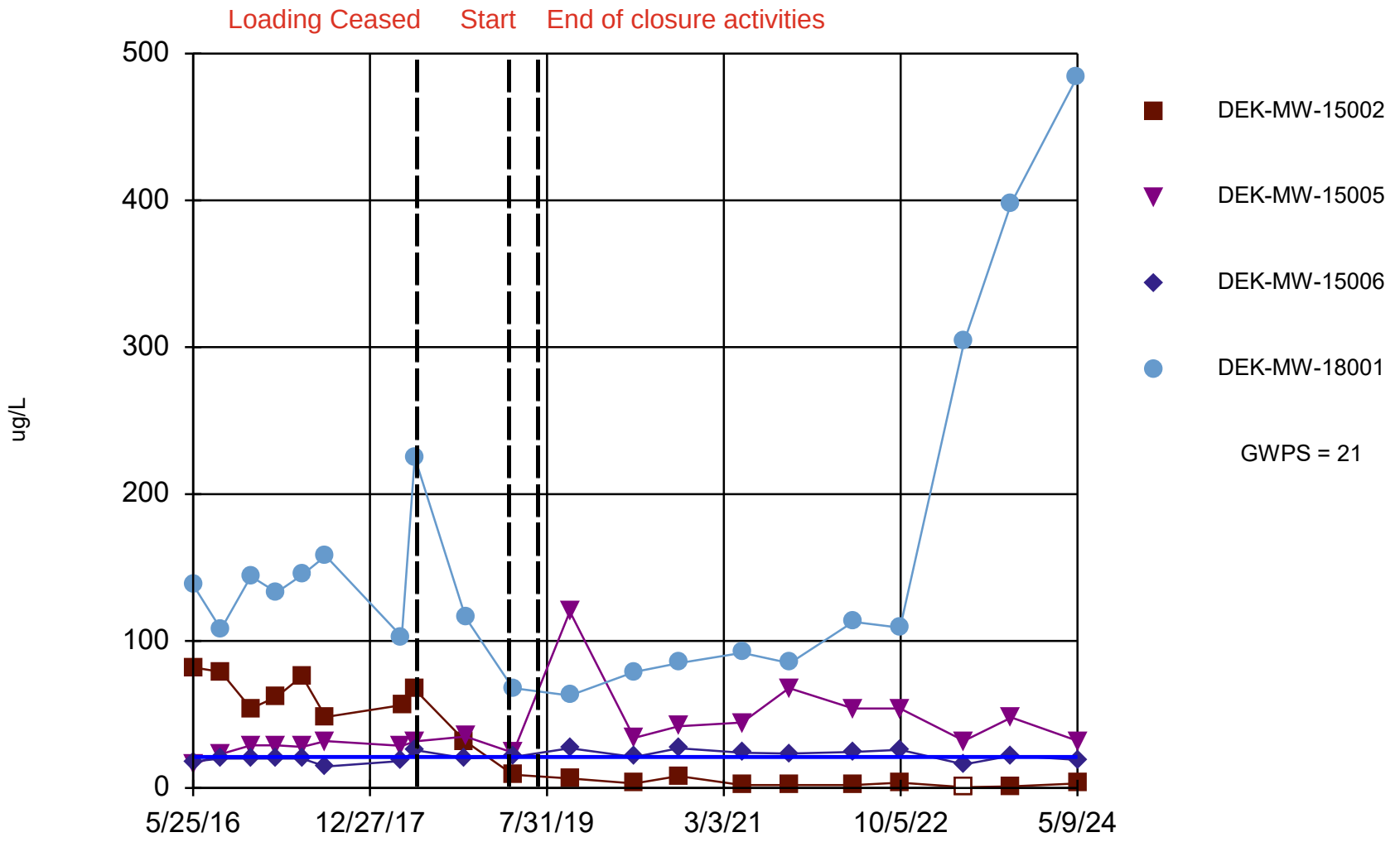
Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
RSL - Regional Screening Level from 83 FR 36435.
UTL - Upper Tolerance Limit (95%) of the background data set.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL and UTL as established in TRC's Technical Memorandum dated October 15, 2018.
* - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR) April 2012.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules.
All metals were analyzed as total unless otherwise specified.

Attachment 1
Sanitas™ Output Files

Hollow symbols indicate censored values.

Arsenic Comparison to GWPS

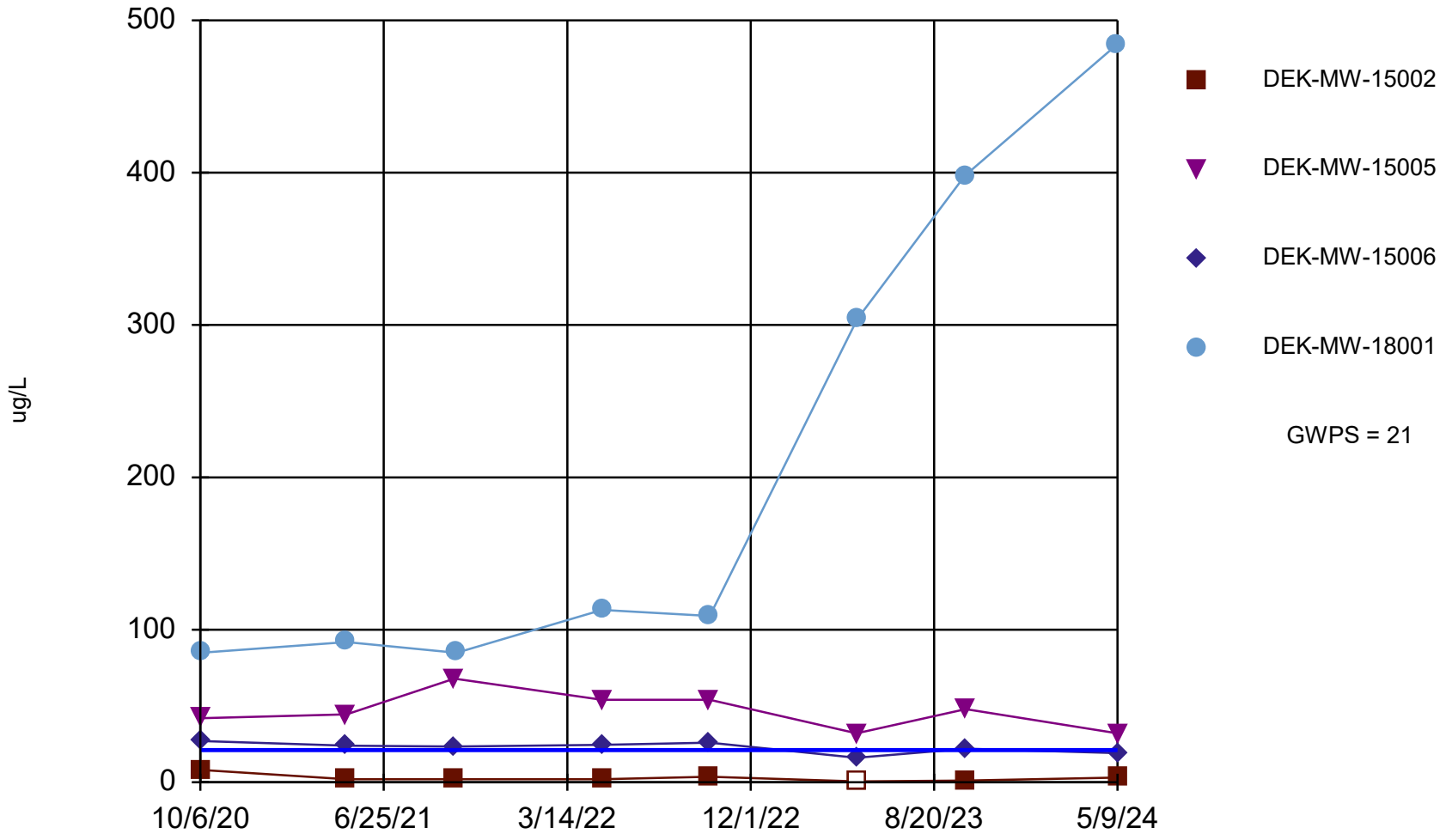


Time Series Analysis Run 6/20/2024 10:06 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2

Hollow symbols indicate censored values.

Arsenic, Total



Time Series Analysis Run 6/20/2024 10:16 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2

Summary Report

Constituent: Arsenic, Total Analysis Run 6/20/2024 10:17 AM
Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2

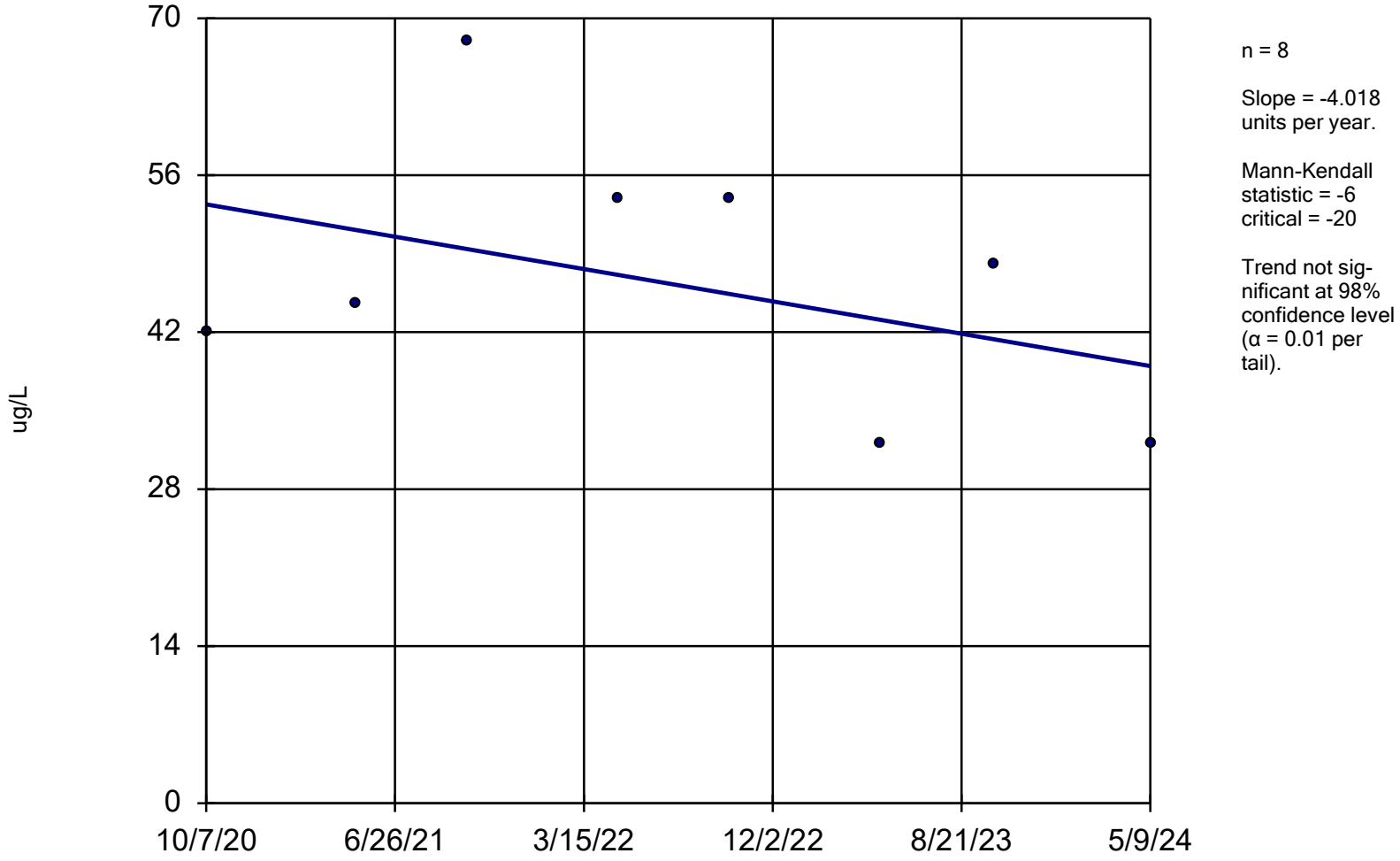
For observations made between 10/6/2020 and 5/9/2024, a summary of the selected data set:

Observations = 32
NDs = 3%
Wells = 4
Minimum Value = 1
Maximum Value = 484
Mean Value = 70.28
Median Value = 29.5
Standard Deviation = 113.2
Coefficient of Variation = 1.611
Skewness = 2.606

Well	#Obs.	NDs	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
DEK-MW-15002	8	12%	1	8	2.813	2	2.267	0.806	1.657
DEK-MW-15005	8	0%	32	68	46.81	46.25	12.08	0.258	0.3149
DEK-MW-15006	8	0%	16	27	22.75	23.75	3.665	0.1611	-0.7507
DEK-MW-18001	8	0%	85	484	208.8	111	162.1	0.7767	0.7611

Arsenic, Total

DEK-MW-15005

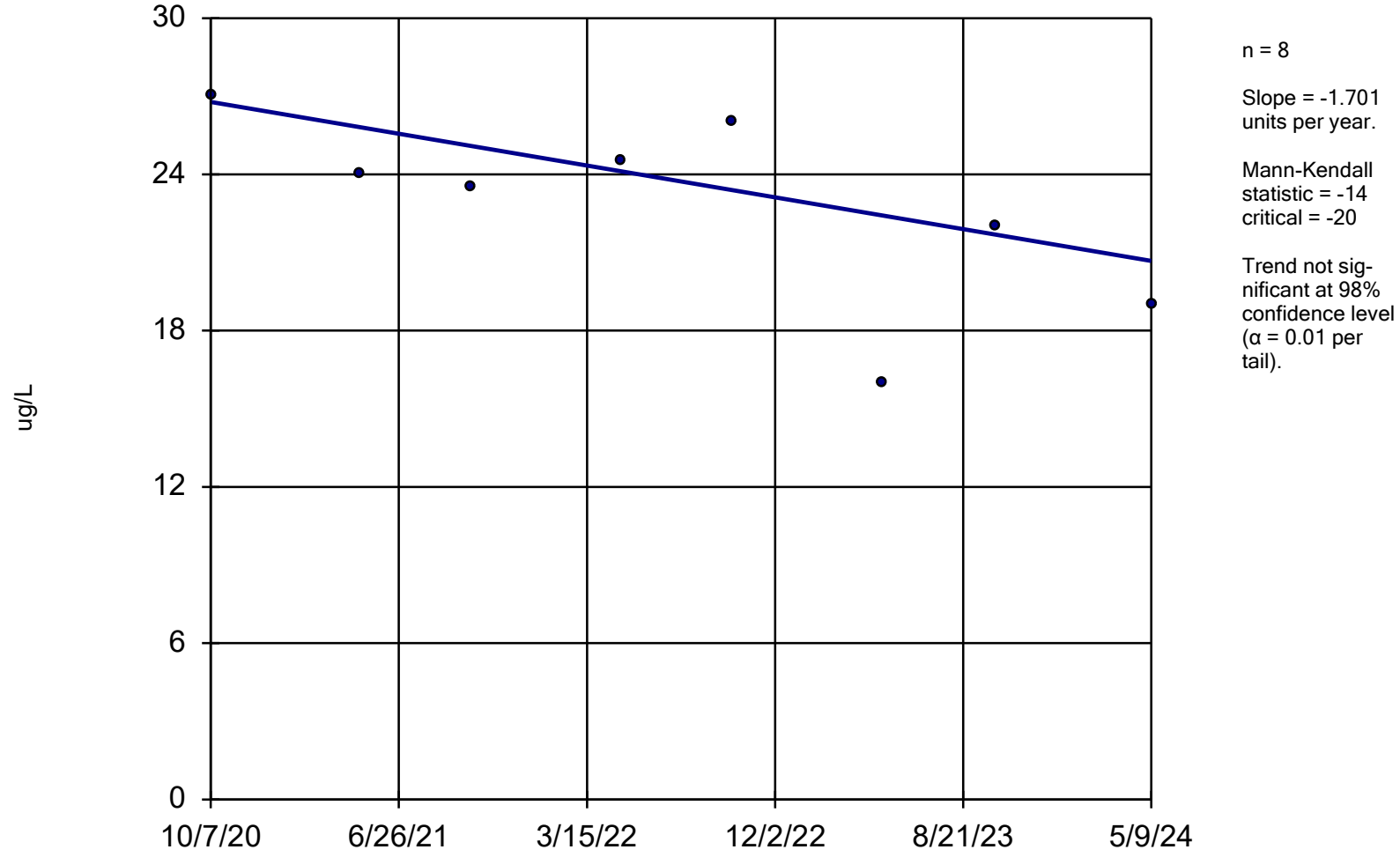


Sen's Slope and 98% Confidence Band Analysis Run 6/20/2024 10:54 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2

Arsenic, Total

DEK-MW-15006



n = 8

Slope = -1.701 units per year.

Mann-Kendall statistic = -14
critical = -20

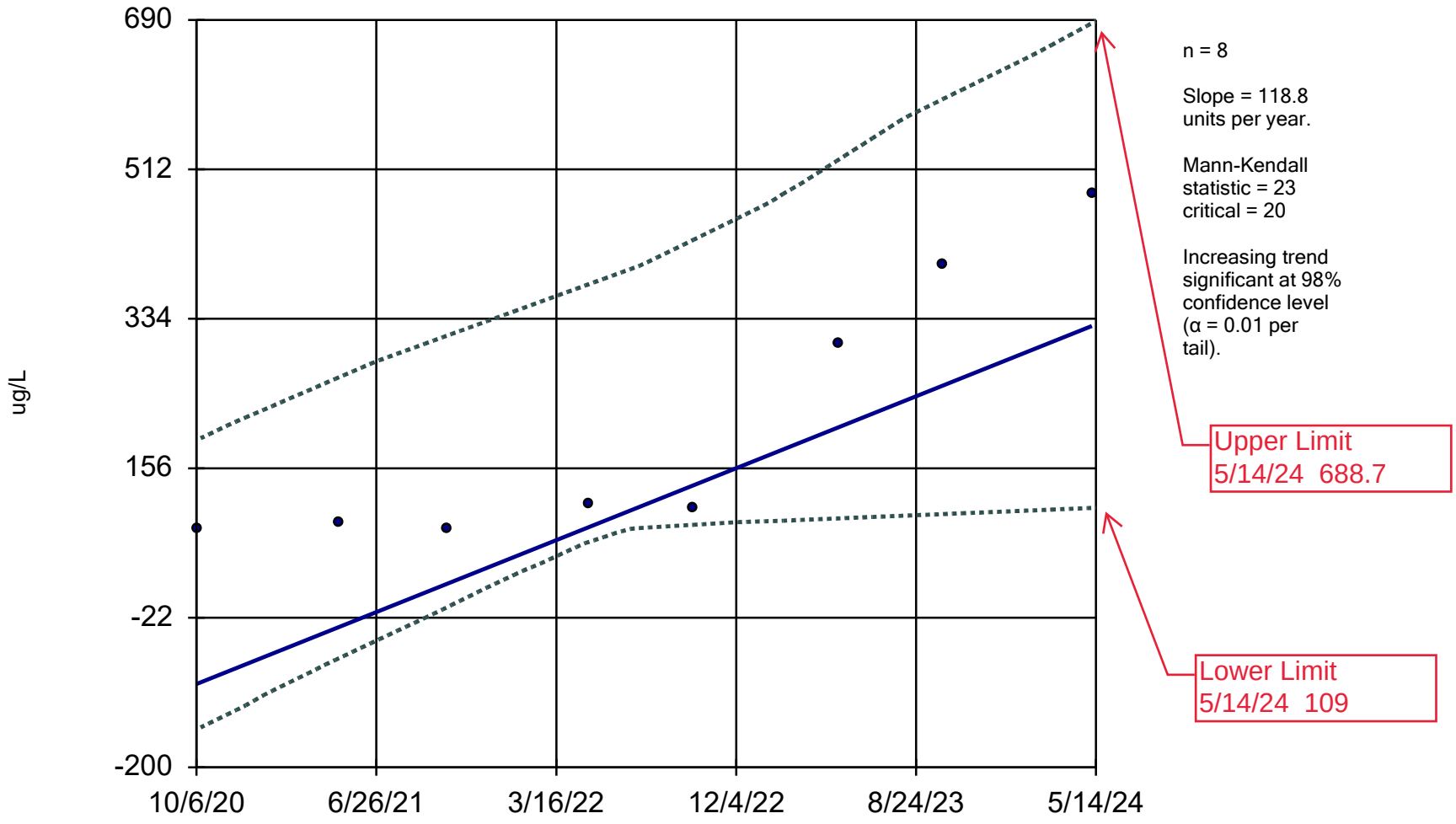
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope and 98% Confidence Band Analysis Run 6/20/2024 10:54 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2

Arsenic, Total

DEK-MW-18001

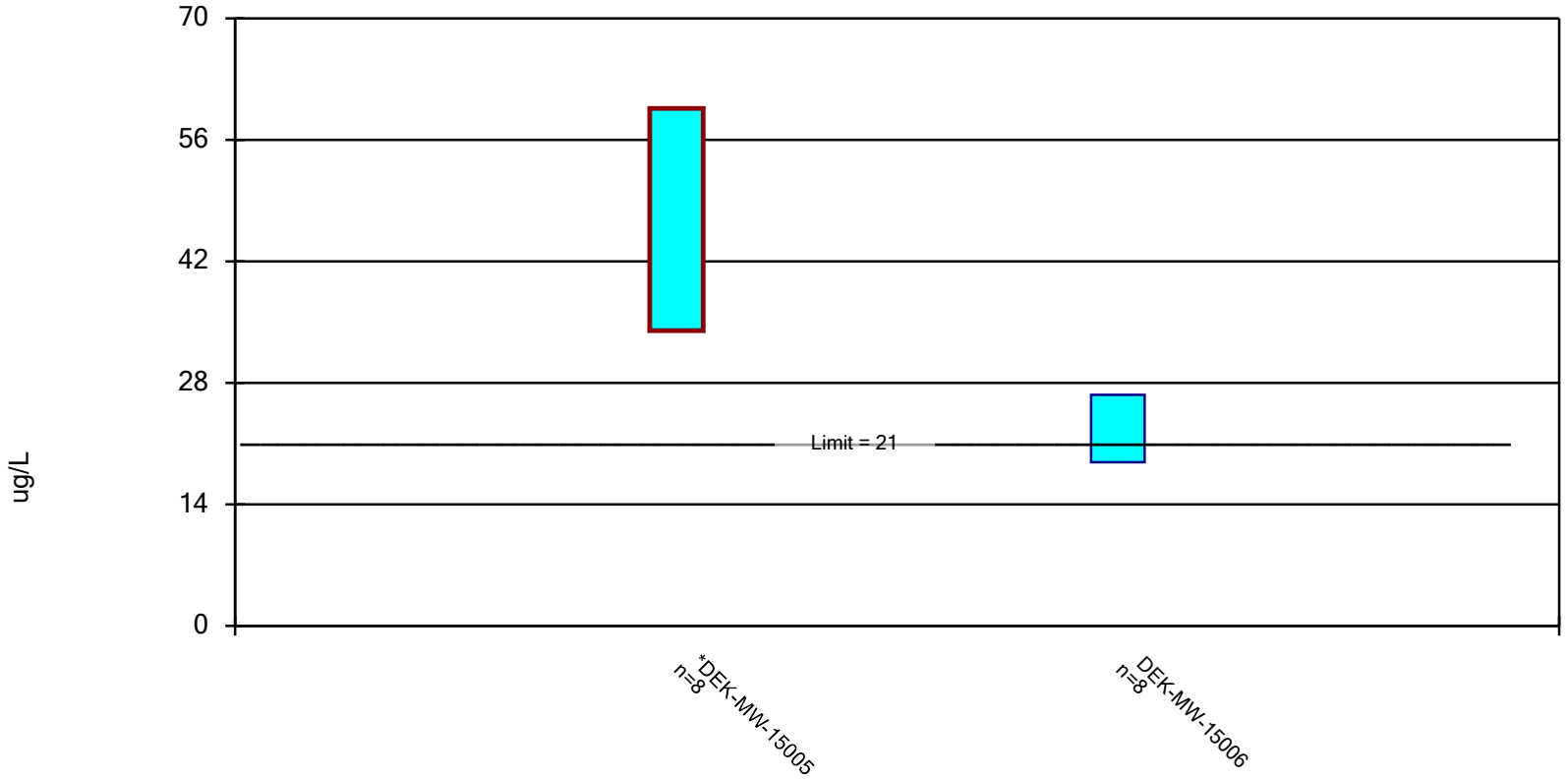


Sen's Slope and 98% Confidence Band Analysis Run 6/20/2024 10:55 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2

Parametric Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, Total Analysis Run 6/20/2024 10:22 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2

Confidence Interval

Constituent: Arsenic, Total (ug/L) Analysis Run 6/20/2024 10:22 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2

	DEK-MW-15005	DEK-MW-15006
10/7/2020	42	27
5/3/2021	44.5 (D)	24
10/4/2021	68	23.5 (D)
5/3/2022	54	24.5 (D)
10/4/2022	54	26
5/2/2023	32 (D)	16
10/5/2023	48	22
5/9/2024	32	19
Mean	46.81	22.75
Std. Dev.	12.08	3.665
Upper Lim.	59.61	26.63
Lower Lim.	34.01	18.87

Appendix C
Laboratory Analytical Reports

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

135 W. Trail St.
Jackson, MI 49201
phone 517-788-1251
fax 517-788-2533

To: JJFirlit, Karn/Weadock

From: EBlaj, T-258

Date: May 23, 2024

Subject: RCRA GROUNDWATER MONITORING – DEK BOTTOM ASH POND WELLS – 2024 Q2

CC: HDRegister, P22-521

Darby Litz, Project Manager
TRC Companies, Inc.
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 24-0339

TRC Environmental, Inc. conducted groundwater monitoring at the DEKarn Bottom Ash Pond Wells area during the week of 05/06/2024 for the 2nd Quarter requirement, as specified in the Sampling and Analysis Plan for the site. The samples were received for analysis by the Chemistry department of Laboratory Services on 05/10/2024.

Samples for Total Sulfide have been subcontracted to Merit Laboratories, Inc. and the results are listed under the analyst initials "Merit". Please note that the subcontracted work is not reported under the CE laboratory scope of accreditation.

With the exception noted above, the report that follows presents the results of the requested analytical testing; the results apply only to the samples, as received. All samples have been analyzed in accordance with the 2016 TNI Standard and the applicable A2LA accreditation scope for Laboratory Services. Any exceptions to applicable test method criteria and standard compliance are noted in the Case Narrative or flagged with applicable qualifiers in the analytical results section.

Reviewed and approved by:

Emil Blaj
Sr. Technical Analyst
Project Lead

ilac-MRA A2LA ACCREDITED Certificate #1097.04

CASE NARRATIVE

I. Sample Receipt

All samples were received within hold time and in good conditions; no anomalies were noted on the attached Sample Log-In Shipment Inspection Form during sample check-in. Identification of all samples included in the work order/project is provided in the sample summary section. All sample preservation and temperature upon receipt was verified by the sample custodian and confirmed to meet method requirements.

II. Methodology

Unless otherwise indicated, sample preparation and analysis was performed in accordance with the corresponding test methods from "Methods for the Determination of Inorganic Substances in Environmental Samples (EPA/600/R-93/100); SW-846, "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", USEPA (latest revisions), and Standard Methods for the Examination of Water and Wastewater, APHA-AWWA-WPCF, 22nd Edition, 2012.

III. Results/Quality Control

Analytical results for this report are presented by laboratory sample ID, container, & aliquot number. Results for the field blanks, field duplicates, and recoveries of the field matrix spike & matrix spike duplicate samples are included in the results section; all other quality control data is listed in the Quality Control Summary associated with the particular test method, as appropriate. Unless specifically noted in the case narrative, all method quality control requirements have been met. If any results are qualified, the corresponding data flags/qualifiers are listed on the last page of the results section. Any additional information on method performance, when applicable, is presented in this section of the case narrative. When data flags are not needed, the qualifiers text box on the last page is left blank, and a statement confirms that no exceptions occurred.

DEFINITIONS / QUALIFIERS

The following qualifiers and/or acronyms are used in the report, where applicable:

Acronym	Description
RL	Reporting Limit
ND	Result not detected or below Reporting Limit
NT	Non TNI analyte
LCS	Laboratory Control Sample
LRB	Laboratory Reagent Blank (also referred to as Method Blank)
DUP	Duplicate
MS	Matrix Spike
MSD	Matrix Spike Duplicate
RPD	Relative Percent Difference
MDL	Method Detection Limit
PQL	Practical Quantitation Limit
TDL	Target Detection Limit
SM	Standard Methods Compendium

Qualifier	Description
*	Generic data flag, applicable description added in the corresponding notes section
B	The analyte was detected in the LRB at a level which is significant relative to sample result
D	Reporting limit elevated due to dilution
E	Estimated due to result exceeding the linear range of the analyzer
H	The maximum recommended hold time was exceeded
I	Dilution required due to matrix interference; reporting limit elevated
J	Estimated due to result found above MDL but below PQL (or RL)
K	Reporting limit raised due to matrix interference
M	The precision for duplicate analysis was not met; RPD outside acceptance criteria
N	Non-homogeneous sample made analysis questionable
PI	Possible interference may have affected the accuracy of the laboratory result
Q	Matrix Spike or Matrix Spike Duplicate recovery outside acceptance criteria
R	Result confirmed by new sample preparation and reanalysis
X	Other notation required; comment listed in sample notes and/or case narrative

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q2-2024 DEK Bottom Ash Pond Wells
Date Received: 5/10/2024
Chemistry Project: 24-0339

Sample #	Field Sample ID	Matrix	Sample Date	Site
24-0339-01	DEK-MW-15002	Groundwater	05/09/2024 10:31	DEK Bottom Ash Pond
24-0339-02	DEK-MW-15005	Groundwater	05/09/2024 08:37	DEK Bottom Ash Pond
24-0339-03	DEK-MW-15006	Groundwater	05/09/2024 11:38	DEK Bottom Ash Pond
24-0339-04	DUP-DEK-BAP-01	Groundwater	05/09/2024 00:00	DEK Bottom Ash Pond
24-0339-05	FB-DEK-BAP	Water	05/09/2024 11:38	DEK Bottom Ash Pond
24-0339-06	EB-DEK-BAP	Water	05/09/2024 12:00	DEK Bottom Ash Pond

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK Bottom Ash Pond**
Field Sample ID: **DEK-MW-15002**
Lab Sample ID: 24-0339-01
Matrix: Groundwater

Laboratory Project: **24-0339**
Collect Date: 05/09/2024
Collect Time: 10:31 AM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0339-01-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Arsenic	3		ug/L	1.0	05/13/2024	AB24-0513-12
Barium	129		ug/L	5.0	05/13/2024	AB24-0513-12
Beryllium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Boron	1310		ug/L	20.0	05/13/2024	AB24-0513-12
Cadmium	ND		ug/L	0.2	05/13/2024	AB24-0513-12
Calcium	94300		ug/L	1000.0	05/13/2024	AB24-0513-12
Chromium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Cobalt	ND		ug/L	6.0	05/13/2024	AB24-0513-12
Copper	2		ug/L	1.0	05/13/2024	AB24-0513-12
Iron	33		ug/L	20.0	05/13/2024	AB24-0513-12
Lead	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Lithium	31		ug/L	10.0	05/13/2024	AB24-0513-12
Magnesium	25100		ug/L	1000.0	05/13/2024	AB24-0513-12
Manganese	268		ug/L	5.0	05/13/2024	AB24-0513-12
Molybdenum	ND		ug/L	5.0	05/13/2024	AB24-0513-12
Nickel	4		ug/L	2.0	05/13/2024	AB24-0513-12
Potassium	8630		ug/L	100.0	05/13/2024	AB24-0513-12
Selenium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Silver	ND		ug/L	0.2	05/13/2024	AB24-0513-12
Sodium	90000		ug/L	1000.0	05/13/2024	AB24-0513-12
Thallium	ND		ug/L	2.0	05/13/2024	AB24-0513-12
Vanadium	3		ug/L	2.0	05/13/2024	AB24-0513-12
Zinc	ND		ug/L	10.0	05/13/2024	AB24-0513-12

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0339-01-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/20/2024	AB24-0515-03

Anions by EPA 300.0 Aqueous, NO2, NO3

Aliquot #: 24-0339-01-C02-A01 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Nitrate	ND		ug/L	100.0	05/10/2024	AB24-0510-06
Nitrite	ND		ug/L	100.0	05/10/2024	AB24-0510-06

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0339-01-C02-A02 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	76300		ug/L	1000.0	05/14/2024	AB24-0513-11

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK Bottom Ash Pond**
Field Sample ID: **DEK-MW-15002**
Lab Sample ID: 24-0339-01
Matrix: Groundwater

Laboratory Project: **24-0339**
Collect Date: 05/09/2024
Collect Time: 10:31 AM

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0339-01-C02-A02 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Fluoride	ND		ug/L	1000.0	05/10/2024	AB24-0513-11
Sulfate	60300		ug/L	1000.0	05/14/2024	AB24-0513-11

Nitrogen-Ammonia by SM4500NH3(h), Groundwater HL

Aliquot #: 24-0339-01-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Ammonia	8390		ug/L	25.0	05/14/2024	AB24-0514-02

Total Dissolved Solids by SM 2540C

Aliquot #: 24-0339-01-C04-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	694		mg/L	10.0	05/10/2024	AB24-0510-10

Alkalinity by SM 2320B

Aliquot #: 24-0339-01-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	426000		ug/L	10000.0	05/15/2024	AB24-0515-02
Alkalinity Bicarbonate	426000		ug/L	10000.0	05/15/2024	AB24-0515-02
Alkalinity Carbonate	ND		ug/L	10000.0	05/15/2024	AB24-0515-02

Sulfide, Total by SM 4500 S2D

Aliquot #: 24-0339-01-C07-A01 **Analyst: Merit**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfide	1760	D	ug/L	100.0	05/13/2024	AB24-0513-15

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK Bottom Ash Pond**
Field Sample ID: **DEK-MW-15005**
Lab Sample ID: 24-0339-02
Matrix: Groundwater

Laboratory Project: **24-0339**
Collect Date: 05/09/2024
Collect Time: 08:37 AM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0339-02-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Arsenic	32		ug/L	1.0	05/13/2024	AB24-0513-12
Barium	341		ug/L	5.0	05/13/2024	AB24-0513-12
Beryllium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Boron	1030		ug/L	20.0	05/13/2024	AB24-0513-12
Cadmium	ND		ug/L	0.2	05/13/2024	AB24-0513-12
Calcium	158000		ug/L	1000.0	05/13/2024	AB24-0513-12
Chromium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Cobalt	ND		ug/L	6.0	05/13/2024	AB24-0513-12
Copper	2		ug/L	1.0	05/13/2024	AB24-0513-12
Iron	836		ug/L	20.0	05/13/2024	AB24-0513-12
Lead	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Lithium	32		ug/L	10.0	05/13/2024	AB24-0513-12
Magnesium	32100		ug/L	1000.0	05/13/2024	AB24-0513-12
Manganese	459		ug/L	5.0	05/13/2024	AB24-0513-12
Molybdenum	6		ug/L	5.0	05/13/2024	AB24-0513-12
Nickel	3		ug/L	2.0	05/13/2024	AB24-0513-12
Potassium	9610		ug/L	100.0	05/13/2024	AB24-0513-12
Selenium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Silver	ND		ug/L	0.2	05/13/2024	AB24-0513-12
Sodium	130000		ug/L	1000.0	05/13/2024	AB24-0513-12
Thallium	ND		ug/L	2.0	05/13/2024	AB24-0513-12
Vanadium	3		ug/L	2.0	05/13/2024	AB24-0513-12
Zinc	ND		ug/L	10.0	05/13/2024	AB24-0513-12

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0339-02-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/20/2024	AB24-0515-03

Anions by EPA 300.0 Aqueous, NO2, NO3

Aliquot #: 24-0339-02-C02-A01 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Nitrate	ND		ug/L	100.0	05/10/2024	AB24-0510-06
Nitrite	ND		ug/L	100.0	05/10/2024	AB24-0510-06

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0339-02-C02-A02 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	147000		ug/L	1000.0	05/14/2024	AB24-0513-11

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK Bottom Ash Pond**
Field Sample ID: **DEK-MW-15005**
Lab Sample ID: 24-0339-02
Matrix: Groundwater

Laboratory Project: **24-0339**
Collect Date: 05/09/2024
Collect Time: 08:37 AM

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0339-02-C02-A02 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Fluoride	ND		ug/L	1000.0	05/10/2024	AB24-0513-11
Sulfate	358000		ug/L	1000.0	05/14/2024	AB24-0513-11

Nitrogen-Ammonia by SM4500NH3(h), Groundwater HL

Aliquot #: 24-0339-02-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Ammonia	4380		ug/L	25.0	05/14/2024	AB24-0514-02

Total Dissolved Solids by SM 2540C

Aliquot #: 24-0339-02-C04-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1400		mg/L	10.0	05/10/2024	AB24-0510-10

Alkalinity by SM 2320B

Aliquot #: 24-0339-02-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	337000		ug/L	10000.0	05/15/2024	AB24-0515-02
Alkalinity Bicarbonate	337000		ug/L	10000.0	05/15/2024	AB24-0515-02
Alkalinity Carbonate	ND		ug/L	10000.0	05/15/2024	AB24-0515-02

Sulfide, Total by SM 4500 S2D

Aliquot #: 24-0339-02-C07-A01 **Analyst: Merit**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfide	30		ug/L	20.0	05/13/2024	AB24-0513-15

Sample Site: **DEK Bottom Ash Pond**
Field Sample ID: **DEK-MW-15006**
Lab Sample ID: 24-0339-03
Matrix: Groundwater

Laboratory Project: **24-0339**
Collect Date: 05/09/2024
Collect Time: 11:38 AM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0339-03-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Arsenic	19		ug/L	1.0	05/13/2024	AB24-0513-12
Barium	159		ug/L	5.0	05/13/2024	AB24-0513-12
Beryllium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Boron	1110		ug/L	20.0	05/13/2024	AB24-0513-12
Cadmium	ND		ug/L	0.2	05/13/2024	AB24-0513-12
Calcium	196000		ug/L	1000.0	05/13/2024	AB24-0513-12
Chromium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Cobalt	ND		ug/L	6.0	05/13/2024	AB24-0513-12
Copper	1		ug/L	1.0	05/13/2024	AB24-0513-12
Iron	1770		ug/L	20.0	05/13/2024	AB24-0513-12
Lead	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Lithium	21		ug/L	10.0	05/13/2024	AB24-0513-12
Magnesium	30800		ug/L	1000.0	05/13/2024	AB24-0513-12
Manganese	764		ug/L	5.0	05/13/2024	AB24-0513-12
Molybdenum	8		ug/L	5.0	05/13/2024	AB24-0513-12
Nickel	4		ug/L	2.0	05/13/2024	AB24-0513-12
Potassium	8300		ug/L	100.0	05/13/2024	AB24-0513-12
Selenium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Silver	ND		ug/L	0.2	05/13/2024	AB24-0513-12
Sodium	80000		ug/L	1000.0	05/13/2024	AB24-0513-12
Thallium	ND		ug/L	2.0	05/13/2024	AB24-0513-12
Vanadium	ND		ug/L	2.0	05/13/2024	AB24-0513-12
Zinc	ND		ug/L	10.0	05/13/2024	AB24-0513-12

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0339-03-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/20/2024	AB24-0515-03

Anions by EPA 300.0 Aqueous, NO2, NO3

Aliquot #: 24-0339-03-C02-A01 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Nitrate	ND		ug/L	100.0	05/10/2024	AB24-0510-06
Nitrite	ND		ug/L	100.0	05/10/2024	AB24-0510-06

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0339-03-C02-A02 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	49500		ug/L	1000.0	05/14/2024	AB24-0513-11

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK Bottom Ash Pond**
Field Sample ID: **DEK-MW-15006**
Lab Sample ID: 24-0339-03
Matrix: Groundwater

Laboratory Project: **24-0339**
Collect Date: 05/09/2024
Collect Time: 11:38 AM

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0339-03-C02-A02 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Fluoride	ND		ug/L	1000.0	05/10/2024	AB24-0513-11
Sulfate	545000		ug/L	1000.0	05/16/2024	AB24-0513-11

Nitrogen-Ammonia by SM4500NH3(h), Groundwater HL

Aliquot #: 24-0339-03-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Ammonia	5830		ug/L	25.0	05/14/2024	AB24-0514-02

Total Dissolved Solids by SM 2540C

Aliquot #: 24-0339-03-C04-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1220		mg/L	10.0	05/10/2024	AB24-0510-10

Alkalinity by SM 2320B

Aliquot #: 24-0339-03-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	266000		ug/L	10000.0	05/15/2024	AB24-0515-02
Alkalinity Bicarbonate	266000		ug/L	10000.0	05/15/2024	AB24-0515-02
Alkalinity Carbonate	ND		ug/L	10000.0	05/15/2024	AB24-0515-02

Sulfide, Total by SM 4500 S2D

Aliquot #: 24-0339-03-C07-A01 **Analyst: Merit**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfide	30		ug/L	20.0	05/13/2024	AB24-0513-15

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK Bottom Ash Pond**
Field Sample ID: **DUP-DEK-BAP-01**
Lab Sample ID: 24-0339-04
Matrix: Groundwater

Laboratory Project: **24-0339**
Collect Date: 05/09/2024
Collect Time: 12:00 AM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0339-04-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Arsenic	3		ug/L	1.0	05/13/2024	AB24-0513-12
Barium	126		ug/L	5.0	05/13/2024	AB24-0513-12
Beryllium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Boron	1240		ug/L	20.0	05/13/2024	AB24-0513-12
Cadmium	ND		ug/L	0.2	05/13/2024	AB24-0513-12
Calcium	94400		ug/L	1000.0	05/13/2024	AB24-0513-12
Chromium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Cobalt	ND		ug/L	6.0	05/13/2024	AB24-0513-12
Copper	2		ug/L	1.0	05/13/2024	AB24-0513-12
Iron	34		ug/L	20.0	05/13/2024	AB24-0513-12
Lead	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Lithium	31		ug/L	10.0	05/13/2024	AB24-0513-12
Magnesium	25100		ug/L	1000.0	05/13/2024	AB24-0513-12
Manganese	268		ug/L	5.0	05/13/2024	AB24-0513-12
Molybdenum	ND		ug/L	5.0	05/13/2024	AB24-0513-12
Nickel	4		ug/L	2.0	05/13/2024	AB24-0513-12
Potassium	8760		ug/L	100.0	05/13/2024	AB24-0513-12
Selenium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Silver	ND		ug/L	0.2	05/13/2024	AB24-0513-12
Sodium	87900		ug/L	1000.0	05/13/2024	AB24-0513-12
Thallium	ND		ug/L	2.0	05/13/2024	AB24-0513-12
Vanadium	2		ug/L	2.0	05/13/2024	AB24-0513-12
Zinc	ND		ug/L	10.0	05/13/2024	AB24-0513-12

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0339-04-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/20/2024	AB24-0515-03

Anions by EPA 300.0 Aqueous, NO2, NO3

Aliquot #: 24-0339-04-C02-A01 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Nitrate	ND		ug/L	100.0	05/10/2024	AB24-0510-06
Nitrite	ND		ug/L	100.0	05/10/2024	AB24-0510-06

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0339-04-C02-A02 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	75100		ug/L	1000.0	05/14/2024	AB24-0513-11

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK Bottom Ash Pond**
Field Sample ID: **DUP-DEK-BAP-01**
Lab Sample ID: 24-0339-04
Matrix: Groundwater

Laboratory Project: **24-0339**
Collect Date: 05/09/2024
Collect Time: 12:00 AM

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0339-04-C02-A02 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Fluoride	ND		ug/L	1000.0	05/10/2024	AB24-0513-11
Sulfate	60600		ug/L	1000.0	05/14/2024	AB24-0513-11

Nitrogen-Ammonia by SM4500NH3(h), Groundwater HL

Aliquot #: 24-0339-04-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Ammonia	8620		ug/L	25.0	05/14/2024	AB24-0514-02

Total Dissolved Solids by SM 2540C

Aliquot #: 24-0339-04-C04-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	746		mg/L	10.0	05/10/2024	AB24-0510-10

Alkalinity by SM 2320B

Aliquot #: 24-0339-04-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	429000		ug/L	10000.0	05/15/2024	AB24-0515-02
Alkalinity Bicarbonate	429000		ug/L	10000.0	05/15/2024	AB24-0515-02
Alkalinity Carbonate	ND		ug/L	10000.0	05/15/2024	AB24-0515-02

Sulfide, Total by SM 4500 S2D

Aliquot #: 24-0339-04-C07-A01 **Analyst: Merit**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfide	1670	D	ug/L	100.0	05/13/2024	AB24-0513-15

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK Bottom Ash Pond**
Field Sample ID: **FB-DEK-BAP**
Lab Sample ID: 24-0339-05
Matrix: Water

Laboratory Project: **24-0339**
Collect Date: 05/09/2024
Collect Time: 11:38 AM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0339-05-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Arsenic	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Barium	ND		ug/L	5.0	05/13/2024	AB24-0513-12
Beryllium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Boron	ND		ug/L	20.0	05/13/2024	AB24-0513-12
Cadmium	ND		ug/L	0.2	05/13/2024	AB24-0513-12
Calcium	ND		ug/L	1000.0	05/13/2024	AB24-0513-12
Chromium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Cobalt	ND		ug/L	6.0	05/13/2024	AB24-0513-12
Copper	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Iron	ND		ug/L	20.0	05/13/2024	AB24-0513-12
Lead	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Lithium	ND		ug/L	10.0	05/13/2024	AB24-0513-12
Magnesium	ND		ug/L	1000.0	05/13/2024	AB24-0513-12
Manganese	ND		ug/L	5.0	05/13/2024	AB24-0513-12
Molybdenum	ND		ug/L	5.0	05/13/2024	AB24-0513-12
Nickel	2		ug/L	2.0	05/13/2024	AB24-0513-12
Potassium	ND		ug/L	100.0	05/13/2024	AB24-0513-12
Selenium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Silver	ND		ug/L	0.2	05/13/2024	AB24-0513-12
Sodium	ND		ug/L	1000.0	05/13/2024	AB24-0513-12
Thallium	ND		ug/L	2.0	05/13/2024	AB24-0513-12
Vanadium	ND		ug/L	2.0	05/13/2024	AB24-0513-12
Zinc	ND		ug/L	10.0	05/13/2024	AB24-0513-12

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0339-05-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/20/2024	AB24-0515-03

Anions by EPA 300.0 Aqueous, NO2, NO3

Aliquot #: 24-0339-05-C02-A01 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Nitrate	ND		ug/L	100.0	05/10/2024	AB24-0510-06
Nitrite	ND		ug/L	100.0	05/10/2024	AB24-0510-06

Nitrogen-Ammonia by SM4500NH3(h), Groundwater HL

Aliquot #: 24-0339-05-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Ammonia	ND		ug/L	25.0	05/14/2024	AB24-0514-02

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site:	**DEK Bottom Ash Pond**	Laboratory Project:	**24-0339**
Field Sample ID:	**FB-DEK-BAP**	Collect Date:	05/09/2024
Lab Sample ID:	24-0339-05	Collect Time:	11:38 AM
Matrix:	Water		

Sulfide, Total by SM 4500 S2D

Aliquot #: 24-0339-05-C04-A01 **Analyst: Merit**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfide	ND		ug/L	20.0	05/13/2024	AB24-0513-15

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK Bottom Ash Pond**
Field Sample ID: **EB-DEK-BAP**
Lab Sample ID: 24-0339-06
Matrix: Water

Laboratory Project: **24-0339**
Collect Date: 05/09/2024
Collect Time: 12:00 PM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0339-06-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Arsenic	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Barium	ND		ug/L	5.0	05/13/2024	AB24-0513-12
Beryllium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Boron	ND		ug/L	20.0	05/13/2024	AB24-0513-12
Cadmium	ND		ug/L	0.2	05/13/2024	AB24-0513-12
Calcium	ND		ug/L	1000.0	05/13/2024	AB24-0513-12
Chromium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Cobalt	ND		ug/L	6.0	05/13/2024	AB24-0513-12
Copper	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Iron	ND		ug/L	20.0	05/13/2024	AB24-0513-12
Lead	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Lithium	ND		ug/L	10.0	05/13/2024	AB24-0513-12
Magnesium	ND		ug/L	1000.0	05/13/2024	AB24-0513-12
Manganese	ND		ug/L	5.0	05/13/2024	AB24-0513-12
Molybdenum	ND		ug/L	5.0	05/13/2024	AB24-0513-12
Nickel	ND		ug/L	2.0	05/13/2024	AB24-0513-12
Potassium	ND		ug/L	100.0	05/13/2024	AB24-0513-12
Selenium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Silver	ND		ug/L	0.2	05/13/2024	AB24-0513-12
Sodium	ND		ug/L	1000.0	05/13/2024	AB24-0513-12
Thallium	ND		ug/L	2.0	05/13/2024	AB24-0513-12
Vanadium	ND		ug/L	2.0	05/13/2024	AB24-0513-12
Zinc	ND		ug/L	10.0	05/13/2024	AB24-0513-12

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0339-06-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/20/2024	AB24-0515-03

Anions by EPA 300.0 Aqueous, NO2, NO3

Aliquot #: 24-0339-06-C02-A01 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Nitrate	ND		ug/L	100.0	05/10/2024	AB24-0510-06
Nitrite	ND		ug/L	100.0	05/10/2024	AB24-0510-06

Nitrogen-Ammonia by SM4500NH3(h), Groundwater HL

Aliquot #: 24-0339-06-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Ammonia	ND		ug/L	25.0	05/14/2024	AB24-0514-02

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site:	**DEK Bottom Ash Pond**	Laboratory Project:	**24-0339**
Field Sample ID:	**EB-DEK-BAP**	Collect Date:	05/09/2024
Lab Sample ID:	24-0339-06	Collect Time:	12:00 PM
Matrix:	Water		

Sulfide, Total by SM 4500 S2D

Aliquot #: 24-0339-06-C04-A01 **Analyst: Merit**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfide	ND		ug/L	20.0	05/13/2024	AB24-0513-15

Data Qualifiers	Exception Summary
D = RL increased due to dilution.	No other exceptions occurred.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 24-0339

Inspection Date: 05/10/24 **Inspection By:** CB

Sample Origin/Project Name: DEK BAP

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx _____ UPS _____ USPS _____ Airborne _____

Other/~~Hand Carry~~ (whom) TRC

Tracking Number: _____ Shipping Form Attached: Yes _____ No ____

Shipping Containers: Enter the type and number of shipping containers received.

Cooler ✓ Cardboard Box _____ Custom Case _____ Envelope/Mailer ____

Loose/Unpackaged Containers _____ Other _____

Condition of Shipment: Enter the as-received condition of the shipment container.

Damaged Shipment Observed: None ✓ Dented _____ Leaking _____

Other _____

Shipment Security: Enter if any of the shipping containers were opened before receipt.

Shipping Containers Received: Opened _____ Sealed ✓

Enclosed Documents: Enter the type of documents enclosed with the shipment.

CoC ✓ Work Request _____ Air Data Sheet _____ Other _____

Temperature of Containers: Measure the temperature of several sample containers.

As-Received Temperature Range 0.9-3.2°C Samples Received on Ice: Yes ✓ No ____

M&TE # and Expiration 015402 5.23.24

Number and Type of Containers: Enter the total number of sample containers received.

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or ~~60mL~~)	8				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	24				
24 mL vial (glass)					
~~500~~ 250 mL (plastic)	4				
Other _____					

FSP 0.14pH
13.640-508
lot: 205522
exp: 2.15.25

PG. 2&2 not needed

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

Page _____ of _____

SAMPLING SITE / CUSTOMER: Q2-2024 DEK Bottom Ash Pond Wells	PROJECT NUMBER: 24-0339	SAP CC or WO#:	ANALYSIS REQUESTED (Attach List if More Space is Needed)
SAMPLING TEAM:	TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____	REQUESTER: Harold Register	QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____
SEND REPORT TO: Joseph Firlit	email:	phone:	
COPY TO: Harold Register; TRC	MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste		

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	Ammonia	TDS	Alkalinity	Sulfide				REMARKS
24-0339-01	5-9-24	1031	GW	DEK-MW-15002	7	4	1	1	1				x	x	x	x	x	x				
-02	5-9-24	0837	GW	DEK-MW-15005	7	4	1	1	1				x	x	x	x	x	x				
-03	5-9-24	1138	GW	DEK-MW-15006	7	4	1	1	1				x	x	x	x	x	x				
-04	5-9-24	—	GW	DUP-DEK-BAP-01	7	4	1	1	1				x	x	x	x	x	x				
-05	5-9-24	1138	W	FB-DEK-BAP	4	1	1	1	1				x	x	x			x				
-06	5-9-24	1200	W	EB-DEK-BAP	4	1	1	1	1				x	x	x			x				

RELINQUISHED BY:	DATE/TIME: 5-10-24 / 0759	RECEIVED BY:	COMMENTS:
RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:	Received on Ice? ☑ Yes ☐ No M&TE #: 015402 Temperature: 0.9-3.2 °C Cal. Due Date: 5-23-24

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

135 W. Trail St.
Jackson, MI 49201
phone 517-788-1251
fax 517-788-2533

To: JJFirlit, Karn/Weadock

From: EBlaj, T-258

Date: May 23, 2024

Subject: RCRA GROUNDWATER MONITORING – KARN BAP & LINED IMP. WELLS – 2024 Q2

CC: HDRegister, P22-521

Darby Litz, Project Manager
TRC Companies, Inc.
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 24-0340

TRC Environmental, Inc. conducted groundwater monitoring at the DEKarn Bottom Ash Pond and Lined Impoundment Wells area during the week of 05/06/2024, for the 2nd Quarter requirement, as specified in the Sampling and Analysis Plan for the site. The samples were received for analysis by the Chemistry department of Laboratory Services on 05/09/2024.

Samples for Total Sulfide have been subcontracted to Merit Laboratories, Inc. and the results are listed under the analyst initials "Merit". Please note that the subcontracted work is not reported under the CE laboratory scope of accreditation.

With the exception noted above, the report that follows presents the results of the requested analytical testing; the results apply only to the samples, as received. All samples have been analyzed in accordance with the 2016 TNI Standard and the applicable A2LA accreditation scope for Laboratory Services. Any exceptions to applicable test method criteria and standard compliance are noted in the Case Narrative or flagged with applicable qualifiers in the analytical results section.

Reviewed and approved by:

Emil Blaj
Sr. Technical Analyst
Project Lead

ilac-MRA A2LA ACCREDITED Certificate #1097.04

CASE NARRATIVE

I. Sample Receipt

All samples were received within hold time and in good conditions; no anomalies were noted on the attached Sample Log-In Shipment Inspection Form during sample check-in. Identification of all samples included in the work order/project is provided in the sample summary section. All sample preservation and temperature upon receipt was verified by the sample custodian and confirmed to meet method requirements.

II. Methodology

Unless otherwise indicated, sample preparation and analysis was performed in accordance with the corresponding test methods from "Methods for the Determination of Inorganic Substances in Environmental Samples (EPA/600/R-93/100); SW-846, "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", USEPA (latest revisions), and Standard Methods for the Examination of Water and Wastewater, APHA-AWWA-WPCF, 22nd Edition, 2012.

III. Results/Quality Control

Analytical results for this report are presented by laboratory sample ID, container, & aliquot number. Results for the field blanks, field duplicates, and recoveries of the field matrix spike & matrix spike duplicate samples are included in the results section; all other quality control data is listed in the Quality Control Summary associated with the particular test method, as appropriate. Unless specifically noted in the case narrative, all method quality control requirements have been met. If any results are qualified, the corresponding data flags/qualifiers are listed on the last page of the results section. Any additional information on method performance, when applicable, is presented in this section of the case narrative. When data flags are not needed, the qualifiers text box on the last page is left blank, and a statement confirms that no exceptions occurred.

DEFINITIONS / QUALIFIERS

The following qualifiers and/or acronyms are used in the report, where applicable:

Acronym	Description
RL	Reporting Limit
ND	Result not detected or below Reporting Limit
NT	Non TNI analyte
LCS	Laboratory Control Sample
LRB	Laboratory Reagent Blank (also referred to as Method Blank)
DUP	Duplicate
MS	Matrix Spike
MSD	Matrix Spike Duplicate
RPD	Relative Percent Difference
MDL	Method Detection Limit
PQL	Practical Quantitation Limit
TDL	Target Detection Limit
SM	Standard Methods Compendium

Qualifier	Description
*	Generic data flag, applicable description added in the corresponding notes section
B	The analyte was detected in the LRB at a level which is significant relative to sample result
D	Reporting limit elevated due to dilution
E	Estimated due to result exceeding the linear range of the analyzer
H	The maximum recommended hold time was exceeded
I	Dilution required due to matrix interference; reporting limit elevated
J	Estimated due to result found above MDL but below PQL (or RL)
K	Reporting limit raised due to matrix interference
M	The precision for duplicate analysis was not met; RPD outside acceptance criteria
N	Non-homogeneous sample made analysis questionable
PI	Possible interference may have affected the accuracy of the laboratory result
Q	Matrix Spike or Matrix Spike Duplicate recovery outside acceptance criteria
R	Result confirmed by new sample preparation and reanalysis
X	Other notation required; comment listed in sample notes and/or case narrative

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q2-2024 DEK Bottom Ash Pond & Lined Impoundment
Date Received: 5/9/2024
Chemistry Project: 24-0340

Sample #	Field Sample ID	Matrix	Sample Date	Site
24-0340-01	DEK-MW-18001	Groundwater	05/08/2024 13:03	DEK Bottom Ash Pond & Lined Impoundment
24-0340-02	DEK-MW-18001 MS	Groundwater	05/08/2024 13:03	DEK Bottom Ash Pond & Lined Impoundment
24-0340-03	DEK-MW-18001 MSD	Groundwater	05/08/2024 13:03	DEK Bottom Ash Pond & Lined Impoundment

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001**
Lab Sample ID: 24-0340-01
Matrix: Groundwater

Laboratory Project: **24-0340**
Collect Date: 05/08/2024
Collect Time: 01:03 PM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0340-01-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Arsenic	484		ug/L	1.0	05/13/2024	AB24-0513-12
Barium	147		ug/L	5.0	05/13/2024	AB24-0513-12
Beryllium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Boron	917		ug/L	20.0	05/13/2024	AB24-0513-12
Cadmium	ND		ug/L	0.2	05/13/2024	AB24-0513-12
Calcium	52500		ug/L	1000.0	05/13/2024	AB24-0513-12
Chromium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Cobalt	ND		ug/L	6.0	05/13/2024	AB24-0513-12
Copper	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Iron	458		ug/L	20.0	05/13/2024	AB24-0513-12
Lead	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Lithium	19		ug/L	10.0	05/13/2024	AB24-0513-12
Magnesium	11200		ug/L	1000.0	05/13/2024	AB24-0513-12
Manganese	133		ug/L	5.0	05/13/2024	AB24-0513-12
Molybdenum	17		ug/L	5.0	05/13/2024	AB24-0513-12
Nickel	2		ug/L	2.0	05/13/2024	AB24-0513-12
Potassium	5460		ug/L	100.0	05/13/2024	AB24-0513-12
Selenium	ND		ug/L	1.0	05/13/2024	AB24-0513-12
Silver	ND		ug/L	0.2	05/13/2024	AB24-0513-12
Sodium	134000		ug/L	1000.0	05/13/2024	AB24-0513-12
Thallium	ND		ug/L	2.0	05/13/2024	AB24-0513-12
Vanadium	ND		ug/L	2.0	05/13/2024	AB24-0513-12
Zinc	19		ug/L	10.0	05/13/2024	AB24-0513-12

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0340-01-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/20/2024	AB24-0515-03

Anions by EPA 300.0 Aqueous, NO2, NO3

Aliquot #: 24-0340-01-C02-A01 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Nitrate	ND		ug/L	100.0	05/09/2024	AB24-0509-16
Nitrite	ND		ug/L	100.0	05/09/2024	AB24-0509-16

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0340-01-C02-A02 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	66100		ug/L	1000.0	05/14/2024	AB24-0513-11

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001**
Lab Sample ID: 24-0340-01
Matrix: Groundwater

Laboratory Project: **24-0340**
Collect Date: 05/08/2024
Collect Time: 01:03 PM

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0340-01-C02-A02 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Fluoride	ND		ug/L	1000.0	05/09/2024	AB24-0513-11
Sulfate	226000		ug/L	1000.0	05/14/2024	AB24-0513-11

Nitrogen-Ammonia by SM4500NH3(h), Groundwater HL

Aliquot #: 24-0340-01-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Ammonia	1810		ug/L	25.0	05/14/2024	AB24-0514-02

Total Dissolved Solids by SM 2540C

Aliquot #: 24-0340-01-C04-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	670		mg/L	10.0	05/09/2024	AB24-0509-17

Alkalinity by SM 2320B

Aliquot #: 24-0340-01-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	154000		ug/L	10000.0	05/15/2024	AB24-0515-02
Alkalinity Bicarbonate	154000		ug/L	10000.0	05/15/2024	AB24-0515-02
Alkalinity Carbonate	ND		ug/L	10000.0	05/15/2024	AB24-0515-02

Sulfide, Total by SM 4500 S2D

Aliquot #: 24-0340-01-C07-A01 **Analyst: Merit**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfide	78		ug/L	20.0	05/10/2024	AB24-0510-05

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001 MS**
Lab Sample ID: 24-0340-02
Matrix: Groundwater

Laboratory Project: **24-0340**
Collect Date: 05/08/2024
Collect Time: 01:03 PM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0340-02-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	106		%	1.0	05/13/2024	AB24-0513-12
Arsenic	104		%	1.0	05/13/2024	AB24-0513-12
Barium	103		%	5.0	05/13/2024	AB24-0513-12
Beryllium	98		%	1.0	05/13/2024	AB24-0513-12
Boron	110		%	20.0	05/13/2024	AB24-0513-12
Cadmium	105		%	0.2	05/13/2024	AB24-0513-12
Calcium	99.8		%	1000.0	05/13/2024	AB24-0513-12
Chromium	93		%	1.0	05/13/2024	AB24-0513-12
Cobalt	93		%	6.0	05/13/2024	AB24-0513-12
Copper	89		%	1.0	05/13/2024	AB24-0513-12
Iron	106		%	20.0	05/13/2024	AB24-0513-12
Lead	100		%	1.0	05/13/2024	AB24-0513-12
Lithium	99		%	10.0	05/13/2024	AB24-0513-12
Magnesium	106		%	1000.0	05/13/2024	AB24-0513-12
Manganese	103		%	5.0	05/13/2024	AB24-0513-12
Molybdenum	110		%	5.0	05/13/2024	AB24-0513-12
Nickel	91		%	2.0	05/13/2024	AB24-0513-12
Potassium	105		%	100.0	05/13/2024	AB24-0513-12
Selenium	106		%	1.0	05/13/2024	AB24-0513-12
Silver	97.5		%	0.2	05/13/2024	AB24-0513-12
Sodium	110		%	1000.0	05/13/2024	AB24-0513-12
Thallium	99		%	2.0	05/13/2024	AB24-0513-12
Vanadium	97		%	2.0	05/13/2024	AB24-0513-12
Zinc	88		%	10.0	05/13/2024	AB24-0513-12

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0340-02-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	98.0		%	0.2	05/20/2024	AB24-0515-03

Anions by EPA 300.0 Aqueous, NO2, NO3

Aliquot #: 24-0340-02-C02-A01 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Nitrate	96		%	100.0	05/09/2024	AB24-0509-16
Nitrite	105		%	100.0	05/09/2024	AB24-0509-16

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0340-02-C02-A02 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	105		%	1000.0	05/14/2024	AB24-0513-11

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001 MS**
Lab Sample ID: 24-0340-02
Matrix: Groundwater

Laboratory Project: **24-0340**
Collect Date: 05/08/2024
Collect Time: 01:03 PM

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0340-02-C02-A02 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Fluoride	96		%	1000.0	05/09/2024	AB24-0513-11
Sulfate	102		%	1000.0	05/14/2024	AB24-0513-11

Nitrogen-Ammonia by SM4500NH3(h), Groundwater HL

Aliquot #: 24-0340-02-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Ammonia	97		%	25.0	05/14/2024	AB24-0514-02

Alkalinity by SM 2320B

Aliquot #: 24-0340-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	97.8		%	10000.0	05/15/2024	AB24-0515-02

Sulfide, Total by SM 4500 S2D

Aliquot #: 24-0340-02-C06-A01 **Analyst: Merit**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfide	92		%	20.0	05/10/2024	AB24-0510-05

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001 MSD**
Lab Sample ID: 24-0340-03
Matrix: Groundwater

Laboratory Project: **24-0340**
Collect Date: 05/08/2024
Collect Time: 01:03 PM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0340-03-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	107		%	1.0	05/13/2024	AB24-0513-12
Arsenic	106		%	1.0	05/13/2024	AB24-0513-12
Barium	106		%	5.0	05/13/2024	AB24-0513-12
Beryllium	99		%	1.0	05/13/2024	AB24-0513-12
Boron	105		%	20.0	05/13/2024	AB24-0513-12
Cadmium	105		%	0.2	05/13/2024	AB24-0513-12
Calcium	95.8		%	1000.0	05/13/2024	AB24-0513-12
Chromium	96		%	1.0	05/13/2024	AB24-0513-12
Cobalt	96		%	6.0	05/13/2024	AB24-0513-12
Copper	91		%	1.0	05/13/2024	AB24-0513-12
Iron	103		%	20.0	05/13/2024	AB24-0513-12
Lead	100		%	1.0	05/13/2024	AB24-0513-12
Lithium	101		%	10.0	05/13/2024	AB24-0513-12
Magnesium	104		%	1000.0	05/13/2024	AB24-0513-12
Manganese	101		%	5.0	05/13/2024	AB24-0513-12
Molybdenum	110		%	5.0	05/13/2024	AB24-0513-12
Nickel	94		%	2.0	05/13/2024	AB24-0513-12
Potassium	102		%	100.0	05/13/2024	AB24-0513-12
Selenium	108		%	1.0	05/13/2024	AB24-0513-12
Silver	98.0		%	0.2	05/13/2024	AB24-0513-12
Sodium	105		%	1000.0	05/13/2024	AB24-0513-12
Thallium	98		%	2.0	05/13/2024	AB24-0513-12
Vanadium	99		%	2.0	05/13/2024	AB24-0513-12
Zinc	91		%	10.0	05/13/2024	AB24-0513-12

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0340-03-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	101		%	0.2	05/20/2024	AB24-0515-03

Anions by EPA 300.0 Aqueous, NO2, NO3

Aliquot #: 24-0340-03-C02-A01 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Nitrate	94		%	100.0	05/09/2024	AB24-0509-16
Nitrite	105		%	100.0	05/09/2024	AB24-0509-16

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0340-03-C02-A02 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	103		%	1000.0	05/14/2024	AB24-0513-11

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site:	**DEK Bottom Ash Pond & Lined Impoundment**	Laboratory Project:	**24-0340**
Field Sample ID:	**DEK-MW-18001 MSD**	Collect Date:	05/08/2024
Lab Sample ID:	24-0340-03	Collect Time:	01:03 PM
Matrix:	Groundwater		

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0340-03-C02-A02 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Fluoride	95		%	1000.0	05/09/2024	AB24-0513-11
Sulfate	100		%	1000.0	05/14/2024	AB24-0513-11

Nitrogen-Ammonia by SM4500NH3(h), Groundwater HL

Aliquot #: 24-0340-03-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Ammonia	100		%	25.0	05/14/2024	AB24-0514-02

Alkalinity by SM 2320B

Aliquot #: 24-0340-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	98.3		%	10000.0	05/15/2024	AB24-0515-02

Sulfide, Total by SM 4500 S2D

Aliquot #: 24-0340-03-C06-A01 **Analyst: Merit**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfide	92		%	20.0	05/10/2024	AB24-0510-05

Data Qualifiers	Exception Summary
	No exceptions occurred.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 24-0340

Inspection Date: 5.9.24 **Inspection By:** CIE

Sample Origin/Project Name: DEK BAP + KI

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx ✓ UPS _____ USPS _____ Airborne _____

Other/Hand Carry (whom) _____

Tracking Number: 274481774855 Shipping Form Attached: Yes ✓ No _____

Shipping Containers: Enter the type and number of shipping containers received.

Cooler (1) Cardboard Box _____ Custom Case _____ Envelope/Mailer _____

Loose/Unpackaged Containers _____ Other _____

Condition of Shipment: Enter the as-received condition of the shipment container.

Damaged Shipment Observed: None ✓ Dented _____ Leaking _____

Other _____

Shipment Security: Enter if any of the shipping containers were opened before receipt.

Shipping Containers Received: Opened _____ Sealed ✓

Enclosed Documents: Enter the type of documents enclosed with the shipment.

CoC ✓ Work Request _____ Air Data Sheet _____ Other _____

Temperature of Containers: Measure the temperature of several sample containers.

As-Received Temperature Range 0.2 - 2.0°C Samples Received on Ice: Yes ✓ No _____

M&TE # and Expiration 015402 5.23.24

Number and Type of Containers: Enter the total number of sample containers received.

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL)	6				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	12				
24 mL vial (glass)					
250/500 mL (plastic)	1				
Other					

FSP 0-14
#13-640-508
lot: 205522
exp: 2.15.25

pg. 2&2 not needed

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

Page 1 of 1

SAMPLING SITE / CUSTOMER: Q2-2024 DEK Bottom Ash Pond & Lined Impound.

PROJECT NUMBER: 24-0340

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM: J. Krenz

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Joseph Firlit — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	Ammonia	TDS	Alkalinity	Sulfide	REMARKS
24-0340-01	5-8-24	1303	GW	DEK-MW-18001	7	4	1	1	1				x	x	x	x	x	x	
-02	↓	↓	GW	DEK-MW-18001 MS	6	3	1	1	1				x	x	x		x	x	
-03	↓	↓	GW	DEK-MW-18001 MSD	6	3	1	1	1				x	x	x		x	x	

RELINQUISHED BY: [signature] DATE/TIME: 5/8/24 1700 RECEIVED BY: Fed-Ex

RELINQUISHED BY: Fed-Ex DATE/TIME: 5.9.24 1130 RECEIVED BY: [signature]

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015402

Temperature: 0.2·2.0 °C Cal. Due Date: 5-23-24

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

135 W. Trail St.
Jackson, MI 49201

phone 517-788-1251
fax 517-788-2533

To: JJFirlit, Karn/Weadock

From: EBlaj, T-258

Date: May 23, 2024

Subject: RCRA GROUNDWATER MONITORING – DEK-JCW BACKGROUND WELLS – 2024 Q2

CC: HDRegister, P22-521

Darby Litz, Project Manager
TRC Companies, Inc.
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 24-0343

TRC Environmental, Inc. conducted groundwater monitoring at the Karn/Weadock Background Wells area during the week of 05/06/2024 for the 2nd Quarter requirement, as specified in the Sampling and Analysis Plan for the site. The samples were received for analysis by the Chemistry department of Laboratory Services on 05/10/2024.

The report that follows presents the results of the requested analytical testing; the results apply only to the samples as received. All samples have been analyzed in accordance with the 2016 TNI Standard and the applicable A2LA accreditation scope for Laboratory Services. Any exceptions to applicable test method criteria and standard compliance are noted in the Case Narrative, or flagged with applicable qualifiers in the analytical results section.

Reviewed and approved by:

Emil Blaj
Sr. Technical Analyst
Project Lead

ilac-MRA A2LA ACCREDITED Certificate #1097.04

CASE NARRATIVE

I. Sample Receipt

All samples were received within hold time and in good conditions; no anomalies were noted on the attached Sample Log-In Shipment Inspection Form during sample check-in. Identification of all samples included in the work order/project is provided in the sample summary section. All sample preservation and temperature upon receipt was verified by the sample custodian and confirmed to meet method requirements.

II. Methodology

Unless otherwise indicated, sample preparation and analysis was performed in accordance with the corresponding test methods from "Methods for the Determination of Inorganic Substances in Environmental Samples (EPA/600/R-93/100); SW-846, "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", USEPA (latest revisions), and Standard Methods for the Examination of Water and Wastewater, APHA-AWWA-WPCF, 22nd Edition, 2012.

III. Results/Quality Control

Analytical results for this report are presented by laboratory sample ID, container, & aliquot number. Results for the field blanks, field duplicates, and recoveries of the field matrix spike & matrix spike duplicate samples are included in the results section, when applicable; all other quality control data is listed in the Quality Control Summary associated with the particular test method, as appropriate. Unless specifically noted in the case narrative, all method quality control requirements have been met. If any results are qualified, the corresponding data flags/qualifiers are listed on the last page of the results section. Any additional information on method performance, when applicable, is presented in this section of the case narrative. When data flags are not needed, the qualifiers text box on the last page is left blank, and a statement confirms that no exceptions occurred.

DEFINITIONS / QUALIFIERS

The following qualifiers and/or acronyms are used in the report, where applicable:

Acronym	Description
RL	Reporting Limit
ND	Result not detected or below Reporting Limit
NT	Non TNI analyte
LCS	Laboratory Control Sample
LRB	Laboratory Reagent Blank (also referred to as Method Blank)
DUP	Duplicate
MS	Matrix Spike
MSD	Matrix Spike Duplicate
RPD	Relative Percent Difference
MDL	Method Detection Limit
PQL	Practical Quantitation Limit
TDL	Target Detection Limit
SM	Standard Methods Compendium

Qualifier	Description
*	Generic data flag, applicable description added in the corresponding notes section
B	The analyte was detected in the LRB at a level which is significant relative to sample result
D	Reporting limit elevated due to dilution
E	Estimated due to result exceeding the linear range of the analyzer
H	The maximum recommended hold time was exceeded
I	Dilution required due to matrix interference; reporting limit elevated
J	Estimated due to result found above MDL but below PQL (or RL)
K	Reporting limit raised due to matrix interference
M	The precision for duplicate analysis was not met; RPD outside acceptance criteria
N	Non-homogeneous sample made analysis questionable
PI	Possible interference may have affected the accuracy of the laboratory result
Q	Matrix Spike or Matrix Spike Duplicate recovery outside acceptance criteria
R	Result confirmed by new sample preparation and reanalysis
X	Other notation required; comment listed in sample notes and/or case narrative

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q2-2024 DEK-JCW Background Wells
Date Received: 5/10/2024
Chemistry Project: 24-0343

Sample #	Field Sample ID	Matrix	Sample Date	Site
24-0343-01	MW-15002	Groundwater	05/08/2024 14:51	DEK JCW Background
24-0343-02	MW-15008	Groundwater	05/08/2024 13:15	DEK JCW Background
24-0343-03	MW-15016	Groundwater	05/08/2024 14:47	DEK JCW Background
24-0343-04	MW-15019	Groundwater	05/08/2024 14:13	DEK JCW Background
24-0343-05	DUP-Background	Groundwater	05/08/2024 00:00	DEK JCW Background
24-0343-06	FB- Background	Water	05/08/2024 16:05	DEK JCW Background

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15002**
Lab Sample ID: 24-0343-01
Matrix: Groundwater

Laboratory Project: **24-0343**
Collect Date: 05/08/2024
Collect Time: 02:51 PM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0343-01-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Arsenic	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Barium	43		ug/L	5.0	05/14/2024	AB24-0515-01
Beryllium	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Boron	21		ug/L	20.0	05/14/2024	AB24-0515-01
Cadmium	ND		ug/L	0.2	05/14/2024	AB24-0515-01
Calcium	55900		ug/L	1000.0	05/14/2024	AB24-0515-01
Chromium	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Cobalt	ND		ug/L	6.0	05/14/2024	AB24-0515-01
Copper	2		ug/L	1.0	05/14/2024	AB24-0515-01
Iron	526		ug/L	20.0	05/14/2024	AB24-0515-01
Lead	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Lithium	ND		ug/L	10.0	05/14/2024	AB24-0515-01
Magnesium	6360		ug/L	1000.0	05/14/2024	AB24-0515-01
Molybdenum	ND		ug/L	5.0	05/14/2024	AB24-0515-01
Nickel	2		ug/L	2.0	05/14/2024	AB24-0515-01
Potassium	243		ug/L	100.0	05/14/2024	AB24-0515-01
Selenium	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Silver	ND		ug/L	0.2	05/14/2024	AB24-0515-01
Sodium	51500		ug/L	1000.0	05/14/2024	AB24-0515-01
Thallium	ND		ug/L	2.0	05/14/2024	AB24-0515-01
Vanadium	ND		ug/L	2.0	05/14/2024	AB24-0515-01
Zinc	ND		ug/L	10.0	05/14/2024	AB24-0515-01

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0343-01-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/20/2024	AB24-0515-05

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0343-01-C02-A01 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	28300		ug/L	1000.0	05/15/2024	AB24-0514-08
Fluoride	ND		ug/L	1000.0	05/15/2024	AB24-0514-08
Sulfate	7530		ug/L	1000.0	05/15/2024	AB24-0514-08

Total Dissolved Solids by SM 2540C

Aliquot #: 24-0343-01-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	358		mg/L	10.0	05/10/2024	AB24-0510-10

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15008**
Lab Sample ID: 24-0343-02
Matrix: Groundwater

Laboratory Project: **24-0343**
Collect Date: 05/08/2024
Collect Time: 01:15 PM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0343-02-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Arsenic	3		ug/L	1.0	05/14/2024	AB24-0515-01
Barium	93		ug/L	5.0	05/14/2024	AB24-0515-01
Beryllium	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Boron	142		ug/L	20.0	05/14/2024	AB24-0515-01
Cadmium	ND		ug/L	0.2	05/14/2024	AB24-0515-01
Calcium	121000		ug/L	1000.0	05/14/2024	AB24-0515-01
Chromium	1		ug/L	1.0	05/14/2024	AB24-0515-01
Cobalt	ND		ug/L	6.0	05/14/2024	AB24-0515-01
Copper	1		ug/L	1.0	05/14/2024	AB24-0515-01
Iron	16900		ug/L	20.0	05/14/2024	AB24-0515-01
Lead	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Lithium	22		ug/L	10.0	05/14/2024	AB24-0515-01
Magnesium	19300		ug/L	1000.0	05/14/2024	AB24-0515-01
Molybdenum	ND		ug/L	5.0	05/14/2024	AB24-0515-01
Nickel	4		ug/L	2.0	05/14/2024	AB24-0515-01
Potassium	3180		ug/L	100.0	05/14/2024	AB24-0515-01
Selenium	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Silver	ND		ug/L	0.2	05/14/2024	AB24-0515-01
Sodium	221000		ug/L	1000.0	05/14/2024	AB24-0515-01
Thallium	ND		ug/L	2.0	05/14/2024	AB24-0515-01
Vanadium	9		ug/L	2.0	05/14/2024	AB24-0515-01
Zinc	ND		ug/L	10.0	05/14/2024	AB24-0515-01

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0343-02-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/20/2024	AB24-0515-05

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0343-02-C02-A01 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	395000		ug/L	1000.0	05/16/2024	AB24-0514-08
Fluoride	ND		ug/L	1000.0	05/15/2024	AB24-0514-08
Sulfate	2570		ug/L	1000.0	05/15/2024	AB24-0514-08

Total Dissolved Solids by SM 2540C

Aliquot #: 24-0343-02-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1280		mg/L	10.0	05/10/2024	AB24-0510-10

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15016**
Lab Sample ID: 24-0343-03
Matrix: Groundwater

Laboratory Project: **24-0343**
Collect Date: 05/08/2024
Collect Time: 02:47 PM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0343-03-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Arsenic	17		ug/L	1.0	05/14/2024	AB24-0515-01
Barium	157		ug/L	5.0	05/14/2024	AB24-0515-01
Beryllium	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Boron	398		ug/L	20.0	05/14/2024	AB24-0515-01
Cadmium	ND		ug/L	0.2	05/14/2024	AB24-0515-01
Calcium	243000		ug/L	1000.0	05/14/2024	AB24-0515-01
Chromium	1		ug/L	1.0	05/14/2024	AB24-0515-01
Cobalt	ND		ug/L	6.0	05/14/2024	AB24-0515-01
Copper	2		ug/L	1.0	05/14/2024	AB24-0515-01
Iron	21900		ug/L	20.0	05/14/2024	AB24-0515-01
Lead	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Lithium	68		ug/L	10.0	05/14/2024	AB24-0515-01
Magnesium	39200		ug/L	1000.0	05/14/2024	AB24-0515-01
Molybdenum	ND		ug/L	5.0	05/14/2024	AB24-0515-01
Nickel	10		ug/L	2.0	05/14/2024	AB24-0515-01
Potassium	9050		ug/L	100.0	05/14/2024	AB24-0515-01
Selenium	1		ug/L	1.0	05/14/2024	AB24-0515-01
Silver	ND		ug/L	0.2	05/14/2024	AB24-0515-01
Sodium	96000		ug/L	1000.0	05/14/2024	AB24-0515-01
Thallium	ND		ug/L	2.0	05/14/2024	AB24-0515-01
Vanadium	2		ug/L	2.0	05/14/2024	AB24-0515-01
Zinc	ND		ug/L	10.0	05/14/2024	AB24-0515-01

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0343-03-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/20/2024	AB24-0515-05

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0343-03-C02-A01 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	175000		ug/L	1000.0	05/16/2024	AB24-0514-08
Fluoride	ND		ug/L	1000.0	05/15/2024	AB24-0514-08
Sulfate	194000		ug/L	1000.0	05/15/2024	AB24-0514-08

Total Dissolved Solids by SM 2540C

Aliquot #: 24-0343-03-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1190		mg/L	10.0	05/10/2024	AB24-0510-10

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15019**
Lab Sample ID: 24-0343-04
Matrix: Groundwater

Laboratory Project: **24-0343**
Collect Date: 05/08/2024
Collect Time: 02:13 PM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0343-04-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Arsenic	2		ug/L	1.0	05/14/2024	AB24-0515-01
Barium	364		ug/L	5.0	05/14/2024	AB24-0515-01
Beryllium	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Boron	241		ug/L	20.0	05/14/2024	AB24-0515-01
Cadmium	ND		ug/L	0.2	05/14/2024	AB24-0515-01
Calcium	173000		ug/L	1000.0	05/14/2024	AB24-0515-01
Chromium	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Cobalt	ND		ug/L	6.0	05/14/2024	AB24-0515-01
Copper	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Iron	23100		ug/L	20.0	05/14/2024	AB24-0515-01
Lead	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Lithium	14		ug/L	10.0	05/14/2024	AB24-0515-01
Magnesium	40900		ug/L	1000.0	05/14/2024	AB24-0515-01
Molybdenum	ND		ug/L	5.0	05/14/2024	AB24-0515-01
Nickel	5		ug/L	2.0	05/14/2024	AB24-0515-01
Potassium	815		ug/L	100.0	05/14/2024	AB24-0515-01
Selenium	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Silver	ND		ug/L	0.2	05/14/2024	AB24-0515-01
Sodium	221000		ug/L	1000.0	05/14/2024	AB24-0515-01
Thallium	ND		ug/L	2.0	05/14/2024	AB24-0515-01
Vanadium	3		ug/L	2.0	05/14/2024	AB24-0515-01
Zinc	ND		ug/L	10.0	05/14/2024	AB24-0515-01

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0343-04-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/20/2024	AB24-0515-05

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0343-04-C02-A01 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	374000		ug/L	1000.0	05/16/2024	AB24-0514-08
Fluoride	ND		ug/L	1000.0	05/15/2024	AB24-0514-08
Sulfate	93800		ug/L	1000.0	05/15/2024	AB24-0514-08

Total Dissolved Solids by SM 2540C

Aliquot #: 24-0343-04-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1340		mg/L	10.0	05/10/2024	AB24-0510-10

Sample Site: **DEK JCW Background**
Field Sample ID: **DUP-Background**
Lab Sample ID: 24-0343-05
Matrix: Groundwater

Laboratory Project: **24-0343**
Collect Date: 05/08/2024
Collect Time: 12:00 AM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0343-05-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Arsenic	3		ug/L	1.0	05/14/2024	AB24-0515-01
Barium	92		ug/L	5.0	05/14/2024	AB24-0515-01
Beryllium	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Boron	140		ug/L	20.0	05/14/2024	AB24-0515-01
Cadmium	ND		ug/L	0.2	05/14/2024	AB24-0515-01
Calcium	124000		ug/L	1000.0	05/14/2024	AB24-0515-01
Chromium	1		ug/L	1.0	05/14/2024	AB24-0515-01
Cobalt	ND		ug/L	6.0	05/14/2024	AB24-0515-01
Copper	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Iron	17300		ug/L	20.0	05/14/2024	AB24-0515-01
Lead	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Lithium	22		ug/L	10.0	05/14/2024	AB24-0515-01
Magnesium	19400		ug/L	1000.0	05/14/2024	AB24-0515-01
Molybdenum	ND		ug/L	5.0	05/14/2024	AB24-0515-01
Nickel	4		ug/L	2.0	05/14/2024	AB24-0515-01
Potassium	3970		ug/L	100.0	05/14/2024	AB24-0515-01
Selenium	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Silver	ND		ug/L	0.2	05/14/2024	AB24-0515-01
Sodium	223000		ug/L	1000.0	05/14/2024	AB24-0515-01
Thallium	ND		ug/L	2.0	05/14/2024	AB24-0515-01
Vanadium	8		ug/L	2.0	05/14/2024	AB24-0515-01
Zinc	ND		ug/L	10.0	05/14/2024	AB24-0515-01

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0343-05-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/20/2024	AB24-0515-05

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 24-0343-05-C02-A01 **Analyst: KDR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	395000		ug/L	1000.0	05/16/2024	AB24-0514-08
Fluoride	ND		ug/L	1000.0	05/15/2024	AB24-0514-08
Sulfate	2520		ug/L	1000.0	05/15/2024	AB24-0514-08

Total Dissolved Solids by SM 2540C

Aliquot #: 24-0343-05-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1210		mg/L	10.0	05/10/2024	AB24-0510-10

Consumers Energy
Count on Us®
Laboratory Services
A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/24

Sample Site: **DEK JCW Background**
Field Sample ID: **FB- Background**
Lab Sample ID: 24-0343-06
Matrix: Water

Laboratory Project: **24-0343**
Collect Date: 05/08/2024
Collect Time: 04:05 PM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 24-0343-06-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Arsenic	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Barium	ND		ug/L	5.0	05/14/2024	AB24-0515-01
Beryllium	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Boron	ND		ug/L	20.0	05/14/2024	AB24-0515-01
Cadmium	ND		ug/L	0.2	05/14/2024	AB24-0515-01
Calcium	ND		ug/L	1000.0	05/14/2024	AB24-0515-01
Chromium	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Cobalt	ND		ug/L	6.0	05/14/2024	AB24-0515-01
Copper	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Iron	ND		ug/L	20.0	05/14/2024	AB24-0515-01
Lead	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Lithium	ND		ug/L	10.0	05/14/2024	AB24-0515-01
Magnesium	ND		ug/L	1000.0	05/14/2024	AB24-0515-01
Molybdenum	ND		ug/L	5.0	05/14/2024	AB24-0515-01
Nickel	ND		ug/L	2.0	05/14/2024	AB24-0515-01
Potassium	ND		ug/L	100.0	05/14/2024	AB24-0515-01
Selenium	ND		ug/L	1.0	05/14/2024	AB24-0515-01
Silver	ND		ug/L	0.2	05/14/2024	AB24-0515-01
Sodium	ND		ug/L	1000.0	05/14/2024	AB24-0515-01
Thallium	ND		ug/L	2.0	05/14/2024	AB24-0515-01
Vanadium	ND		ug/L	2.0	05/14/2024	AB24-0515-01
Zinc	ND		ug/L	10.0	05/14/2024	AB24-0515-01

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 24-0343-06-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/20/2024	AB24-0515-05

Data Qualifiers	Exception Summary
	No exceptions occurred.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 24-0343

Inspection Date: 5/10/24 **Inspection By:** CIE

Sample Origin/Project Name: JCW-DEK Background

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx _____ UPS _____ USPS _____ Airborne _____

Other/~~Hand~~ Carry (whom) TRC

Tracking Number: _____ Shipping Form Attached: Yes _____ No ____

Shipping Containers: Enter the type and number of shipping containers received.

Cooler ✓ Cardboard Box _____ Custom Case _____ Envelope/Mailer ____

Loose/Unpackaged Containers _____ Other _____

Condition of Shipment: Enter the as-received condition of the shipment container.

Damaged Shipment Observed: None ✓ Dented _____ Leaking _____

Other _____

Shipment Security: Enter if any of the shipping containers were opened before receipt.

Shipping Containers Received: Opened _____ Sealed ✓

Enclosed Documents: Enter the type of documents enclosed with the shipment.

CoC ✓ Work Request _____ Air Data Sheet _____ Other _____

Temperature of Containers: Measure the temperature of several sample containers.

As-Received Temperature Range 0.4 - 2.4°C Samples Received on Ice: Yes ✓ No ____

M&TE # and Expiration 015402 5.23.24

Number and Type of Containers: Enter the total number of sample containers received.

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL)					
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	11				
24 mL vial (glass)					
250 mL (plastic)	5				
Other					

FSP pit 0-14
13-640-508
Lot: 205522
exp: 2-15-25

PG. 2 & 2 not needed

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

SAMPLING SITE / CUSTOMER: Q2-2024 JCW-DEK Background Wells	PROJECT NUMBER: 24-0343	SAP CC or WO#:	ANALYSIS REQUESTED (Attach List if More Space is Needed)
SAMPLING TEAM:	TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____	REQUESTER: Harold Register	QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____
SEND REPORT TO: Joseph Firlit	email:	phone:	
COPY TO: Harold Register; TRC	MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste		

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	REMARKS
24-0343-01	5/8/24	1451	GW	MW-15002	3	2	1						x	x	x	
-02	5/8/24	1315	GW	MW-15008	3	2	1						x	x	x	
-03	5/8/24	1497	GW	MW-15016	3	2	1						x	x	x	
-04	5/8/24	1413	GW	MW-15019	3	2	1						x	x	x	
-05	5/8/24	—	GW	DUP-Background	3	2	1						x	x	x	
-06	5/8/24	1605	W	FB- Background	1								x			

RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:
	5/10/24 0700	
RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015402

Temperature: 0.4-2.4 °C Cal. Due Date: 5-23-24

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Darby Litz
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Generated 6/14/2024 10:52:31 AM

JOB DESCRIPTION

Karn/Weadock CCR DEK Botton Ash Pond

JOB NUMBER

240-204357-1

Eurofins Cleveland
180 S. Van Buren Avenue
Barberton OH 44203

See page two for job notes and contact information.

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization

Generated
6/14/2024 10:52:31 AM

Authorized for release by
Kris Brooks, Project Manager II
Kris.Brooks@et.eurofinsus.com
(330)966-9790

Table of Contents

Definitions/Glossary

Client: TRC Environmental Corporation. Job ID: 240-204357-1
Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 240-204357-1 Eurofins Cleveland

Job Narrative
240-204357-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 5/11/2024 8:00 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 1.9°C and 3.0°C.

Receipt Exceptions
The number of containers listed on the COC pages do not match what was received for the following: DEK-MW-15002 (240-204357-1), DEK-MW-15005 (240-204357-2) and DUP-DEK-BAP-01 (240-204357-4). There is sufficient volume for the requested analyses.

Gas Flow Proportional Counter
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Rad
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Method Summary

Client: TRC Environmental Corporation.
Job ID: 240-204357-1
Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	EET SL
904.0	Radium-228 (GFPC)	EPA	EET SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	EET SL
PrecSep STD	Preparation, Precipitate Separation (Standard In-Growth)	None	EET SL
PrecSep_0	Preparation, Precipitate Separation	None	EET SL

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: TRC Environmental Corporation.
Job ID: 240-204357-1
Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-204357-1	DEK-MW-15002	Water	05/09/24 10:31	05/11/24 08:00
240-204357-2	DEK-MW-15005	Water	05/09/24 08:37	05/11/24 08:00
240-204357-3	DEK-MW-15006	Water	05/09/24 11:38	05/11/24 08:00
240-204357-4	DUP-DEK-BAP-01	Water	05/09/24 00:00	05/11/24 08:00
240-204357-5	EB-DEK-BAP	Water	05/09/24 12:00	05/11/24 08:00

Client Sample ID: DEK-MW-15002 — Lab Sample ID: 240-204357-1

Date Collected: 05/09/24 10:31 — **Matrix: Water**
Date Received: 05/11/24 08:00

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.292**		0.0929	0.0965	1.00	0.0751	pCi/L	05/16/24 09:22	06/12/24 09:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.1*		*30 - 110*	*05/16/24 09:22*	*06/12/24 09:58*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.249	U	0.308	0.309	1.00	0.511	pCi/L	05/16/24 09:27	05/22/24 16:21	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.1*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:21*	*1*
Y Carrier	*80.7*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:21*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.541**		0.322	0.324	5.00	0.511	pCi/L		06/13/24 11:50	1

Client Sample ID: DEK-MW-15005 — Lab Sample ID: 240-204357-2

Date Collected: 05/09/24 08:37 — **Matrix: Water**
Date Received: 05/11/24 08:00

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.653		0.131	0.144	1.00	0.0651	pCi/L	05/16/24 09:22	06/12/24 09:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.8*		*30 - 110*	*05/16/24 09:22*	*06/12/24 09:58*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.898		0.377	0.386	1.00	0.480	pCi/L	05/16/24 09:27	05/22/24 16:22	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.8*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*
Y Carrier	*80.7*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.55		0.399	0.412	5.00	0.480	pCi/L		06/13/24 11:50	1

Client Sample ID: DEK-MW-15006 — Lab Sample ID: 240-204357-3

Date Collected: 05/09/24 11:38 — **Matrix: Water**
Date Received: 05/11/24 08:00

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.497		0.121	0.129	1.00	0.0839	pCi/L	05/16/24 09:22	06/12/24 09:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.6*		*30 - 110*	*05/16/24 09:22*	*06/12/24 09:58*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.593		0.328	0.333	1.00	0.455	pCi/L	05/16/24 09:27	05/22/24 16:22	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.6*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*
Y Carrier	*85.2*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.09		0.350	0.357	5.00	0.455	pCi/L		06/13/24 11:50	1

Client Sample ID: DUP-DEK-BAP-01 — Lab Sample ID: 240-204357-4

Date Collected: 05/09/24 00:00 — **Matrix: Water**
Date Received: 05/11/24 08:00

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.299		0.0990	0.103	1.00	0.0913	pCi/L	05/16/24 09:22	06/12/24 09:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*30 - 110*	*05/16/24 09:22*	*06/12/24 09:58*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.132	U	0.307	0.307	1.00	0.538	pCi/L	05/16/24 09:27	05/22/24 16:22	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*
Y Carrier	*86.7*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.431	U	0.323	0.324	5.00	0.538	pCi/L		06/13/24 11:50	1

Client: TRC Environmental Corporation.
Job ID: 240-204357-1
Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Client Sample ID: EB-DEK-BAP
Lab Sample ID: 240-204357-5
Date Collected: 05/09/24 12:00
Matrix: Water
Date Received: 05/11/24 08:00

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0341	U	0.0545	0.0546	1.00	0.0948	pCi/L	05/16/24 09:22	06/12/24 09:59	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*84.6*		*30 - 110*	*05/16/24 09:22*	*06/12/24 09:59*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.141	U	0.307	0.307	1.00	0.537	pCi/L	05/16/24 09:27	05/22/24 16:22	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*84.6*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*
Y Carrier	*85.6*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.175	U	0.312	0.312	5.00	0.537	pCi/L		06/13/24 11:50	1

Tracer/Carrier Summary

Client: TRC Environmental Corporation. Job ID: 240-204357-1
Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
		Ba
Lab Sample ID	Client Sample ID	(30-110)
240-204357-1	DEK-MW-15002	89.1
240-204357-2	DEK-MW-15005	91.8
240-204357-3	DEK-MW-15006	88.6
240-204357-4	DUP-DEK-BAP-01	88.3
240-204357-5	EB-DEK-BAP	84.6
240-204357-5 DU	EB-DEK-BAP	82.6
LCS 160-662015/2-A	Lab Control Sample	89.6
MB 160-662015/1-A	Method Blank	94.3

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)	
		Ba	Y
Lab Sample ID	Client Sample ID	(30-110)	(30-110)
240-204357-1	DEK-MW-15002	89.1	80.7
240-204357-2	DEK-MW-15005	91.8	80.7
240-204357-3	DEK-MW-15006	88.6	85.2
240-204357-4	DUP-DEK-BAP-01	88.3	86.7
240-204357-5	EB-DEK-BAP	84.6	85.6
240-204357-5 DU	EB-DEK-BAP	82.6	76.6
LCS 160-662016/2-A	Lab Control Sample	89.6	81.5
MB 160-662016/1-A	Method Blank	94.3	81.9

Tracer/Carrier Legend

Ba = Ba Carrier
Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-662015/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 665824 — **Prep Batch: 662015**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.03763	U	0.0464	0.0466	1.00	0.0761	pCi/L	05/16/24 09:22	06/12/24 09:56	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.3*		*30 - 110*	*05/16/24 09:22*	*06/12/24 09:56*	*1*

Lab Sample ID: LCS 160-662015/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 665824 — **Prep Batch: 662015**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	11.29		1.15	1.00	0.0974	pCi/L	100	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*89.6*		*30 - 110*

Lab Sample ID: 240-204357-5 DU — **Client Sample ID: EB-DEK-BAP**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 665824 — **Prep Batch: 662015**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-226	0.0341	U		0.03874	U	0.0493	1.00	0.0811	pCi/L			0.04	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Ba Carrier	*82.6*		*30 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-662016/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 662959 — **Prep Batch: 662016**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.02553	U	0.303	0.303	1.00	0.568	pCi/L	05/16/24 09:27	05/22/24 16:21	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.3*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:21*	*1*
Y Carrier	*81.9*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:21*	*1*

Method: 904.0 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCS 160-662016/2-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 662959 **Prep Batch: 662016**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			8.92	10.45		1.39	1.00	0.473	pCi/L	117	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*89.6*		*30 - 110*
Y Carrier	*81.5*		*30 - 110*

Lab Sample ID: 240-204357-5 DU **Client Sample ID: EB-DEK-BAP**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 662959 **Prep Batch: 662016**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-228	0.141	U		-0.03889	U	0.313	1.00	0.603	pCi/L			0.29	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Ba Carrier	*82.6*		*30 - 110*
Y Carrier	*76.6*		*30 - 110*

QC Association Summary

Client: TRC Environmental Corporation.
Job ID: 240-204357-1
Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Rad

Prep Batch: 662015

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-204357-1	DEK-MW-15002	Total/NA	Water	PrecSep STD	
240-204357-2	DEK-MW-15005	Total/NA	Water	PrecSep STD	
240-204357-3	DEK-MW-15006	Total/NA	Water	PrecSep STD	
240-204357-4	DUP-DEK-BAP-01	Total/NA	Water	PrecSep STD	
240-204357-5	EB-DEK-BAP	Total/NA	Water	PrecSep STD	
MB 160-662015/1-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-662015/2-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
240-204357-5 DU	EB-DEK-BAP	Total/NA	Water	PrecSep STD	

Prep Batch: 662016

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-204357-1	DEK-MW-15002	Total/NA	Water	PrecSep_0	
240-204357-2	DEK-MW-15005	Total/NA	Water	PrecSep_0	
240-204357-3	DEK-MW-15006	Total/NA	Water	PrecSep_0	
240-204357-4	DUP-DEK-BAP-01	Total/NA	Water	PrecSep_0	
240-204357-5	EB-DEK-BAP	Total/NA	Water	PrecSep_0	
MB 160-662016/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-662016/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
240-204357-5 DU	EB-DEK-BAP	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-204357-1
Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Client Sample ID: DEK-MW-15002 — Lab Sample ID: 240-204357-1

Date Collected: 05/09/24 10:31 — **Matrix: Water**
Date Received: 05/11/24 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			662015	MLT	EET SL	05/16/24 09:22
Total/NA	Analysis	903.0		1	665824	SWS	EET SL	06/12/24 09:58
Total/NA	Prep	PrecSep_0			662016	MLT	EET SL	05/16/24 09:27
Total/NA	Analysis	904.0		1	662959	SCB	EET SL	05/22/24 16:21
Total/NA	Analysis	Ra226_Ra228		1	666196	FLC	EET SL	06/13/24 11:50

Client Sample ID: DEK-MW-15005 — Lab Sample ID: 240-204357-2

Date Collected: 05/09/24 08:37 — **Matrix: Water**
Date Received: 05/11/24 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			662015	MLT	EET SL	05/16/24 09:22
Total/NA	Analysis	903.0		1	665824	SWS	EET SL	06/12/24 09:58
Total/NA	Prep	PrecSep_0			662016	MLT	EET SL	05/16/24 09:27
Total/NA	Analysis	904.0		1	662959	SCB	EET SL	05/22/24 16:22
Total/NA	Analysis	Ra226_Ra228		1	666196	FLC	EET SL	06/13/24 11:50

Client Sample ID: DEK-MW-15006 — Lab Sample ID: 240-204357-3

Date Collected: 05/09/24 11:38 — **Matrix: Water**
Date Received: 05/11/24 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			662015	MLT	EET SL	05/16/24 09:22
Total/NA	Analysis	903.0		1	665824	SWS	EET SL	06/12/24 09:58
Total/NA	Prep	PrecSep_0			662016	MLT	EET SL	05/16/24 09:27
Total/NA	Analysis	904.0		1	662959	SCB	EET SL	05/22/24 16:22
Total/NA	Analysis	Ra226_Ra228		1	666196	FLC	EET SL	06/13/24 11:50

Client Sample ID: DUP-DEK-BAP-01 — Lab Sample ID: 240-204357-4

Date Collected: 05/09/24 00:00 — **Matrix: Water**
Date Received: 05/11/24 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			662015	MLT	EET SL	05/16/24 09:22
Total/NA	Analysis	903.0		1	665824	SWS	EET SL	06/12/24 09:58
Total/NA	Prep	PrecSep_0			662016	MLT	EET SL	05/16/24 09:27
Total/NA	Analysis	904.0		1	662959	SCB	EET SL	05/22/24 16:22
Total/NA	Analysis	Ra226_Ra228		1	666196	FLC	EET SL	06/13/24 11:50

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-204357-1
Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Client Sample ID: EB-DEK-BAP

Lab Sample ID: 240-204357-5

Date Collected: 05/09/24 12:00

Matrix: Water

Date Received: 05/11/24 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			662015	MLT	EET SL	05/16/24 09:22
Total/NA	Analysis	903.0		1	665824	SWS	EET SL	06/12/24 09:59
Total/NA	Prep	PrecSep_0			662016	MLT	EET SL	05/16/24 09:27
Total/NA	Analysis	904.0		1	662959	SCB	EET SL	05/22/24 16:22
Total/NA	Analysis	Ra226_Ra228		1	666196	FLC	EET SL	06/13/24 11:50

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: TRC Environmental Corporation. Job ID: 240-204357-1
Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Laboratory: Eurofins St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-08-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-24
California	Los Angeles County Sanitation Districts	10259	06-30-22 *
California	State	2886	06-30-24
Connecticut	State	PH-0241	03-31-25
Florida	NELAP	E87689	06-30-24
HI - RadChem Recognition	State	n/a	06-30-24
Illinois	NELAP	200023	11-30-24
Iowa	State	373	12-01-24
Kansas	NELAP	E-10236	10-31-24
Kentucky (DW)	State	KY90125	12-31-24
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-24
Louisiana	NELAP	04080	06-30-22 *
Louisiana (All)	NELAP	04080	06-30-24
Louisiana (DW)	State	LA011	12-31-24
Maryland	State	310	09-30-24
Massachusetts	State	M-MO054	06-30-24
MI - RadChem Recognition	State	9005	06-30-24
Missouri	State	780	06-30-25
Nevada	State	MO00054	07-31-24
New Jersey	NELAP	MO002	06-30-24
New Mexico	State	MO00054	06-30-24
New York	NELAP	11616	03-31-25
North Carolina (DW)	State	29700	07-31-24
North Dakota	State	R-207	06-30-24
Oklahoma	NELAP	9997	08-31-24
Oregon	NELAP	4157	09-01-24
Pennsylvania	NELAP	68-00540	02-28-25
South Carolina	State	85002001	06-30-24
Texas	NELAP	T104704193	07-31-24
US Fish & Wildlife	US Federal Programs	058448	07-31-24
USDA	US Federal Programs	P330-17-00028	05-18-26
Utah	NELAP	MO00054	07-31-24
Virginia	NELAP	10310	06-15-25
Washington	State	C592	08-30-24
West Virginia DEP	State	381	10-31-24

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins Cleveland
180 S. Van Buren Avenue
Barberton, OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

MICHIGAN 190

Chain of Custody Record

eurofins | Environment Testing

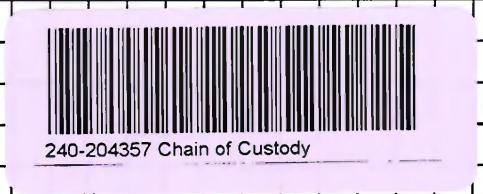
Client Information	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-120142-29052.1
Client Contact: Jacob Krenz	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:			Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: Δ Yes Δ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD			
Email: JKrenz@trccompanies.com	WO #: 553814.0001			
Project Name: Karn/Weadock CCR DEK Bottom Ash Pond	Project #: 24024154			
Site:	SSOW#:			

Analysis Requested

Preservation Codes: D - HNO3

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	D		
DEK-MW-15002	5-9-24	1031	G	Water	N	N	X	X	2	
DEK-MW-15005	5-9-24	0837	G	Water	N	N	X	X	2	
DEK-MW-15006	5-9-24	1138		Water	N	N	X	X	2	
DUP-DEK-BAP-01	5-9-24	~~10~~	G	Water	N	N	X	X	2	
EB-DEK-BAP	5-9-24	1200	G	Water	N	N	X	X	2	
				Water						



MICHIGAN 190

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	5-10-24/1010	TRC		5/10/2024 10:10	EFTA
Relinquished by:	Date/Time:	Company	Received by: JESSICA RIGDON	Date/Time: 5-11-24 0800	Company BVTNC
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

Eurofins – Cleveland Sample Receipt Form/Narrative
Barberton Facility

Login # 204357

Client TRC Site Name

Cooler unpacked by DNP

Cooler Received on 5 11 24 Opened on 5-11 24

FedEx. 1st Grd Exp UPS FAS (Waypoint) Client Drop Off Eurofins Courier Other

Receipt After-hours Drop-off Date/Time Storage Location

Eurofins Cooler # EC Foam Box Client Cooler Box Other

Packing material used Bubble Wrap Foam Plastic Bag (None) Other

COOLANT: (Wet Ice) Blue Ice Dry Ice Water None

1 Cooler temperature upon receipt ☒ See Multiple Cooler Form

IR GUN # 18 (CF 0.0 °C) Observed Cooler Temp °C Corrected Cooler Temp °C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1	(Yes)	No
Were the seals on the outside of the cooler(s) signed & dated?	(Yes)	No NA
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes	(No)
-Were tamper/custody seals intact and uncompromised?	(Yes)	No NA
3 Shippers' packing slip attached to the cooler(s)?	Yes	(No)
4. Did custody papers accompany the sample(s)?	(Yes)	No
5 Were the custody papers relinquished & signed in the appropriate place?	(Yes)	No
6 Was/were the person(s) who collected the samples clearly identified on the COC?	(Yes)	No
7 Did all bottles arrive in good condition (Unbroken)?	(Yes)	No
8 Could all bottle labels (ID/Date/Time) be reconciled with the COC?	(Yes)	No
9 For each sample, does the COC specify preservatives (Y/N), # of containers (Y/N), and sample type of grab/comp (Y/N)?		
10 Were correct bottle(s) used for the test(s) indicated?	(Yes)	No
11 Sufficient quantity received to perform indicated analyses?	(Yes)	No
12. Are these work share samples and all listed on the COC?	Yes	(No)
If yes, Questions 13 17 have been checked at the originating laboratory		
13 Were all preserved sample(s) at the correct pH upon receipt?	(Yes)	No NA pH Strip Lot# HC439975
14 Were VOAs on the COC?	Yes	(No)
15 Were air bubbles >6 mm in any VOA vials? ● ← Larger than this	Yes	No (NA)
16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot #	Yes	(No)
17 Was a LL Hg or Me Hg trip blank present?	Yes	(No)

Tests that are not checked for pH by Receiving

VOAs
Oil and Grease
TOC

Contacted PM Date by via Verbal Voice Mail Other

Concerning

18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES ☐ additional next page

Samples processed by

19 SAMPLE CONDITION

Sample(s) were received after the recommended holding time had expired.

Sample(s) were received in a broken container

Sample(s) were received with bubble >6 mm in diameter (Notify PM)

20 SAMPLE PRESERVATION

Sample(s) were further preserved in the laboratory

Time preserved Preservative(s) added/Lot number(s)

VOA Sample Preservation Date/Time VOAs Frozen

Login # 204357

Eurofins - Cleveland Sample Receipt Multiple Cooler Form

Cooler Description (Circle)	IR Gun # (Circle)	Observed Temp °C	Corrected Temp °C	Coolant (Circle)
EC Client Box Other	IR GUN #: 18	1.9	1.9	Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #: 18	3.0	3.0	Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None

☐ See Temperature Excursion Form

WI-NC-099 Cooler Receipt Form Page 2 – Multiple Coolers

5/11/2024

Login Container Summary Report

240-204357

6/14/2024

Temperature readings _____

Client Sample ID	Lab ID	Container Type	Container pH	Container Temp	Preservation Added	Preservation Lot Number
DEK-MW-15002	240-204357-A-1	Plastic 1 liter - Nitric Acid	<2			
DEK-MW-15002	240-204357-B-1	Plastic 1 liter - Nitric Acid	<2			
DEK-MW-15005	240-204357-A-2	Plastic 1 liter - Nitric Acid	<2			
DEK-MW-15005	240-204357 B-2	Plastic 1 liter - Nitric Acid	<2			
DEK-MW-15006	240-204357-A-3	Plastic 1 liter - Nitric Acid	<2			
DEK-MW 15006	240 204357-B-3	Plastic 1 liter - Nitric Acid	<2			
DUP-DEK-BAP-01	240-204357-A-4	Plastic 1 liter - Nitric Acid	<2			
DUP-DEK-BAP-01	240-204357-B-4	Plastic 1 liter - Nitric Acid	<2			
EB-DEK-BAP	240-204357-A-5	Plastic 1 liter - Nitric Acid	<2			
EB-DEK-BAP	240-204357-B-5	Plastic 1 liter - Nitric Acid	<2			

Eurofins Cleveland
180 S. Van Buren Avenue
Barberton, OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

eurofins | Environment Testing

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-184583.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: Michigan	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-204357-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 6/12/2024	Analysis Requested		Preservation Codes: -
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Karn/Weadock CCR DEK Botton Ash Pond	Project #: 24024154			Other:
Site:	SSOW#:			

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_STD Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
DEK-MW-15002 (240-204357-1)	5/9/24	10:31 Eastern		Water			X	X	X	1	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DEK-MW-15005 (240-204357-2)	5/9/24	08:37 Eastern		Water			X	X	X	1	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Environment Testing North Central, LLC.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
MALISSA LOAR					
			M. Pinette	MAY 14 2024 0950	

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Eurofins Cleveland
180 S. Van Buren Avenue
Barberton, OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

eurofins | Environment Testing

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-184582.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: Michigan	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-204357-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 6/12/2024			Preservation Codes: -
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Karn/Weadock CCR DEK Botton Ash Pond	Project #: 24024154			Other:
Site:	SSOW#:			

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_STD Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
DEK-MW-15005 (240-204357-2)	5/9/24	08:37 Eastern		Water			X	X	X	1	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DEK-MW-15006 (240-204357-3)	5/9/24	11:38 Eastern		Water			X	X	X	1	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-DEK-BAP-01 (240-204357-4)	5/9/24	Eastern		Water			X	X	X	1	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Environment Testing North Central, LLC.

Possible Hazard Identification	*Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*
Unconfirmed	☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	Relinquished by: MALISSA LOAR					
	Relinquished by:	Date/Time:	Company	Received by: M. Pinette	Date/Time: MAY 14 2024 0950	Company
	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

Eurofins Cleveland
180 S. Van Buren Avenue
Barberton, OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

eurofins | Environment Testing

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-184585.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: Michigan	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-204357-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 6/12/2024			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Karn/Weadock CCR DEK Botton Ash Pond	Project #: 24024154			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
-
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_STD Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
EB-DEK-BAP (240-204357-5)	5/9/24	12:00 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Environment Testing North Central, LLC.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
MALISSA LOAR					
Relinquished by:	Date/Time:	Company	Received by: M. Pinette	Date/Time: MAY 14 2024 0950	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

6/14/2024

Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

Job Number: 240-204357-1

Login Number: 204357
List Number: 2
Creator: Thornley, Richard W

List Source: Eurofins St. Louis
List Creation: 05/14/24 05:18 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

Job Number: 240-204357-1

Login Number: 204357
List Number: 3
Creator: Pinette, Meadow L

List Source: Eurofins St. Louis
List Creation: 05/15/24 01:55 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Darby Litz
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Generated 6/13/2024 8:16:54 PM

JOB DESCRIPTION

Karn/Weadock CCR DEK Bottom Ash Pond

JOB NUMBER

240-204354-1

Eurofins Cleveland
180 S. Van Buren Avenue
Barberton OH 44203

See page two for job notes and contact information.

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization

Generated
6/13/2024 8:16:54 PM

Authorized for release by
Kris Brooks, Project Manager II
Kris.Brooks@et.eurofinsus.com
(330)966-9790

Table of Contents

Definitions/Glossary

Client: TRC Environmental Corporation. Job ID: 240-204354-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 240-204354-1 Eurofins Cleveland

Job Narrative
240-204354-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The sample was received on 5/11/2024 8:00 AM. Unless otherwise noted below, the sample arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 1.9°C and 3.0°C.

Gas Flow Proportional Counter
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Rad
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Method Summary

Client: TRC Environmental Corporation. Job ID: 240-204354-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	EET SL
904.0	Radium-228 (GFPC)	EPA	EET SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	EET SL
PrecSep STD	Preparation, Precipitate Separation (Standard In-Growth)	None	EET SL
PrecSep_0	Preparation, Precipitate Separation	None	EET SL

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: TRC Environmental Corporation.
Job ID: 240-204354-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-204354-1	DEK-MW-18001	Water	05/08/24 13:03	05/11/24 08:00

Client Sample ID: DEK-MW-18001 Lab Sample ID: 240-204354-1

Date Collected: 05/08/24 13:03 **Matrix: Water**
Date Received: 05/11/24 08:00

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.238		0.0933	0.0958	1.00	0.0935	pCi/L	05/16/24 09:22	06/12/24 09:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.1*		*30 - 110*	*05/16/24 09:22*	*06/12/24 09:58*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.000	U	0.329	0.329	1.00	0.623	pCi/L	05/16/24 09:27	05/22/24 16:21	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.1*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:21*	*1*
Y Carrier	*75.5*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:21*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.238	U	0.342	0.343	5.00	0.623	pCi/L		06/13/24 11:27	1

Tracer/Carrier Summary

Client: TRC Environmental Corporation. Job ID: 240-204354-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
		Ba
Lab Sample ID	Client Sample ID	(30-110)
240-204354-1	DEK-MW-18001	79.1
LCS 160-662015/2-A	Lab Control Sample	89.6
MB 160-662015/1-A	Method Blank	94.3

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)	
		Ba	Y
Lab Sample ID	Client Sample ID	(30-110)	(30-110)
240-204354-1	DEK-MW-18001	79.1	75.5
LCS 160-662016/2-A	Lab Control Sample	89.6	81.5
MB 160-662016/1-A	Method Blank	94.3	81.9

Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-662015/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 665824 — **Prep Batch: 662015**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.03763	U	0.0464	0.0466	1.00	0.0761	pCi/L	05/16/24 09:22	06/12/24 09:56	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.3*		*30 - 110*	*05/16/24 09:22*	*06/12/24 09:56*	*1*

Lab Sample ID: LCS 160-662015/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 665824 — **Prep Batch: 662015**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	11.29		1.15	1.00	0.0974	pCi/L	100	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*89.6*		*30 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-662016/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 662959 — **Prep Batch: 662016**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.02553	U	0.303	0.303	1.00	0.568	pCi/L	05/16/24 09:27	05/22/24 16:21	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.3*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:21*	*1*
Y Carrier	*81.9*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:21*	*1*

Lab Sample ID: LCS 160-662016/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 662959 — **Prep Batch: 662016**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			8.92	10.45		1.39	1.00	0.473	pCi/L	117	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*89.6*		*30 - 110*
Y Carrier	*81.5*		*30 - 110*

QC Association Summary

Client: TRC Environmental Corporation. Job ID: 240-204354-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Rad

Prep Batch: 662015

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-204354-1	DEK-MW-18001	Total/NA	Water	PrecSep STD	
MB 160-662015/1-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-662015/2-A	Lab Control Sample	Total/NA	Water	PrecSep STD	

Prep Batch: 662016

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-204354-1	DEK-MW-18001	Total/NA	Water	PrecSep_0	
MB 160-662016/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-662016/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-204354-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Client Sample ID: DEK-MW-18001 Lab Sample ID: 240-204354-1

Date Collected: 05/08/24 13:03 **Matrix: Water**
Date Received: 05/11/24 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			662015	MLT	EET SL	05/16/24 09:22
Total/NA	Analysis	903.0		1	665824	SWS	EET SL	06/12/24 09:58
Total/NA	Prep	PrecSep_0			662016	MLT	EET SL	05/16/24 09:27
Total/NA	Analysis	904.0		1	662959	SCB	EET SL	05/22/24 16:21
Total/NA	Analysis	Ra226_Ra228		1	666196	FLC	EET SL	06/13/24 11:27

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: TRC Environmental Corporation. Job ID: 240-204354-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Laboratory: Eurofins St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-08-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-24
California	Los Angeles County Sanitation Districts	10259	06-30-22 *
California	State	2886	06-30-24
Connecticut	State	PH-0241	03-31-25
Florida	NELAP	E87689	06-30-24
HI - RadChem Recognition	State	n/a	06-30-24
Illinois	NELAP	200023	11-30-24
Iowa	State	373	12-01-24
Kansas	NELAP	E-10236	10-31-24
Kentucky (DW)	State	KY90125	12-31-24
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-24
Louisiana	NELAP	04080	06-30-22 *
Louisiana (All)	NELAP	04080	06-30-24
Louisiana (DW)	State	LA011	12-31-24
Maryland	State	310	09-30-24
Massachusetts	State	M-MO054	06-30-24
MI - RadChem Recognition	State	9005	06-30-24
Missouri	State	780	06-30-25
Nevada	State	MO00054	07-31-24
New Jersey	NELAP	MO002	06-30-24
New Mexico	State	MO00054	06-30-24
New York	NELAP	11616	03-31-25
North Carolina (DW)	State	29700	07-31-24
North Dakota	State	R-207	06-30-24
Oklahoma	NELAP	9997	08-31-24
Oregon	NELAP	4157	09-01-24
Pennsylvania	NELAP	68-00540	02-28-25
South Carolina	State	85002001	06-30-24
Texas	NELAP	T104704193	07-31-24
US Fish & Wildlife	US Federal Programs	058448	07-31-24
USDA	US Federal Programs	P330-17-00028	05-18-26
Utah	NELAP	MO00054	07-31-24
Virginia	NELAP	10310	06-15-25
Washington	State	C592	08-30-24
West Virginia DEP	State	381	10-31-24

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins Cleveland
180 S. Van Buren Avenue
Barberton, OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

MICHIGAN 190

eurofins | Environment Testing

Client Information	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-120143-29053.1
Client Contact: Jacob Krenz	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:	Analysis Requested		Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			Preservation Codes: D - HNO3
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: Δ Yes Δ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD			
Email: JKrenz@trccompanies.com	WO #: 553814.0001			
Project Name: Karn/Weadock CCR DEK Bottom Ash Pond & I	Project #: 24024154			Other:
Site:	SSOW#:			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	D		
DEK-MW-18001	5-8-24	1303	G	Water	N	N	X	X	2	
				Water						

240-204354 Chain of Custody

MICHIGAN 190

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify)	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		5-10-24 1010	TRC		5/10/24	
2		5/10/24 10:10	EFTA	JESSICA RIGDON	5-11-24 0800 10:10	EFTA
3						

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Eurofins – Cleveland Sample Receipt Form/Narrative Login # 204354
Barberton Facility

Client TRC Site Name

Cooler unpacked by: MR

Cooler Received on 5 11 24 Opened on 5-11-24

FedEx. 1st Grd Exp UPS FAS (Waypoint) Client Drop Off Eurofins Courier Other

Receipt After-hours Drop-off Date/Time Storage Location

Eurofins Cooler # EC Foam Box Client Cooler Box Other

Packing material used Bubble Wrap Foam Plastic Bag (None) Other

COOLANT: (Wet Ice) Blue Ice Dry Ice Water None

1 Cooler temperature upon receipt ☒ See Multiple Cooler Form

IR GUN # 18 (CF 0.0 °C) Observed Cooler Temp °C Corrected Cooler Temp. °C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1	(Yes) No	
-Were the seals on the outside of the cooler(s) signed & dated?	(Yes) No NA	
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes (No)	
-Were tamper/custody seals intact and uncompromised?	(Yes) No NA	
3 Shippers' packing slip attached to the cooler(s)?	Yes (No)	
4 Did custody papers accompany the sample(s)?	(Yes) No	
5 Were the custody papers relinquished & signed in the appropriate place?	(Yes) No	
6 Was/were the person(s) who collected the samples clearly identified on the COC?	(Yes) No	
7 Did all bottles arrive in good condition (Unbroken)?	(Yes) No	
8 Could all bottle labels (ID/Date/Time) be reconciled with the COC?	(Yes) No	
9 For each sample, does the COC specify preservatives (Y/N), # of containers (Y/N), and sample type of grab/comp (Y/N)?		
10 Were correct bottle(s) used for the test(s) indicated?	(Yes) No	
11 Sufficient quantity received to perform indicated analyses?	(Yes) No	
12 Are these work share samples and all listed on the COC?	Yes (No)	
If yes, Questions 13-17 have been checked at the originating laboratory		
13 Were all preserved sample(s) at the correct pH upon receipt?	(Yes) No NA	pH Strip Lot# HC439975
14. Were VOAs on the COC?	Yes (No)	
15 Were air bubbles >6 mm in any VOA vials? ● ← Larger than this.	Yes No (NA)	
16 Was a VOA trip blank present in the cooler(s)? Trip Blank Lot #	Yes (No)	
17 Was a LL Hg or Me Hg trip blank present?	Yes (No)	

Tests that are not checked for pH by Receiving

VOAs
Oil and Grease
TOC

Contacted PM Date by via Verbal Voice Mail Other

Concerning

18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES ☐ additional next page

Samples processed by:

19 SAMPLE CONDITION

Sample(s) were received after the recommended holding time had expired

Sample(s) were received in a broken container

Sample(s) were received with bubble >6 mm in diameter (Notify PM)

20. SAMPLE PRESERVATION

Sample(s) were further preserved in the laboratory

Time preserved Preservative(s) added/Lot number(s)

VOA Sample Preservation Date/Time VOAs Frozen.

Login # 204354

Eurofins - Cleveland Sample Receipt Multiple Cooler Form

Cooler Description (Circle)	IR Gun # (Circle)	Observed Temp °C	Corrected Temp °C	Coolant (Circle)
(EC) Client Box Other	IR GUN #: 18	1.9	1.9	(Wet Ice) Blue Ice Dry Ice Water None
(EC) Client Box Other	IR GUN #: 18	3.0	3.0	(Wet Ice) Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None

☐ See Temperature Excursion Form

WI-NC-099 Cooler Receipt Form Page 2 – Multiple Coolers

5/11/2024

Login Container Summary Report

240-204354

6/13/2024

Temperature readings _____

Client Sample ID	Lab ID	Container Type	pH	Container Temp	Preservation Added	Preservation Lot Number
DEK-MW-18001	240-204354-A-1	Plastic 1 liter - Nitric Acid	<2			
DEK-MW 18001	240-204354-B-1	Plastic 1 liter - Nitric Acid	<2			

Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

Job Number: 240-204354-1

Login Number: 204354
List Number: 2
Creator: Thornley, Richard W

List Source: Eurofins St. Louis
List Creation: 05/14/24 05:18 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Darby Litz
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Generated 6/14/2024 11:02:48 AM

JOB DESCRIPTION

Karn/Weadock CCR Background Well

JOB NUMBER

240-204358-1

Eurofins Cleveland
180 S. Van Buren Avenue
Barberton OH 44203

See page two for job notes and contact information.

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization

Generated
6/14/2024 11:02:48 AM

Authorized for release by
Kris Brooks, Project Manager II
Kris.Brooks@et.eurofinsus.com
(330)966-9790

Table of Contents

Definitions/Glossary

Client: TRC Environmental Corporation. Job ID: 240-204358-1
Project/Site: Karn/Weadock CCR Background Well

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 240-204358-1 Eurofins Cleveland

Job Narrative
240-204358-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 5/11/2024 8:00 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 1.7°C, 3.4°C and 3.9°C.

Receipt Exceptions
The number of containers listed on the COC pages do not match what was received for the following: MW-15016 (240-204358-3) and EQ-BACKGROUND (240-204358-6). There is sufficient volume for the requested analyses.

Gas Flow Proportional Counter
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Rad
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Method Summary

Client: TRC Environmental Corporation.
Job ID: 240-204358-1
Project/Site: Karn/Weadock CCR Background Well

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	EET SL
904.0	Radium-228 (GFPC)	EPA	EET SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	EET SL
PrecSep STD	Preparation, Precipitate Separation (Standard In-Growth)	None	EET SL
PrecSep_0	Preparation, Precipitate Separation	None	EET SL

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: TRC Environmental Corporation.
Job ID: 240-204358-1
Project/Site: Karn/Weadock CCR Background Well

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-204358-1	MW-15002	Water	05/08/24 14:51	05/11/24 08:00
240-204358-2	MW-15008	Water	05/08/24 13:15	05/11/24 08:00
240-204358-3	MW-15016	Water	05/08/24 14:57	05/11/24 08:00
240-204358-4	MW-15019	Water	05/08/24 14:13	05/11/24 08:00
240-204358-5	DUP-BACKGROUND	Water	05/08/24 00:00	05/11/24 08:00
240-204358-6	EQ-BACKGROUND	Water	05/08/24 16:05	05/11/24 08:00

Client Sample ID: MW-15002 — Lab Sample ID: 240-204358-1

Date Collected: 05/08/24 14:51 — **Matrix: Water**
Date Received: 05/11/24 08:00

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0657	U	0.0534	0.0537	1.00	0.0742	pCi/L	05/16/24 09:22	06/12/24 10:00	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.1*		*30 - 110*	*05/16/24 09:22*	*06/12/24 10:00*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0468	U	0.277	0.277	1.00	0.512	pCi/L	05/16/24 09:27	05/22/24 16:22	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.1*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*
Y Carrier	*82.2*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.113	U	0.282	0.282	5.00	0.512	pCi/L		06/13/24 11:50	1

Client Sample ID: MW-15008 — Lab Sample ID: 240-204358-2

Date Collected: 05/08/24 13:15 — **Matrix: Water**
Date Received: 05/11/24 08:00

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.589**		0.166	0.175	1.00	0.123	pCi/L	05/16/24 09:22	06/12/24 10:00	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*73.6*		*30 - 110*	*05/16/24 09:22*	*06/12/24 10:00*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.438	U	0.514	0.516	1.00	0.847	pCi/L	05/16/24 09:27	05/22/24 16:22	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*73.6*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*
Y Carrier	*81.1*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.03**		0.540	0.545	5.00	0.847	pCi/L		06/13/24 11:50	1

Client Sample ID: MW-15016 — Lab Sample ID: 240-204358-3

Date Collected: 05/08/24 14:57 — **Matrix: Water**
Date Received: 05/11/24 08:00

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.143	U	0.104	0.105	1.00	0.149	pCi/L	05/16/24 09:22	06/12/24 10:00	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.3*		*30 - 110*	*05/16/24 09:22*	*06/12/24 10:00*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.229	U	0.413	0.414	1.00	0.715	pCi/L	05/16/24 09:27	05/22/24 16:22	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.3*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*
Y Carrier	*81.5*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.372	U	0.426	0.427	5.00	0.715	pCi/L		06/13/24 11:50	1

Client Sample ID: MW-15019 — Lab Sample ID: 240-204358-4

Date Collected: 05/08/24 14:13 — **Matrix: Water**
Date Received: 05/11/24 08:00

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.332**		0.116	0.120	1.00	0.0982	pCi/L	05/16/24 09:22	06/12/24 10:00	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.8*		*30 - 110*	*05/16/24 09:22*	*06/12/24 10:00*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.490	U	0.409	0.412	1.00	0.638	pCi/L	05/16/24 09:27	05/22/24 16:22	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.8*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*
Y Carrier	*87.1*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:22*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.822**		0.425	0.429	5.00	0.638	pCi/L		06/13/24 11:50	1

Client Sample ID: DUP-BACKGROUND
Lab Sample ID: 240-204358-5
Date Collected: 05/08/24 00:00
Matrix: Water
Date Received: 05/11/24 08:00

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.443		0.146	0.151	1.00	0.151	pCi/L	05/16/24 09:22	06/12/24 10:06	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.1*		*30 - 110*	*05/16/24 09:22*	*06/12/24 10:06*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.29		0.568	0.580	1.00	0.751	pCi/L	05/16/24 09:27	05/22/24 16:39	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.1*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:39*	*1*
Y Carrier	*83.4*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:39*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.73		0.586	0.599	5.00	0.751	pCi/L		06/13/24 11:50	1

Client Sample ID: EQ-BACKGROUND
Lab Sample ID: 240-204358-6

Date Collected: 05/08/24 16:05
Matrix: Water
Date Received: 05/11/24 08:00

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0109	U	0.0568	0.0568	1.00	0.111	pCi/L	05/16/24 09:22	06/12/24 10:06	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*75.6*		*30 - 110*	*05/16/24 09:22*	*06/12/24 10:06*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0753	U	0.394	0.394	1.00	0.712	pCi/L	05/16/24 09:27	05/22/24 16:39	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*75.6*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:39*	*1*
Y Carrier	*83.0*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:39*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.0862	U	0.398	0.398	5.00	0.712	pCi/L		06/13/24 11:50	1

Tracer/Carrier Summary

Client: TRC Environmental Corporation.
Job ID: 240-204358-1
Project/Site: Karn/Weadock CCR Background Well

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water
Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
		Ba
Lab Sample ID	Client Sample ID	(30-110)
240-204358-1	MW-15002	85.1
240-204358-2	MW-15008	73.6
240-204358-3	MW-15016	83.3
240-204358-4	MW-15019	92.8
240-204358-5	DUP-BACKGROUND	85.1
240-204358-6	EQ-BACKGROUND	75.6
LCS 160-662015/2-A	Lab Control Sample	89.6
MB 160-662015/1-A	Method Blank	94.3

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water
Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
		Ba	Y
Lab Sample ID	Client Sample ID	(30-110)	(30-110)
240-204358-1	MW-15002	85.1	82.2
240-204358-2	MW-15008	73.6	81.1
240-204358-3	MW-15016	83.3	81.5
240-204358-4	MW-15019	92.8	87.1
240-204358-5	DUP-BACKGROUND	85.1	83.4
240-204358-6	EQ-BACKGROUND	75.6	83.0
LCS 160-662016/2-A	Lab Control Sample	89.6	81.5
MB 160-662016/1-A	Method Blank	94.3	81.9

Tracer/Carrier Legend

Ba = Ba Carrier
Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-662015/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 665824 — **Prep Batch: 662015**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.03763	U	0.0464	0.0466	1.00	0.0761	pCi/L	05/16/24 09:22	06/12/24 09:56	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.3*		*30 - 110*	*05/16/24 09:22*	*06/12/24 09:56*	*1*

Lab Sample ID: LCS 160-662015/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 665824 — **Prep Batch: 662015**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	11.29		1.15	1.00	0.0974	pCi/L	100	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*89.6*		*30 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-662016/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 662959 — **Prep Batch: 662016**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.02553	U	0.303	0.303	1.00	0.568	pCi/L	05/16/24 09:27	05/22/24 16:21	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.3*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:21*	*1*
Y Carrier	*81.9*		*30 - 110*	*05/16/24 09:27*	*05/22/24 16:21*	*1*

Lab Sample ID: LCS 160-662016/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 662959 — **Prep Batch: 662016**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			8.92	10.45		1.39	1.00	0.473	pCi/L	117	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*89.6*		*30 - 110*
Y Carrier	*81.5*		*30 - 110*

QC Association Summary

Client: TRC Environmental Corporation. Job ID: 240-204358-1
Project/Site: Karn/Weadock CCR Background Well

Rad

Prep Batch: 662015

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-204358-1	MW-15002	Total/NA	Water	PrecSep STD	
240-204358-2	MW-15008	Total/NA	Water	PrecSep STD	
240-204358-3	MW-15016	Total/NA	Water	PrecSep STD	
240-204358-4	MW-15019	Total/NA	Water	PrecSep STD	
240-204358-5	DUP-BACKGROUND	Total/NA	Water	PrecSep STD	
240-204358-6	EQ-BACKGROUND	Total/NA	Water	PrecSep STD	
MB 160-662015/1-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-662015/2-A	Lab Control Sample	Total/NA	Water	PrecSep STD	

Prep Batch: 662016

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-204358-1	MW-15002	Total/NA	Water	PrecSep_0	
240-204358-2	MW-15008	Total/NA	Water	PrecSep_0	
240-204358-3	MW-15016	Total/NA	Water	PrecSep_0	
240-204358-4	MW-15019	Total/NA	Water	PrecSep_0	
240-204358-5	DUP-BACKGROUND	Total/NA	Water	PrecSep_0	
240-204358-6	EQ-BACKGROUND	Total/NA	Water	PrecSep_0	
MB 160-662016/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-662016/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-204358-1
Project/Site: Karn/Weadock CCR Background Well

Client Sample ID: MW-15002 Lab Sample ID: 240-204358-1

Date Collected: 05/08/24 14:51 **Matrix: Water**
Date Received: 05/11/24 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			662015	MLT	EET SL	05/16/24 09:22
Total/NA	Analysis	903.0		1	665824	SWS	EET SL	06/12/24 10:00
Total/NA	Prep	PrecSep_0			662016	MLT	EET SL	05/16/24 09:27
Total/NA	Analysis	904.0		1	662959	SCB	EET SL	05/22/24 16:22
Total/NA	Analysis	Ra226_Ra228		1	666196	FLC	EET SL	06/13/24 11:50

Client Sample ID: MW-15008 Lab Sample ID: 240-204358-2

Date Collected: 05/08/24 13:15 **Matrix: Water**
Date Received: 05/11/24 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			662015	MLT	EET SL	05/16/24 09:22
Total/NA	Analysis	903.0		1	665824	SWS	EET SL	06/12/24 10:00
Total/NA	Prep	PrecSep_0			662016	MLT	EET SL	05/16/24 09:27
Total/NA	Analysis	904.0		1	662959	SCB	EET SL	05/22/24 16:22
Total/NA	Analysis	Ra226_Ra228		1	666196	FLC	EET SL	06/13/24 11:50

Client Sample ID: MW-15016 Lab Sample ID: 240-204358-3

Date Collected: 05/08/24 14:57 **Matrix: Water**
Date Received: 05/11/24 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			662015	MLT	EET SL	05/16/24 09:22
Total/NA	Analysis	903.0		1	665824	SWS	EET SL	06/12/24 10:00
Total/NA	Prep	PrecSep_0			662016	MLT	EET SL	05/16/24 09:27
Total/NA	Analysis	904.0		1	662959	SCB	EET SL	05/22/24 16:22
Total/NA	Analysis	Ra226_Ra228		1	666196	FLC	EET SL	06/13/24 11:50

Client Sample ID: MW-15019 Lab Sample ID: 240-204358-4

Date Collected: 05/08/24 14:13 **Matrix: Water**
Date Received: 05/11/24 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			662015	MLT	EET SL	05/16/24 09:22
Total/NA	Analysis	903.0		1	665824	SWS	EET SL	06/12/24 10:00
Total/NA	Prep	PrecSep_0			662016	MLT	EET SL	05/16/24 09:27
Total/NA	Analysis	904.0		1	662959	SCB	EET SL	05/22/24 16:22
Total/NA	Analysis	Ra226_Ra228		1	666196	FLC	EET SL	06/13/24 11:50

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-204358-1
Project/Site: Karn/Weadock CCR Background Well

Client Sample ID: DUP-BACKGROUND — Lab Sample ID: 240-204358-5

Date Collected: 05/08/24 00:00 — **Matrix: Water**
Date Received: 05/11/24 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			662015	MLT	EET SL	05/16/24 09:22
Total/NA	Analysis	903.0		1	665832	SWS	EET SL	06/12/24 10:06
Total/NA	Prep	PrecSep_0			662016	MLT	EET SL	05/16/24 09:27
Total/NA	Analysis	904.0		1	662961	SCB	EET SL	05/22/24 16:39
Total/NA	Analysis	Ra226_Ra228		1	666196	FLC	EET SL	06/13/24 11:50

Client Sample ID: EQ-BACKGROUND — Lab Sample ID: 240-204358-6

Date Collected: 05/08/24 16:05 — **Matrix: Water**
Date Received: 05/11/24 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			662015	MLT	EET SL	05/16/24 09:22
Total/NA	Analysis	903.0		1	665832	SWS	EET SL	06/12/24 10:06
Total/NA	Prep	PrecSep_0			662016	MLT	EET SL	05/16/24 09:27
Total/NA	Analysis	904.0		1	662961	SCB	EET SL	05/22/24 16:39
Total/NA	Analysis	Ra226_Ra228		1	666196	FLC	EET SL	06/13/24 11:50

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: TRC Environmental Corporation. Job ID: 240-204358-1
Project/Site: Karn/Weadock CCR Background Well

Laboratory: Eurofins St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-08-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-24
California	Los Angeles County Sanitation Districts	10259	06-30-22 *
California	State	2886	06-30-24
Connecticut	State	PH-0241	03-31-25
Florida	NELAP	E87689	06-30-24
HI - RadChem Recognition	State	n/a	06-30-24
Illinois	NELAP	200023	11-30-24
Iowa	State	373	12-01-24
Kansas	NELAP	E-10236	10-31-24
Kentucky (DW)	State	KY90125	12-31-24
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-24
Louisiana	NELAP	04080	06-30-22 *
Louisiana (All)	NELAP	04080	06-30-24
Louisiana (DW)	State	LA011	12-31-24
Maryland	State	310	09-30-24
Massachusetts	State	M-MO054	06-30-24
MI - RadChem Recognition	State	9005	06-30-24
Missouri	State	780	06-30-25
Nevada	State	MO00054	07-31-24
New Jersey	NELAP	MO002	06-30-24
New Mexico	State	MO00054	06-30-24
New York	NELAP	11616	03-31-25
North Carolina (DW)	State	29700	07-31-24
North Dakota	State	R-207	06-30-24
Oklahoma	NELAP	9997	08-31-24
Oregon	NELAP	4157	09-01-24
Pennsylvania	NELAP	68-00540	02-28-25
South Carolina	State	85002001	06-30-24
Texas	NELAP	T104704193	07-31-24
US Fish & Wildlife	US Federal Programs	058448	07-31-24
USDA	US Federal Programs	P330-17-00028	05-18-26
Utah	NELAP	MO00054	07-31-24
Virginia	NELAP	10310	06-15-25
Washington	State	C592	08-30-24
West Virginia DEP	State	381	10-31-24

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins Cleveland
180 S. Van Buren Avenue
Barberton, OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

MICHIGAN 190

eurofins | Environment Testing

Client Information	Sampler: Javier Jasso	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-120140-33282.1
Client Contact: Jacob Krenz	Phone: 734 904 3710	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:	Analysis Requested		Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			Preservation Codes: D - HNO3
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: Δ Yes Δ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD			
Email: JKrenz@trccompanies.com	WO #:			Other:
Project Name: Karn/Weadock CCR Background Well	Project #: 24024154			
Site:	SSOW#:			

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	D		
MW-15002	5/8/24	1451	G	Water	N	N	X	X	2	
MW-15008	5/8/24	1315	G	Water	N	N	X	X	2	
MW-15016	5/8/24	1457	G	Water	N	N	X	X	2	
MW-15019	5/8/24	1413	G	Water	N	N	X	X	2	
DUP-Background	5/8/24	—	G	Water	N	N	X	X	2	
EQ-Backgroud	5/8/24	1405	G	Water	N	N	X	X	2	
				Water						

240-204358 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☑ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		5/10/24 0815			5/10/24	FEXA
2		5/10/24 0815	FEXA	JESSE MOROSKO	05/11/24 0815	FEXA
3						

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: —

Eurofins – Cleveland Sample Receipt Form/Narrative Login # :
Barberton Facility

Client TRC Site Name

Cooler unpacked by: JESSE MOROSKO

Cooler Received on 05/11/24 Opened on 05/11/24

FedEx. 1st Grd Exp UPS FAS Waypoint Client Drop Off Eurofins Courier Other

Receipt After-hours Drop-off Date/Time Storage Location

Eurofins Cooler # EC Foam Box Client Cooler Box Other

Packing material used Bubble Wrap Foam Plastic Bag None Other

COOLANT: Wet Ice Blue Ice Dry Ice Water None

1 Cooler temperature upon receipt [X] See Multiple Cooler Form

IR GUN # 18 (CF 1.0 °C) Observed Cooler Temp. °C Corrected Cooler Temp °C

2	Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1	Yes No
	-Were the seals on the outside of the cooler(s) signed & dated?	Yes No NA
	-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes No
	-Were tamper/custody seals intact and uncompromised?	Yes No NA
3	Shippers' packing slip attached to the cooler(s)?	Yes No
4.	Did custody papers accompany the sample(s)?	Yes No
5	Were the custody papers relinquished & signed in the appropriate place?	Yes No
6.	Was/were the person(s) who collected the samples clearly identified on the COC?	Yes No
7	Did all bottles arrive in good condition (Unbroken)?	Yes No
8	Could all bottle labels (ID/Date/Time) be reconciled with the COC?	Yes No
9	For each sample, does the COC specify preservatives (Y/N), # of containers (Y/N), and sample type of grab/comp (Y/N)?	
10	Were correct bottle(s) used for the test(s) indicated?	Yes No
11	Sufficient quantity received to perform indicated analyses?	Yes No
12.	Are these work share samples and all listed on the COC?	Yes No
	If yes, Questions 13-17 have been checked at the originating laboratory	
13	Were all preserved sample(s) at the correct pH upon receipt?	Yes No NA pH Strip Lot# HC439975
14.	Were VOAs on the COC?	Yes No
15	Were air bubbles >6 mm in any VOA vials? ● ← Larger than this	Yes No NA
16.	Was a VOA trip blank present in the cooler(s)? Trip Blank Lot #	Yes No
17	Was a LL Hg or Me Hg trip blank present?	Yes No

Tests that are not checked for pH by Receiving.

VOAs
Oil and Grease
TOC

Contacted PM Date by via Verbal Voice Mail Other

Concerning

18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES ☐ additional next page

Samples processed by:

19 SAMPLE CONDITION

Sample(s) were received after the recommended holding time had expired.
Sample(s) were received in a broken container
Sample(s) were received with bubble >6 mm in diameter (Notify PM)

20 SAMPLE PRESERVATION

Sample(s) were further preserved in the laboratory
Time preserved Preservative(s) added/Lot number(s)

VOA Sample Preservation Date/Time VOAs Frozen.

Login # ____________

Eurofins - Cleveland Sample Receipt Multiple Cooler Form

Cooler Description (Circle)	IR Gun # (Circle)	Observed Temp °C	Corrected Temp °C	Coolant (Circle)
(EC) Client Box Other	IR GUN #: 18	1.7	1.7	(Wet Ice) Blue Ice Dry Ice Water None
(EC) Client Box Other	IR GUN #: 18	3.4	3.4	(Wet Ice) Blue Ice Dry Ice Water None
(EC) Client Box Other	IR GUN #: 18	3.9	3.9	(Wet Ice) Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None
EC Client Box Other	IR GUN #:			Wet Ice Blue Ice Dry Ice Water None

☐ See Temperature Excursion Form

WI-NC-099 Cooler Receipt Form Page 2 – Multiple Coolers

5/11/2024

Login Container Summary Report

240-204358

6/14/2024

Temperature readings _____

Client Sample ID	Lab ID	Container Type	Container pH	Container Temp	Preservation Added	Preservation Lot Number
MW 15002	240-204358 A-1	Plastic 1 liter - Nitric Acid	<2			
MW-15002	240-204358-B-1	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-204358-A-2	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-204358-B-2	Plastic 1 liter - Nitric Acid	<2			
MW-15016	240-204358 A-3	Plastic 1 liter - Nitric Acid	<2			
MW-15016	240-204358-B-3	Plastic 1 liter - Nitric Acid	<2			
MW 15019	240 204358-A-4	Plastic 1 liter - Nitric Acid	<2			
MW-15019	240-204358-B-4	Plastic 1 liter - Nitric Acid	<2			
DUP-BACKGROUND	240-204358-A-5	Plastic 1 liter - Nitric Acid	<2			
DUP-BACKGROUND	240-204358-B-5	Plastic 1 liter - Nitric Acid	<2			
EQ-BACKGROUND	240-204358-A-6	Plastic 1 liter - Nitric Acid	<2			
EQ-BACKGROUND	240-204358-B-6	Plastic 1 liter - Nitric Acid	<2			

Eurofins Cleveland
180 S. Van Buren Avenue
Barberton, OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

eurofins | Environment Testing

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-184582.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: Michigan	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-204358-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 6/12/2024			Preservation Codes: -
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Karn/Weadock CCR Background Well	Project #: 24024154			Other:
Site:	SSOW#:			

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_STD Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
MW-15002 (240-204358-1)	5/8/24	14:51 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15008 (240-204358-2)	5/8/24	13:15 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15016 (240-204358-3)	5/8/24	14:57 Eastern		Water			X	X	X	1	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15019 (240-204358-4)	5/8/24	14:13 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-BACKGROUND (240-204358-5)	5/8/24	Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EQ-BACKGROUND (240-204358-6)	5/8/24	16:05 Eastern		Water			X	X	X	1	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Environment Testing North Central, LLC.

Possible Hazard Identification	*Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*
Unconfirmed	☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	Relinquished by: MALISSA LOAR					
	Relinquished by:	Date/Time:	Company	Received by: M. Pinette	Date/Time: MAY 14 2024 0950	Company
	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

Job Number: 240-204358-1

Login Number: 204358
List Number: 2
Creator: Thornley, Richard W

List Source: Eurofins St. Louis
List Creation: 05/14/24 05:18 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

Job Number: 240-204358-1

Login Number: 204358
List Number: 3
Creator: Thornley, Richard W

List Source: Eurofins St. Louis
List Creation: 05/15/24 08:08 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Consumers Energy
Count on Us®

Enclosure 2

First Semiannual 2024 Nature and Extent Data Summary, DE Karn, Consumers Energy, Essexville, Michigan. (TRC, July 30, 2024).

1540 Eisenhower Pl.
Ann Arbor, MI 48108

T 734.971.7080
TRCcompanies.com

Technical Memorandum

Date:	July 30, 2024
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Kristin Lowery, TRC
Project No.:	553814.0001.0000 Phase 2 Task 2
Subject:	First Semiannual 2024 Nature and Extent Data Summary, DE Karn Bottom Ash Pond, Consumers Energy, Essexville, Michigan

Introduction

In response to the United States Environmental Protection Agency's (U.S. EPA's) Resource Conservation and Recovery Act (RCRA) Coal Combustion Residual rule ("CCR Rule") promulgated on April 17, 2015, as amended, Consumers Energy Company (Consumers Energy) has conducted groundwater monitoring at the DE Karn Bottom Ash Pond CCR Unit. During the statistical evaluation of the initial assessment monitoring event (May 2018) for the Karn Bottom Ash Pond, arsenic was present in one or more downgradient monitoring well(s) at statistically significant levels exceeding the Groundwater Protection Standards (GWPSs)[1].

The CCR Rule 40 CFR §257.96(a) requires that an owner or operator initiate an assessment of corrective measures (ACM) to prevent further release, to remediate any releases, and to restore impacted areas to original conditions if any Appendix IV constituent has been detected at a statistically significant level exceeding a GWPS. The *Assessment of Corrective Measures* (ACM) (TRC, September 2019) was initiated on April 14, 2019 and was certified and submitted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) on September 11, 2019 in accordance with the schedule in §257.96.

Per §257.95(g)(1), in the event that the facility determines, pursuant to §257.93(h), that there is a statistical exceedance of the GWPSs for one or more of the Appendix IV constituents, the facility must characterize the nature and extent of the release of CCR as well as any site conditions that may affect the remedy selected. Installation of additional monitoring wells at locations downgradient of the Karn Bottom Ash Pond groundwater monitoring system was not necessary or feasible due to the presence of existing monitoring wells sampled under the groundwater surface water interface (GSI) Compliance Monitoring Program administered under a Michigan-approved Hydrogeological Monitoring Plan (HMP) (Consumers Energy, 2019), and the proximity of the surface water bodies. Monitoring wells designated for nature and extent characterization are shown on Figures 1 and 2 and data collected over the past year (July 2023 through May 2024) from these nature and extent groundwater monitoring wells are included in Tables 1 and 2.

[1] TRC. 2019. *Statistical Evaluation of Initial Assessment Monitoring Sampling Event, DE Karn Bottom Ash Pond, Consumers Energy Company, Essexville, Michigan*. January 14.

Approach

Given the proximity of the Karn Bottom Ash Pond to the Karn Landfill at the Karn property, the nature and extent of contamination was assessed from a site-wide perspective rather than on a per CCR unit basis. The nature and extent of groundwater impacted by a release from the Karn Bottom Ash Pond overlaps with groundwater impacted by operation of the Karn Landfill. Additionally, looking at impacted groundwater on a site-wide basis was more practical from a risk mitigation standpoint, given:

- The likely age of the release(s);
- A long operational history of ash management;
- The historical use of CCR as fill; and
- The influence of geochemistry on several of the Appendix IV constituent concentrations in groundwater.

Consistent with the ACM, the evaluation of the nature and extent of contamination in groundwater focuses on the constituent which triggered corrective measures, arsenic.

Groundwater Nature and Extent Relative to Groundwater Protection Standards

As discussed in the ACM, the nature and extent of contamination (i.e., arsenic) in groundwater relative to GWPSs, which have been selected to be protective of the drinking water pathway, has been defined per the RCRA CCR Rule requirements based on the site-specific hydrogeology. Current data continue to support that although arsenic concentrations exceed the GWPS in on-site groundwater monitoring locations, there are currently no adverse effects on human health or the environment from either surface water or groundwater due to CCR management at the Karn Bottom Ash Pond. The arsenic concentrations are bounded by the nearby surface water features (the discharge channel to the south, Saginaw River to the west, and Lake Huron to the east and north) and are contained within the limits of the property. The property is owned and operated by Consumers Energy and groundwater is not used for drinking water. There are no on-site drinking water wells and there are no surface water potable water intakes within 3 miles of the site, so the drinking water pathway is not complete.

The distribution of arsenic in the shallow water-bearing unit as compared to the GWPS is presented in Figure 1. Three categories were assigned to groundwater data collected from July 2023 to May 2024, as follows:

- White – No Exceedances: all concentrations were below the GWPS
- Yellow – Two or More Exceedances: individual observations above the GWPS[2]
- Orange – Statistically Significant GWPS Exceedances[3]

The highest concentrations of arsenic observed in the vicinity of the Karn Bottom Ash Pond have

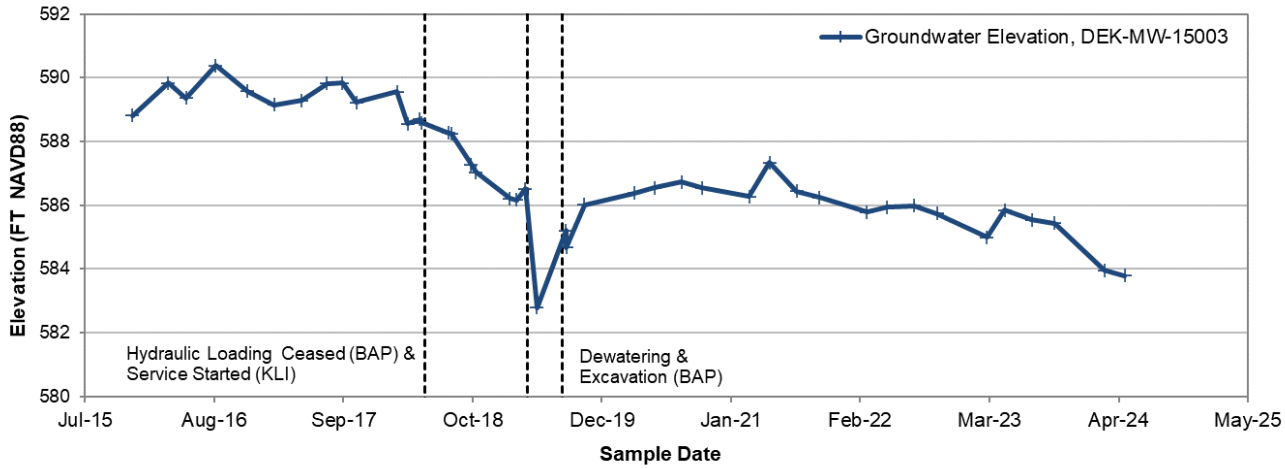
[2] Although an exceedance is defined as a single detection above the GWPS, confidence intervals will be used to determine compliance per the CCR Rule using the Karn Bottom Ash Pond monitoring well network. Compliance with the GWPSs established under § 257.95(h) will be achieved by demonstrating that concentrations of constituents listed in Appendix IV to this part have not exceeded the GWPSs for a period of three consecutive years using the statistical procedures and performance standards in § 257.93(f) and (g).

[3] Lower confidence limit is above the GWPS based upon most recent assessment monitoring statistical evaluation using the eight most recent sampling events (October 2020 through May 2024). Statistical evaluation was only performed on the Karn Bottom Ash Pond downgradient compliance wells (DEK-MW-15002, DEK-MW-15006, DEK-MW-15006, and DEK-MW-18001)

historically been observed at DEK-MW-15003, a monitoring well located to the north of the bottom ash pond and associated with the shifted "highest" elevation of mounded groundwater relative to the Karn Bottom Ash Pond. Although historically the point source discharge of sluiced bottom ash into the Karn Bottom Ash Pond created localized mounding of the potentiometric surface, the Karn Lined Impoundment went into service on June 7, 2018 and has been continuously collecting the process water and bottom ash that previously went into the former bottom ash pond. Since the former bottom ash pond is no longer being hydraulically loaded with sluiced ash and has been dewatered by gravity, the characteristic groundwater mound centered within the pooled area is no longer present. The groundwater elevation data collected from the groundwater monitoring system of the former bottom ash pond this event demonstrate a reduction in groundwater elevation measurements by several feet when compared to groundwater elevations measured prior to June 2018.

Monitoring well DEK-MW-15003 had been at or near the local high point of mounded groundwater at the Karn site following the discontinuing of loading to the Karn Bottom Ash Pond. However, in late 2023, the Karn Generating Facility stopped operating and consequently stopped routine discharge to the discharge ditch north of the Karn Lined Impoundment.[4] This operational change triggered a decrease in groundwater elevation at DEK-MW-15003 and additional flattening of the mounded groundwater.

Groundwater Elevation Changes – DEK-MW-15003



Notes: BAP = Bottom Ash Pond; KLI = Karn Lined Impoundment

Data show that groundwater quality is continuing to change after sluicing to the Karn Bottom Ash Pond ceased in June 2018, when the bottom ash and transport water was diverted to the Karn Lined Impoundment. Arsenic has been the only constituent to have triggered corrective action. TRC used Sanitas™ to compare groundwater data collected while the pond was still in operation ("background" for the purposes of the statistical comparison, December 2015 to June 2018) to data collected once hydraulic loading ceased ("compliance" for the purposes of the statistical comparison, June 2018 to

[4] Discharge to this ditch was completed under authorization of the National Pollutant Discharge Elimination System (NPDES) permit.

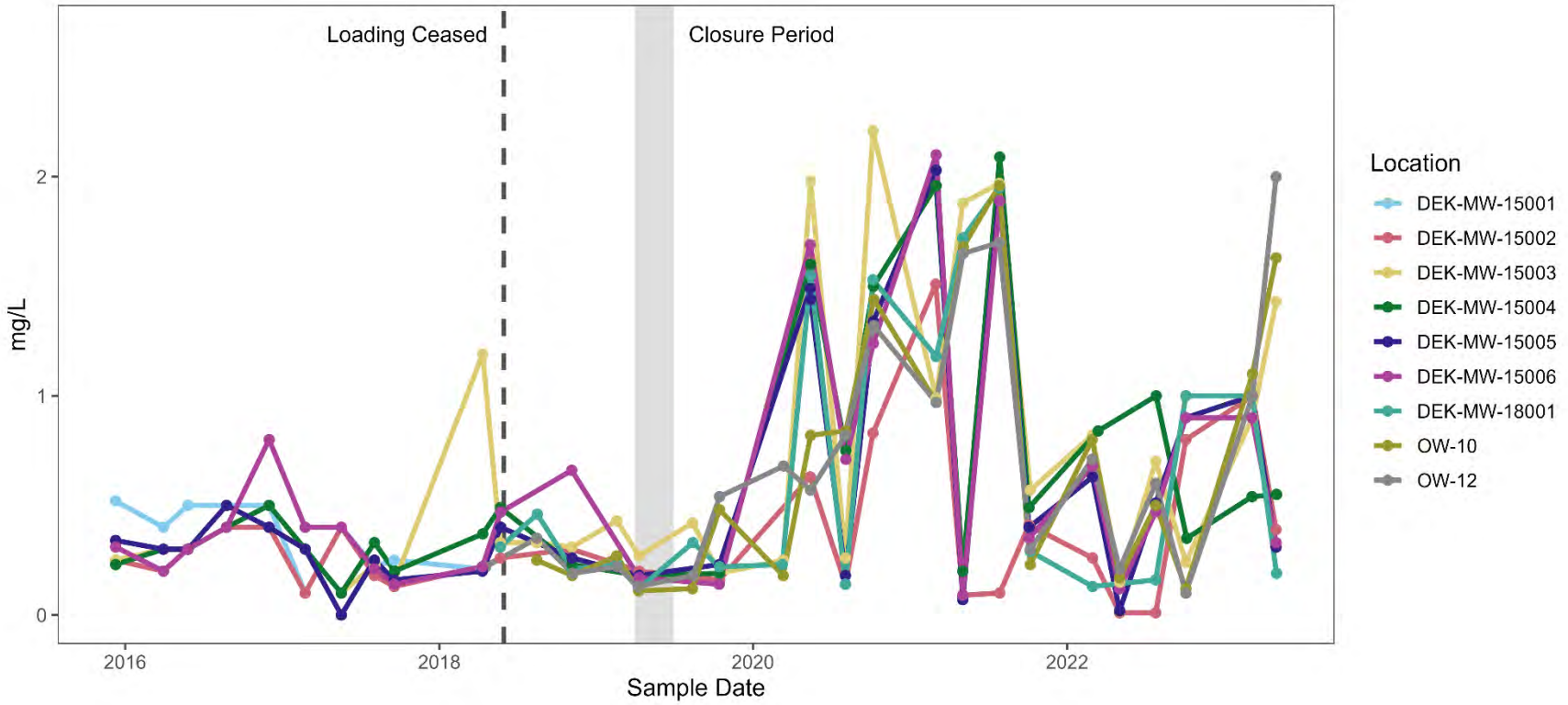
present), as shown by the time-series charts and Welch's t-test results (Attachment A).

Mean arsenic concentrations in groundwater at DEK-MW-15002 and DEK-MW-15003 from June 2018 to present are lower than concentrations observed while the pond was in operation (prior to June 2018), indicating that the discontinuation of hydraulic loading to the Karn Bottom Ash Pond and the completed source removal of CCR was successful in removing a source of arsenic. However, attainment of the GWPS at all the Bottom Ash Pond downgradient monitoring wells may not be feasible due to influences other than the former pond, such as the presence and former operation of the nearby Karn Landfill and the historical use of CCR as fill. Mean arsenic concentrations in groundwater at DEK-MW-15004, DEK-MW-15005, and DEK-MW-15006 from June 2018 to present are higher than concentrations observed while the pond was in operation and arsenic concentrations in groundwater at DEK-MW-18001 have increased since October 2022 and are currently higher than the groundwater concentrations observed while the pond was in operation. These changes in arsenic concentrations following CCR removal at the Karn Bottom Ash Pons demonstrate that there are other influences on groundwater conditions besides the operation of the former pond.

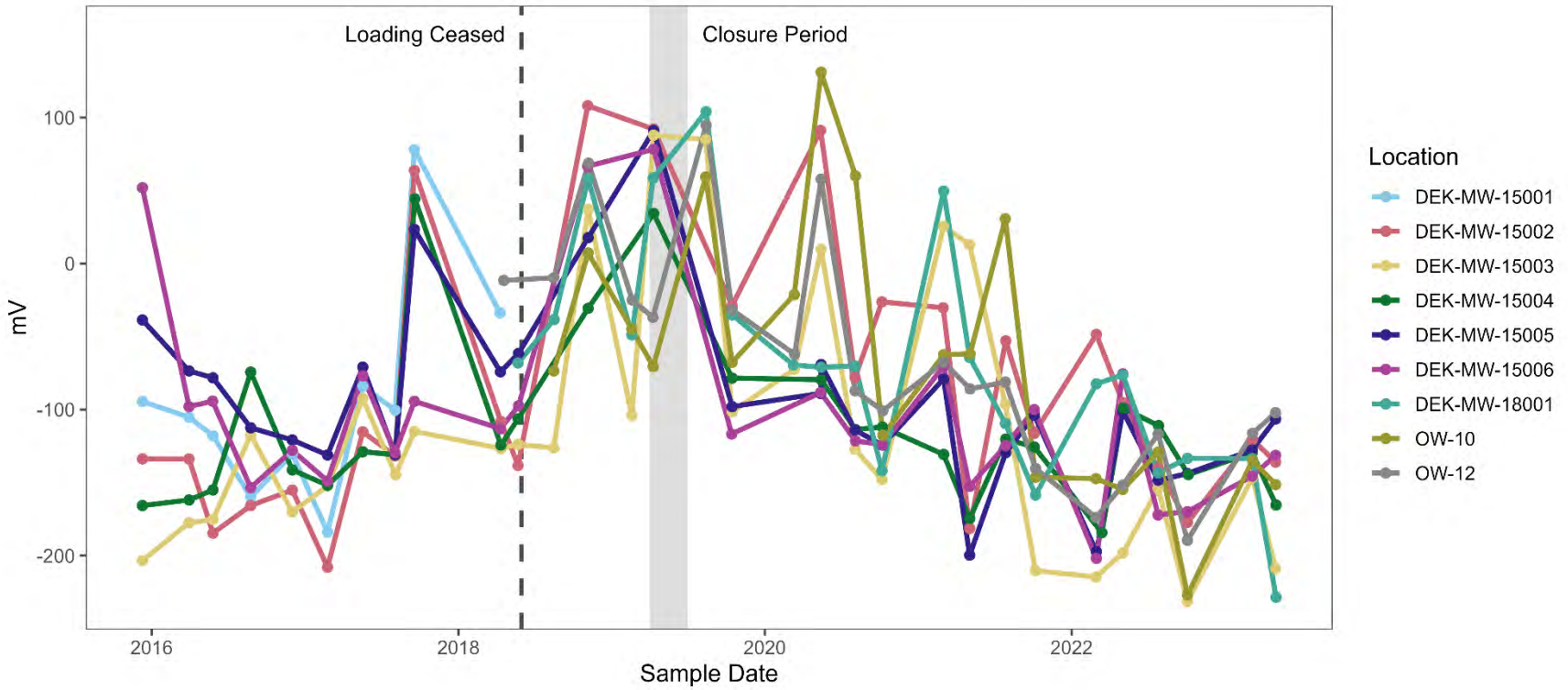
In addition to the groundwater flow direction changes mentioned above, redox conditions which also affect contaminant transport, are still stabilizing in the Bottom Ash Pond Area following removal activities and will continue to be evaluated further. As shown on the charts below, the dissolved oxygen concentration and oxidation-reduction potential (ORP) showed highly variable results following CCR removal activities.

Specifically, dissolved oxygen transitioned from the suboxic/anoxic state of 0.5 mg/L or less to an oxic state of greater than 1.5 mg/L immediately following CCR removal. In the same time period, the electric potential transitioned from a moderately negative electric potential near -100 mV to a moderately positive electric potential of +100 mV. The observed trends for these two key field-measured parameters demonstrate that the preferred equilibrium redox state (e.g. preferred redox couple chemistry) also shifted during the time period immediately following CCR removal. Recent data indicate that trends in the redox conditions may be stabilizing at values similar to pre-dewatering conditions based on measurements of dissolved oxygen in the anoxic range of 0.5 – 1.0 mg/L and negative electric potential. Groundwater quality in the Karn Bottom Ash Pond area will continue to be evaluated in support of conceptual site model refinement and remedy selection**.**

Groundwater Chemistry Changes Post-Dewatering - Dissolved Oxygen



Groundwater Chemistry Changes Post-Dewatering - Oxidation-Reduction Potential



Groundwater Nature and Extent Relative to GSI

As discussed above, the drinking water pathway is not complete. Due to the presence of the surrounding surface water bodies, another relevant pathway is the groundwater surface water interface pathway. Monitoring performed under the Michigan-approved GSI Compliance Monitoring Program demonstrates protection of human health and the environment with criteria determined to be protective at the potential point of exposure. Transect/porewater GSI compliance sampling data collected quarterly show that biogeochemical conditions are contributing to the reduction of arsenic in groundwater as observed in transect push-point samples located along the water's edge of Saginaw Bay, where arsenic concentrations are generally much lower than the arsenic concentrations observed in the perimeter dike wells. Compliance with water quality criteria is demonstrated on a quarterly basis by evaluating the total chronic loading based on contribution from each GSI compliance sample location with respect to the total flux observed in the state-authorized site-specific mixing zone, per the HMP.

The distribution of arsenic in the shallow water-bearing unit as compared to the mixing zone GSI criteria is presented in Figure 2. Three categories were assigned to the data from July 2023 to May 2024, as follows:

- White – No Exceedances: all concentrations were below the mixing zone GSI criteria
- Light Blue – Two consecutive exceedances of the chronic mixing zone GSI criterion
- Dark Blue – Two consecutive exceedances of the acute mixing zone GSI criterion

Groundwater monitoring locations along the DE Karn Intake Channel and between the coal ash management areas and the power plant complex (DEK-MW-15002, DEK-MW-15005, DEK-MW-15006) document that contaminant concentrations of arsenic are less than the authorized mixing zone-based chronic concentration of 100 ug/L. Although arsenic concentrations in the perimeter dike wells at the GSI (MW-06, MW-08, MW-10, MW-12, and MW-14) are above the chronic concentration of 100 ug/L, the total chronic loading (i.e., mass flux), calculated from concentrations observed in transect groundwater samples collected from push-point samplers advanced at locations T1-3GSI through T6-3GSI, remains below the chronic mixing zone GSI criterion, indicating current conditions are protective of the GSI pathway.

Summary

The nature and extent of arsenic in the shallow water-bearing unit is defined in accordance with the Federal CCR rule. Risk from potential exposure to groundwater is managed. The drinking water pathway is not complete. Monitoring performed under the Michigan-approved GSI Compliance Monitoring Program demonstrates protection of human health and the environment with criteria determined to be protective at the potential point of exposure (i.e., state-authorized site-specific mixing zone criteria).

Attachments

Table 1	Summary of Groundwater Sampling Results (Analytical): DE Karn Nature and Extent Monitoring Wells
Table 2	Summary of Groundwater Sampling Results (Analytical): DE Karn Nature and Extent GSI Monitoring Locations

Tables

Table 1
Summary of Groundwater Sampling Results (Analytical)
DE Karn Nature and Extent Monitoring Wells
Essexville, Michigan

										Sample Location:	DEK-MW-15003			DEK-MW-15004				MW-01			
										Sample Date:	7/26/2023	10/4/2023	3/5/2024	5/8/2024	7/25/2023	10/3/2023	3/11/2024	5/9/2024	7/24/2023	10/2/2023	3/4/2024	5/7/2024
Constituent	Unit	GWPS*	MI Residential**	MI Non-Residential**	MI GSI^	MI AMV***	MI FAV***	Chronic MZ^^	Acute MZ^^													
Appendix III																						
Boron	ug/L	NA	500	500	4,000	34,000	69,000	44,000	69,000		678	716	644	652	925	942	905	955	5,670	5,660	5,320	5,350
Calcium	mg/L	NA	NC	NC	500[EE]	NC	NC	NC	NC		24.1	25.0	41.6	34.6	80.1	74.8	75.9	72.3	98.2	119	85.7	86.8
Chloride	mg/L	NA	250[E]	250[E]	50	320,000	640,000	NC	NC		59.0	58.7	59.9	57.3	69	69.1	66.1	65.7	86.9	82.1	91.7	86.2
Fluoride	ug/L	4,000	NC	NC	NC	9,800	20,000	NC	NC		< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	--	--	1370	--
Sulfate	mg/L	NA	250[E]	250[E]	500[EE]	600,000	1,200,000	NC	NC		49.5	52.4	51.1	34.1	253	241	198	174	35.5	78.1	< 1	< 1
Total Dissolved Solids	mg/L	NA	500[E]	500[E]	500	NC	NC	NC	NC		261	284	322	312	722	666	612	610	--	--	520	--
pH, Field	su	NA	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	NC	NC	NC	NC		8.2	8.2	8.1	8.1	7.5	7.2	7.6	7.6	8.1	8.2	8.1	8.0
Appendix IV																						
Antimony	ug/L	6	6.0	6.0	2.0	1,100	2,300	NC	NC		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	--	--	< 1	--
Arsenic	ug/L	**21[1]**	10	10	10	340	680	100	680		**441**	**435**	**350**	**298**	**146**	**155**	**160**	**145**	5	6	6	5
Barium	ug/L	2,000	2,000	2,000	1,200	3,400	6,800	NC	NC		33	41	56	47	152	154	143	135	--	--	51	--
Beryllium	ug/L	4	4.0	4.0	33	300	600	NC	NC		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	--	--	< 1	--
Cadmium	ug/L	5	5.0	5.0	2.5	12	24	NC	NC		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	--	--	< 0.2	--
Chromium	ug/L	100	100	100	11	16	32	NC	NC		< 1	< 1	1	< 1	< 1	< 1	< 1	< 1	< 1	1	< 1	1
Cobalt	ug/L	15	40	100	100	370	740	NC	NC		< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	--	--	< 6	--
Fluoride	ug/L	4,000	NC	NC	NC	9,800	20,000	NC	NC		< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	--	--	1370	--
Lead	ug/L	15	4.0	4.0	14	250	500	NC	NC		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	--	--	< 1	--
Lithium	ug/L	180	170	350	440	910	1,800	NC	NC		20	21	24	21	38	37	35	38	94	110	81	79
Mercury	ug/L	2	2.0	2.0	0.20#	1.4	2.8	NC	NC		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	--	--	< 0.2	--
Molybdenum	ug/L	**100**	73	210	120	29,000	58,000	NC	NC		31	27	21	23	11	8	9	9	< 5	< 5	< 5	< 5
Radium-226/228	pci/L	5	NC	NC	NC	NC	NC	NC	NC		--	0.526	--	< 0.619	--	--	--	--	--	--	--	--
Selenium	ug/L	50	50	50	5.0	62	120	55	120		1	< 1	1	< 1	< 1	1	< 1	1	3	3	5	4
Thallium	ug/L	2	2.0	2.0	2.0	47	94	NC	NC		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	--	--	< 2	--
MI Part 115 Parameters																						
Iron	ug/L	NA	300[E]	300[E]	500,000[EE]	NC	NC	NC	NC		177	139	194	160	3,960	4,160	4,190	4,040	283	329	159	176
Copper	ug/L	NA	1,000[E]	1,000[E]	20	33	66	NC	NC		< 1	< 1	< 1	< 1	1	1	1	1	--	--	--	--
Nickel	ug/L	NA	100	100	120	1,000	2,100	NC	NC		< 2	< 2	< 2	< 2	2	2	3	< 2	--	--	--	--
Silver	ug/L	NA	34	98	0.2	0.54	1.1	NC	NC		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	--	--	--	--
Vanadium	ug/L	NA	4.5	62	27	79	160	NC	NC		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	NA	2,400	5,000[E]	260	260	520	NC	NC		< 10	< 10	< 10	< 10	10	< 10	< 10	< 10	--	--	--	--

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
* - GWPS (Groundwater Protection Standard) is the higher of the Maximum Contaminant Level (MCL)/Regional Screening Level from 83 FR 36435 (RSL) and Upper Tolerance Limit (UTL) as established in TRC's Technical Memorandum dated October 15, 2018.
** - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020, updated October 12, 2023.
^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018) per footnote {G} of Michigan Part 201 criteria tables. Chromium GSI criterion based on hexavalent chromium per footnote {H}. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}. GSI criterion for chloride is 50 mg/L when the discharge is to the Great Lakes or connecting waters per footnote {FF}.
*** - Aquatic Maximum (AMV) and Final Acute Values (FAV) are taken from EGLE Rule 323.1057 Part 4 - Water Quality Standards (Rule 57), March 15, 2018. Hardness-dependent criteria calculated using site-specific hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018). Chromium AMV & FAV criteria are based on hexavalent chromium.
^^ - Mixing Zone (MZ) GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
# - If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and EGLE policy and procedure 09-014 dated June 20, 2012.
[E] - Criterion is the aesthetic drinking water value per footnote {E}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
BOLD font denotes concentrations detected above the GWPS.

Result	Indicates an exceedance of applicable GSI criteria. The chronic-based mixing zone criteria (Chronic MZ) replaces the MI GSI critera for arsenic, boron, and selenium.
Result	Indicates an exceedance of acute-based GSI criteria.

All metals were analyzed as total unless otherwise specified.
[1] - Constituent triggered an Assessment of Corrective Measures for the Karn Bottom Ash Pond as described in TRC's letter report dated Janurary 14, 2019.

Table 1
Summary of Groundwater Sampling Results (Analytical)
DE Karn Nature and Extent Monitoring Wells
Essexville, Michigan

										MW-03				MW-06				MW-08			
									Sample Location:												
									Sample Date:	7/24/2023	10/2/2023	3/4/2024	5/7/2024	7/24/2023	10/2/2023	3/4/2024	5/6/2024	7/24/2023	10/2/2023	3/4/2024	5/6/2024
Constituent	Unit	GWPS*	MI Residential**	MI Non-Residential**	MI GSI^	MI AMV***	MI FAV***	Chronic MZ^^	Acute MZ^^												
Appendix III																					
Boron	ug/L	NA	500	500	4,000	34,000	69,000	44,000	69,000	9,540	9,350	8,460	8,630	551	484	606	667	4,130	4,550	3,730	3,410
Calcium	mg/L	NA	NC	NC	500[EE]	NC	NC	NC	NC	137	138	139	138	94.7	102	151	260	159	165	151	157
Chloride	mg/L	NA	250[E]	250[E]	50	320,000	640,000	NC	NC	75.5	77.5	85.2	83.2	15.4	17	13.8	25.5	56.4	57.9	57.8	59.3
Fluoride	ug/L	4,000	NC	NC	NC	9,800	20,000	NC	NC	--	--	< 1,000	--	--	--	< 1,000	--	--	--	< 1,000	--
Sulfate	mg/L	NA	250[E]	250[E]	500[EE]	600,000	1,200,000	NC	NC	< 1	< 1	< 1	< 1	83.3	100	164	494	277	311	266	315
Total Dissolved Solids	mg/L	NA	500[E]	500[E]	500	NC	NC	NC	NC	--	--	700	--	--	--	758	--	--	--	876	--
pH, Field	su	NA	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	NC	NC	NC	NC	7.9	8.0	7.6	7.6	7.3	7.4	7.0	7.0	7.1	7.1	7.2	7.2
Appendix IV																					
Antimony	ug/L	6	6.0	6.0	2.0	1,100	2,300	NC	NC	--	--	< 1	--	--	--	< 1	--	--	--	< 1	--
Arsenic	ug/L	**21[1]**	10	10	10	340	680	100	680	3	4	5	10	**159**	**163**	**93**	**93**	**89**	**108**	**107**	**99**
Barium	ug/L	2,000	2,000	2,000	1,200	3,400	6,800	NC	NC	--	--	199	--	--	--	118	--	--	--	44	--
Beryllium	ug/L	4	4.0	4.0	33	300	600	NC	NC	--	--	< 1	--	--	--	< 1	--	--	--	< 1	--
Cadmium	ug/L	5	5.0	5.0	2.5	12	24	NC	NC	--	--	< 0.2	--	--	--	< 0.2	--	--	--	< 0.2	--
Chromium	ug/L	100	100	100	11	16	32	NC	NC	1	2	2	2	< 1	< 1	1	2	< 1	< 1	1	1
Cobalt	ug/L	15	40	100	100	370	740	NC	NC	--	--	< 6	--	--	--	< 6	--	--	--	< 6	--
Fluoride	ug/L	4,000	NC	NC	NC	9,800	20,000	NC	NC	--	--	< 1,000	--	--	--	< 1,000	--	--	--	< 1,000	--
Lead	ug/L	15	4.0	4.0	14	250	500	NC	NC	--	--	< 1	--	--	--	< 1	--	--	--	< 1	--
Lithium	ug/L	180	170	350	440	910	1,800	NC	NC	95	95	91	87	32	34	42	50	113	120	112	107
Mercury	ug/L	2	2.0	2.0	0.20#	1.4	2.8	NC	NC	--	--	< 0.2	--	--	--	< 0.2	--	--	--	< 0.2	--
Molybdenum	ug/L	**100**	73	210	120	29,000	58,000	NC	NC	< 5	< 5	< 5	< 5	6	< 5	< 5	< 5	17	16	17	16
Radium-226/228	pci/L	5	NC	NC	NC	NC	NC	NC	NC	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	ug/L	50	50	50	5.0	62	120	55	120	2	2	4	3	1	< 1	< 1	1	2	2	3	3
Thallium	ug/L	2	2.0	2.0	2.0	47	94	NC	NC	--	--	< 2	--	--	--	< 2	--	--	--	< 2	--
MI Part 115 Parameters																					
Iron	ug/L	NA	300[E]	300[E]	500,000[EE]	NC	NC	NC	NC	292	403	719	1010	1,180	1,500	2,490	6,160	9,360	11,200	8,420	8,770
Copper	ug/L	NA	1,000[E]	1,000[E]	20	33	66	NC	NC	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/L	NA	100	100	120	1,000	2,100	NC	NC	--	--	--	--	--	--	--	--	--	--	--	--
Silver	ug/L	NA	34	98	0.2	0.54	1.1	NC	NC	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/L	NA	4.5	62	27	79	160	NC	NC	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	NA	2,400	5,000[E]	260	260	520	NC	NC	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
ug/L - micrograms per liter; mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
* - GWPS (Groundwater Protection Standard) is the higher of the Maximum Contaminant Level (MCL)/Regional Screening Level from 83 FR 36435 (RSL) and Upper Tolerance Limit (UTL) as established in TRC's Technical Memorandum dated October 15, 2018.
** - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020, updated October 12, 2023.
^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018) per footnote {G} of Michigan Part 201 criteria tables. Chromium GSI criterion based on hexavalent chromium per footnote {H}. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}. GSI criterion for chloride is 50 mg/L when the discharge is to the Great Lakes or connecting waters per footnote {FF}.
*** - Aquatic Maximum (AMV) and Final Acute Values (FAV) are taken from EGLE Rule 323.1057 Part 4 - Water Quality Standards (Rule 57), March 15, 2018. Hardness-dependent criteria calculated using site-specific hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018). Chromium AMV & FAV criteria are based on hexavalent chromium.
^^ - Mixing Zone (MZ) GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
# - If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and EGLE policy and procedure 09-014 dated June 20, 2012.
[E] - Criterion is the aesthetic drinking water value per footnote {E}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
BOLD font denotes concentrations detected above the GWPS.
Result Indicates an exceedance of applicable GSI criteria. The chronic-based mixing zone criteria (Chronic MZ) replaces the MI GSI critera for arsenic, boron, and selenium.
Result Indicates an exceedance of acute-based GSI criteria.
All metals were analyzed as total unless otherwise specified.
[1] - Constituent triggered an Assessment of Corrective Measures for the Karn Bottom Ash Pond as described in TRC's letter report dated Janurary 14, 2019.

Table 1
Summary of Groundwater Sampling Results (Analytical)
DE Karn Nature and Extent Monitoring Wells
Essexville, Michigan

										MW-10				MW-12				MW-14			
									Sample Location:												
									Sample Date:	7/24/2023	10/2/2023	3/4/2024	5/6/2024	7/24/2023	10/2/2023	3/4/2024	5/6/2024	7/24/2023	10/2/2023	3/4/2024	5/6/2024
Constituent	Unit	GWPS*	MI Residential**	MI Non-Residential**	MI GSI^	MI AMV***	MI FAV***	Chronic MZ^^	Acute MZ^^												
Appendix III																					
Boron	ug/L	NA	500	500	4,000	34,000	69,000	44,000	69,000	3,750	3,050	2,710	3,090	3,950	4,040	3,680	3,600	2,130	2,930	3,080	3,100
Calcium	mg/L	NA	NC	NC	500[EE]	NC	NC	NC	NC	259	272	302	264	190	184	200	186	301	188	181	179
Chloride	mg/L	NA	250[E]	250[E]	50	320,000	640,000	NC	NC	30.3	23.4	23.6	30.1	53.7	58.1	48.7	47.1	64.3	80.1	67.8	71.4
Fluoride	ug/L	4,000	NC	NC	NC	9,800	20,000	NC	NC	--	--	< 1,000	--	--	--	< 1,000	--	--	--	< 1,000	--
Sulfate	mg/L	NA	250[E]	250[E]	500[EE]	600,000	1,200,000	NC	NC	528	650	666	546	226	229	204	185	1080	310	196	222
Total Dissolved Solids	mg/L	NA	500[E]	500[E]	500	NC	NC	NC	NC	--	--	1,410	--	--	--	970	--	--	--	952	--
pH, Field	su	NA	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	NC	NC	NC	NC	7.0	7.1	6.9	7.1	7.1	7.3	7.2	7.2	6.9	7.1	7.1	7.1
Appendix IV																					
Antimony	ug/L	6	6.0	6.0	2.0	1,100	2,300	NC	NC	--	--	< 1	--	--	--	< 1	--	--	--	< 1	--
Arsenic	ug/L	**21[1]**	10	10	10	340	680	100	680	**427**	**458**	**455**	**645**	**419**	**602**	**471**	**330**	**45**	**110**	**362**	**169**
Barium	ug/L	2,000	2,000	2,000	1,200	3,400	6,800	NC	NC	--	--	117	--	--	--	161	--	--	--	45	--
Beryllium	ug/L	4	4.0	4.0	33	300	600	NC	NC	--	--	< 1	--	--	--	< 1	--	--	--	< 1	--
Cadmium	ug/L	5	5.0	5.0	2.5	12	24	NC	NC	--	--	< 0.2	--	--	--	< 0.2	--	--	--	< 0.2	--
Chromium	ug/L	100	100	100	11	16	32	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1	9	< 1	< 1	6	< 1	1
Cobalt	ug/L	15	40	100	100	370	740	NC	NC	--	--	< 6	--	--	--	< 6	--	--	--	< 6	--
Fluoride	ug/L	4,000	NC	NC	NC	9,800	20,000	NC	NC	--	--	< 1,000	--	--	--	< 1,000	--	--	--	< 1,000	--
Lead	ug/L	15	4.0	4.0	14	250	500	NC	NC	--	--	< 1	--	--	--	< 1	--	--	--	< 1	--
Lithium	ug/L	180	170	350	440	910	1,800	NC	NC	128	124	111	119	117	116	111	106	109	97	81	81
Mercury	ug/L	2	2.0	2.0	0.20#	1.4	2.8	NC	NC	--	--	< 0.2	--	--	--	< 0.2	--	--	--	< 0.2	--
Molybdenum	ug/L	**100**	73	210	120	29,000	58,000	NC	NC	10	13	13	9	5	< 5	< 5	< 5	16	11	6	6
Radium-226/228	pci/L	5	NC	NC	NC	NC	NC	NC	NC	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	ug/L	50	50	50	5.0	62	120	55	120	1	1	2	2	3	2	6	5	43	41	8	12
Thallium	ug/L	2	2.0	2.0	2.0	47	94	NC	NC	--	--	< 2	--	--	--	< 2	--	--	--	< 2	--
MI Part 115 Parameters																					
Iron	ug/L	NA	300[E]	300[E]	500,000[EE]	NC	NC	NC	NC	7,550	11,000	11,100	11,200	2,060	4,240	2,450	1,090	348	1,830	2,730	1,070
Copper	ug/L	NA	1,000[E]	1,000[E]	20	33	66	NC	NC	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/L	NA	100	100	120	1,000	2,100	NC	NC	--	--	--	--	--	--	--	--	--	--	--	--
Silver	ug/L	NA	34	98	0.2	0.54	1.1	NC	NC	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/L	NA	4.5	62	27	79	160	NC	NC	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	2	< 2	< 2
Zinc	ug/L	NA	2,400	5,000[E]	260	260	520	NC	NC	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
* - GWPS (Groundwater Protection Standard) is the higher of the Maximum Contaminant Level (MCL)/Regional Screening Level from 83 FR 36435 (RSL) and Upper Tolerance Limit (UTL) as established in TRC's Technical Memorandum dated October 15, 2018.
** - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020, updated October 12, 2023.
^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018) per footnote {G} of Michigan Part 201 criteria tables. Chromium GSI criterion based on hexavalent chromium per footnote {H}. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}. GSI criterion for chloride is 50 mg/L when the discharge is to the Great Lakes or connecting waters per footnote {FF}.
*** - Aquatic Maximum (AMV) and Final Acute Values (FAV) are taken from EGLE Rule 323.1057 Part 4 - Water Quality Standards (Rule 57), March 15, 2018. Hardness-dependent criteria calculated using site-specific hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018). Chromium AMV & FAV criteria are based on hexavalent chromium.
^^ - Mixing Zone (MZ) GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
# - If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and EGLE policy and procedure 09-014 dated June 20, 2012.
[E] - Criterion is the aesthetic drinking water value per footnote {E}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
BOLD font denotes concentrations detected above the GWPS.

Result	Indicates an exceedance of applicable GSI criteria. The chronic-based mixing zone criteria (Chronic MZ) replaces the MI GSI critera for arsenic, boron, and selenium.
Result	Indicates an exceedance of acute-based GSI criteria.

All metals were analyzed as total unless otherwise specified.
[1] - Constituent triggered an Assessment of Corrective Measures for the Karn Bottom Ash Pond as described in TRC's letter report dated Janurary 14, 2019.

Table 1
Summary of Groundwater Sampling Results (Analytical)
DE Karn Nature and Extent Monitoring Wells
Essexville, Michigan

										Sample Location:	MW-16			OW-10			
										Sample Date:	7/24/2023	10/3/2023	3/4/2024	5/6/2024	7/26/2023	10/4/2023	3/5/2024	5/8/2024
Constituent	Unit	GWPS*	MI Residential**	MI Non-Residential**	MI GSI^	MI AMV***	MI FAV***	Chronic MZ^^	Acute MZ^^									
Appendix III																		
Boron	ug/L	NA	500	500	4,000	34,000	69,000	44,000	69,000		1,910	1,840	1,360	1,260	1,010	1,200	1,200	1,270
Calcium	mg/L	NA	NC	NC	500[EE]	NC	NC	NC	NC		372	345	331	301	113	105	128	141
Chloride	mg/L	NA	250[E]	250[E]	50	320,000	640,000	NC	NC		95.6	85.2	83.6	80.1	51.8	73.2	78.6	82.6
Fluoride	ug/L	4,000	NC	NC	NC	9,800	20,000	NC	NC		--	--	< 1,000	--	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	NA	250[E]	250[E]	500[EE]	600,000	1,200,000	NC	NC		1,310	1,270	1,040	928	29.1	2.66	< 1	< 1
Total Dissolved Solids	mg/L	NA	500[E]	500[E]	500	NC	NC	NC	NC		--	--	1,910	--	560	580	682	832
pH, Field	su	NA	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	NC	NC	NC	NC		7.2	7.3	7.3	7.3	7.1	7.2	7.2	7.3
Appendix IV																		
Antimony	ug/L	6	6.0	6.0	2.0	1,100	2,300	NC	NC		--	--	2	--	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**[1]	10	10	10	340	680	100	680		2	2	8	1	2	2	2	2
Barium	ug/L	2,000	2,000	2,000	1,200	3,400	6,800	NC	NC		--	--	42	--	163	176	164	160
Beryllium	ug/L	4	4.0	4.0	33	300	600	NC	NC		--	--	< 1	--	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	12	24	NC	NC		--	--	< 0.2	--	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	16	32	NC	NC		1	< 1	1	< 1	< 1	1	2	2
Cobalt	ug/L	15	40	100	100	370	740	NC	NC		--	--	< 6	--	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	9,800	20,000	NC	NC		--	--	< 1,000	--	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	15	4.0	4.0	14	250	500	NC	NC		--	--	< 1	--	< 1	< 1	< 1	< 1
Lithium	ug/L	180	170	350	440	910	1,800	NC	NC		148	158	124	116	31	29	34	37
Mercury	ug/L	2	2.0	2.0	0.20#	1.4	2.8	NC	NC		--	--	< 0.2	--	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**100**	73	210	120	29,000	58,000	NC	NC		24	29	21	17	< 5	< 5	< 5	< 5
Radium-226/228	pci/L	5	NC	NC	NC	NC	NC	NC	NC		--	--	--	--	--	< 0.745	--	1.5
Selenium	ug/L	50	50	50	5.0	62	120	55	120		31	28	10	4	3	2	2	2
Thallium	ug/L	2	2.0	2.0	2.0	47	94	NC	NC		--	--	< 2	--	< 2	< 2	< 2	< 2
MI Part 115 Parameters																		
Iron	ug/L	NA	300[E]	300[E]	500,000[EE]	NC	NC	NC	NC		194	358	2,300	141	2,170	1,640	3,130	3,380
Copper	ug/L	NA	1,000[E]	1,000[E]	20	33	66	NC	NC		--	--	--	--	2	2	3	2
Nickel	ug/L	NA	100	100	120	1,000	2,100	NC	NC		--	--	--	--	< 2	2	4	4
Silver	ug/L	NA	34	98	0.2	0.54	1.1	NC	NC		--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NA	4.5	62	27	79	160	NC	NC		< 2	< 2	< 2	< 2	4	4	3	3
Zinc	ug/L	NA	2,400	5,000[E]	260	260	520	NC	NC		--	--	--	--	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
* - GWPS (Groundwater Protection Standard) is the higher of the Maximum Contaminant Level (MCL)/Regional Screening Level from 83 FR 36435 (RSL) and Upper Tolerance Limit (UTL) as established in TRC's Technical Memorandum dated October 15, 2018.
** - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020, updated October 12, 2023.
^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018) per footnote {G} of Michigan Part 201 criteria tables. Chromium GSI criterion based on hexavalent chromium per footnote {H}. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}. GSI criterion for chloride is 50 mg/L when the discharge is to the Great Lakes or connecting waters per footnote {FF}.
*** - Aquatic Maximum (AMV) and Final Acute Values (FAV) are taken from EGLE Rule 323.1057 Part 4 - Water Quality Standards (Rule 57), March 15, 2018. Hardness-dependent criteria calculated using site-specific hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018). Chromium AMV & FAV criteria are based on hexavalent chromium.
^^ - Mixing Zone (MZ) GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
# - If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and EGLE policy and procedure 09-014 dated June 20, 2012.
[E] - Criterion is the aesthetic drinking water value per footnote {E}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
BOLD font denotes concentrations detected above the GWPS.

Result	Indicates an exceedance of applicable GSI criteria. The chronic-based mixing zone criteria (Chronic MZ) replaces the MI GSI critera for arsenic, boron, and selenium.
Result	Indicates an exceedance of acute-based GSI criteria.

All metals were analyzed as total unless otherwise specified.
[1] - Constituent triggered an Assessment of Corrective Measures for the Karn Bottom Ash Pond as described in TRC's letter report dated Janurary 14, 2019.

Table 1
Summary of Groundwater Sampling Results (Analytical)
DE Karn Nature and Extent Monitoring Wells
Essexville, Michigan

										Sample Location:	OW-11			OW-12			
										Sample Date:	7/26/2023	10/4/2023	3/5/2024	5/8/2024	7/26/2023	10/4/2023	3/5/2024	5/9/2024
Constituent	Unit	GWPS*	MI Residential**	MI Non-Residential**	MI GSI^	MI AMV***	MI FAV***	Chronic MZ^^	Acute MZ^^									
Appendix III																		
Boron	ug/L	NA	500	500	4,000	34,000	69,000	44,000	69,000		3,100	3,410	3,370	3,340	818	1,040	1,420	1,410
Calcium	mg/L	NA	NC	NC	500[EE]	NC	NC	NC	NC		5.8	7.8	10.7	10.3	66.5	89	165	179
Chloride	mg/L	NA	250[E]	250[E]	50	320,000	640,000	NC	NC		59.2	57.1	59.3	55.4	49.6	56.8	39.1	33.7
Fluoride	ug/L	4,000	NC	NC	NC	9,800	20,000	NC	NC		1,970	2,620	3,440	3,390	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	NA	250[E]	250[E]	500[EE]	600,000	1,200,000	NC	NC		18.5	17.9	20	19.4	151	197	234	308
Total Dissolved Solids	mg/L	NA	500[E]	500[E]	500	NC	NC	NC	NC		216	208	224	312	510	646	1,010	1,290
pH, Field	su	NA	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	NC	NC	NC	NC		9.7	9.8	9.6	9.5	7.1	7.2	7.2	7.1
Appendix IV																		
Antimony	ug/L	6	6.0	6.0	2.0	1,100	2,300	NC	NC		2	1	4	3	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21[1]**	10	10	10	340	680	100	680		**778**	**907**	**1,080**	**948**	**114**	**112**	**58**	**33**
Barium	ug/L	2,000	2,000	2,000	1,200	3,400	6,800	NC	NC		18	25	31	27	96	130	212	216
Beryllium	ug/L	4	4.0	4.0	33	300	600	NC	NC		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	12	24	NC	NC		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	16	32	NC	NC		< 1	< 1	1	< 1	< 1	< 1	1	< 1
Cobalt	ug/L	15	40	100	100	370	740	NC	NC		< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	9,800	20,000	NC	NC		1,970	2,620	3,440	3,390	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	15	4.0	4.0	14	250	500	NC	NC		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	170	350	440	910	1,800	NC	NC		< 10	< 10	11	12	32	34	59	63
Mercury	ug/L	2	2.0	2.0	0.20#	1.4	2.8	NC	NC		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**100**	73	210	120	29,000	58,000	NC	NC		**151**	**138**	**151**	**146**	17	14	7	7
Radium-226/228	pci/L	5	NC	NC	NC	NC	NC	NC	NC		--	< 0.496	--	< 0.521	--	0.600	--	1.16
Selenium	ug/L	50	50	50	5.0	62	120	55	120		4	3	10	7	< 1	< 1	2	1
Thallium	ug/L	2	2.0	2.0	2.0	47	94	NC	NC		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters																		
Iron	ug/L	NA	300[E]	300[E]	500,000[EE]	NC	NC	NC	NC		42	52	140	21	5,690	7,750	6,250	5,200
Copper	ug/L	NA	1,000[E]	1,000[E]	20	33	66	NC	NC		< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
Nickel	ug/L	NA	100	100	120	1,000	2,100	NC	NC		2	< 2	2	< 2	< 2	< 2	6	3
Silver	ug/L	NA	34	98	0.2	0.54	1.1	NC	NC		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NA	4.5	62	27	79	160	NC	NC		840	334	358	169	< 2	< 2	2	< 2
Zinc	ug/L	NA	2,400	5,000[E]	260	260	520	NC	NC		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
* - GWPS (Groundwater Protection Standard) is the higher of the Maximum Contaminant Level (MCL)/Regional Screening Level from 83 FR 36435 (RSL) and Upper Tolerance Limit (UTL) as established in TRC's Technical Memorandum dated October 15, 2018.
** - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020, updated October 12, 2023.
^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018) per footnote {G} of Michigan Part 201 criteria tables. Chromium GSI criterion based on hexavalent chromium per footnote {H}. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}. GSI criterion for chloride is 50 mg/L when the discharge is to the Great Lakes or connecting waters per footnote {FF}.
*** - Aquatic Maximum (AMV) and Final Acute Values (FAV) are taken from EGLE Rule 323.1057 Part 4 - Water Quality Standards (Rule 57), March 15, 2018. Hardness-dependent criteria calculated using site-specific hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018). Chromium AMV & FAV criteria are based on hexavalent chromium.
^^ - Mixing Zone (MZ) GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
# - If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and EGLE policy and procedure 09-014 dated June 20, 2012.
[E] - Criterion is the aesthetic drinking water value per footnote {E}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
BOLD font denotes concentrations detected above the GWPS.

Result	Indicates an exceedance of applicable GSI criteria. The chronic-based mixing zone criteria (Chronic MZ) replaces the MI GSI critera for arsenic, boron, and selenium.
Result	Indicates an exceedance of acute-based GSI criteria.

All metals were analyzed as total unless otherwise specified.
[1] - Constituent triggered an Assessment of Corrective Measures for the Karn Bottom Ash Pond as described in TRC's letter report dated Janurary 14, 2019.

Table 2
Summary of Groundwater Sampling Results (Analytical)
DE Karn Nature and Extent GSI Monitoring Locations
Essexville, Michigan

										Sample Location:	T1-3GSI			T2-3GSI				T3-3GSI			
										Sample Date:	7/25/2023	10/3/2023	3/7/2024	5/7/2024	7/25/2023	10/3/2023	3/7/2024	5/7/2024	7/25/2023	10/3/2023	3/7/2024	5/7/2024
Constituent	Unit	GWPS*	MI Residential**	MI Non-Residential**	MI GSI^	MI AMV***	MI FAV***	Chronic MZ^^	Acute MZ^^														
Appendix III																							
Boron	ug/L	NA	500	500	4,000	34,000	69,000	44,000	69,000		64	< 20	91	516	5,640	3,700	3,900	5,260	645	3500	1390	114
Calcium	mg/L	NA	NC	NC	500[EE]	NC	NC	NC	NC		55.5	43.2	60.6	92.4	235	141	231	153	160	180	137	80.8
Chloride	mg/L	NA	250[E]	250[E]	50	320,000	640,000	NC	NC		35.4	51	42.9	36.2	52.1	59.1	49.1	57.1	32.2	60.5	49.8	39.3
Sulfate	mg/L	NA	250[E]	250[E]	500[EE]	600,000	1,200,000	NC	NC		33.5	27.2	34.6	14.9	290	39.2	249	193	82.5	44	11.1	42.7
pH, Field	su	NA	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	NC	NC	NC	NC		7.1	7.7	7.6	7.4	6.7	6.9	7.0	7.1	6.9	6.9	7.4	7.2
Appendix IV																						
Arsenic	ug/L	**21[1]**	10	10	10	340	680	100[2]	680		**25**	2	2	< 1	< 1	< 1	1	< 1	< 1	3	**196**	6
Chromium	ug/L	100	100	100	11	16	32	NC	NC		1	< 1	< 1	2	1	1	1	2	1	2	< 1	2
Lithium	ug/L	180	170	350	440	910	1,800	NC	NC		< 10	< 10	< 10	17	128	97	67	102	55	117	70	< 10
Molybdenum	ug/L	100	73	210	120	29,000	58,000	NC	NC		25	6	6	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	50	50	5.0	62	120	NC	NC		1	1	< 1	< 1	1	1	1	2	1	2	1	< 1
MI Part 115 Parameters																						
Iron	ug/L	NA	300[E]	300[E]	500,000[EE]	NC	NC	NC	NC		2,460	23	1,730	233	87	75	118	51	261	127	285	546
Vanadium	ug/L	NA	4.5	62	27	260	520	NC	NC		< 2	< 2	< 2	< 2	< 2	< 2	< 2	2	< 2	< 2	< 2	< 2

Notes:
ug/L - micrograms per liter; mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
* - GWPS (Groundwater Protection Standard) is the higher of the Maximum Contaminant Level (MCL)/Regional Screening Level from 83 FR 36435 (RSL) and Upper Tolerance Limit (UTL) as established in TRC's Technical Memorandum dated October 15, 2018.
** - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020, updated October 12, 2023.
^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018) per footnote {G} of Michigan Part 201 criteria tables. Chromium GSI criterion based on hexavalent chromium per footnote {H}. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}. GSI criterion for chloride is 50 mg/L when the discharge is to the Great Lakes or connecting waters per footnote {FF}.
*** - Aquatic Maximum (AMV) and Final Acute Values (FAV) are taken from EGLE Rule 323.1057 Part 4 - Water Quality Standards (Rule 57), March 15, 2018. Hardness-dependent criteria calculated using site-specific hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018). Chromium AMV & FAV criteria are based on hexavalent chromium.
^^ - Mixing Zone (MZ) GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
[E] - Criterion is the aesthetic drinking water value per footnote {E}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
BOLD font denotes concentrations detected above the GWPS.

Result	Indicates an exceedance of applicable GSI criteria. The chronic-based mixing zone criteria (Chronic MZ) replaces the MI GSI critera for arsenic, boron, and selenium.
Result	Indicates an exceedance of acute-based GSI criteria.

All metals were analyzed as total unless otherwise specified.
Transect samples were unable to be collected during the first quarter 2023 event due to site conditions.
[1] - Constituent triggered an Assessment of Corrective Measures for the Karn Bottom Ash Pond as described in TRC's letter report dated Janurary 14, 2019.
[2] - Compliance demonstrated on a mass flux basis.

Table 2
Summary of Groundwater Sampling Results (Analytical)
DE Karn Nature and Extent GSI Monitoring Locations
Essexville, Michigan

										Sample Location:	T4-3GSI			T5-3GSI				T6-3GSI			
										Sample Date:	7/25/2023	10/3/2023	3/7/2024	5/7/2024	7/25/2023	10/3/2023	3/7/2024	5/7/2024	7/25/2023	10/3/2023	3/7/2024	5/7/2024
Constituent	Unit	GWPS*	MI Residential**	MI Non-Residential**	MI GSI^	MI AMV***	MI FAV***	Chronic MZ^^	Acute MZ^^														
Appendix III																							
Boron	ug/L	NA	500	500	4,000	34,000	69,000	44,000	69,000		528	288	153	129	278	1,500	170	326	97	< 20	57	71
Calcium	mg/L	NA	NC	NC	500[EE]	NC	NC	NC	NC		61.9	90.2	64.9	70.3	72.4	78.6	112	191	51.7	58.5	64.1	46.2
Chloride	mg/L	NA	250[E]	250[E]	50	320,000	640,000	NC	NC		29	15.1	45	29.2	43	48.5	46.3	64.6	59.6	37.3	40.5	27.9
Sulfate	mg/L	NA	250[E]	250[E]	500[EE]	600,000	1,200,000	NC	NC		2.1	59.2	7.19	39.3	30.7	6.03	156	234	14.8	20.4	40.5	32
pH, Field	su	NA	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	NC	NC	NC	NC		7.3	7.3	7.8	7.7	7.4	7.5	7.7	7.5	7.8	7.7	7.5	7.7
Appendix IV																						
Arsenic	ug/L	**21[1]**	10	10	10	340	680	100[2]	680		6	**65**	4	**38**	**505**	**375**	**217**	**254**	< 1	< 1	2	< 1
Chromium	ug/L	100	100	100	11	16	32	NC	NC		< 1	1	< 1	1	1	1	2	2	< 1	2	1	2
Lithium	ug/L	180	170	350	440	910	1,800	NC	NC		33	32	20	17	29	41	22	34	11	14	< 10	< 10
Molybdenum	ug/L	100	73	210	120	29,000	58,000	NC	NC		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6	< 5	< 5	< 5
Selenium	ug/L	50	50	50	5.0	62	120	NC	NC		< 1	< 1	< 1	< 1	1	1	< 1	3	2	< 1	< 1	< 1
MI Part 115 Parameters																						
Iron	ug/L	NA	300[E]	300[E]	500,000[EE]	NC	NC	NC	NC		183	133	347	154	66	471	996	598	93	376	186	41
Vanadium	ug/L	NA	4.5	62	27	260	520	NC	NC		< 2	< 2	< 2	< 2	< 2	< 2	2	2	< 2	< 2	< 2	< 2

Notes:
ug/L - micrograms per liter; mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
* - GWPS (Groundwater Protection Standard) is the higher of the Maximum Contaminant Level (MCL)/Regional Screening Level from 83 FR 36435 (RSL) and Upper Tolerance Limit (UTL) as established in TRC's Technical Memorandum dated October 15, 2018.
** - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020, updated October 12, 2023.
^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018) per footnote {G} of Michigan Part 201 criteria tables. Chromium GSI criterion based on hexavalent chromium per footnote {H}. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}. GSI criterion for chloride is 50 mg/L when the discharge is to the Great Lakes or connecting waters per footnote {FF}.
*** - Aquatic Maximum (AMV) and Final Acute Values (FAV) are taken from EGLE Rule 323.1057 Part 4 - Water Quality Standards (Rule 57), March 15, 2018. Hardness-dependent criteria calculated using site-specific hardness of 258 mg CaCO3/L (average of SW-01 [Lake Huron] and SW-02 [Saginaw River] collected in April 2018). Chromium AMV & FAV criteria are based on hexavalent chromium.
^^ - Mixing Zone (MZ) GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
[E] - Criterion is the aesthetic drinking water value per footnote {E}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
BOLD font denotes concentrations detected above the GWPS.

Result	Indicates an exceedance of applicable GSI criteria. The chronic-based mixing zone criteria (Chronic MZ) replaces the MI GSI critera for arsenic, boron, and selenium.
Result	Indicates an exceedance of acute-based GSI criteria.

All metals were analyzed as total unless otherwise specified.
Transect samples were unable to be collected during the first quarter 2023 event due to site conditions.
[1] - Constituent triggered an Assessment of Corrective Measures for the Karn Bottom Ash Pond as described in TRC's letter report dated Janurary 14, 2019.
[2] - Compliance demonstrated on a mass flux basis.

Figures

Constituent	GWPS (Note 3)
Antimony	6 ug/L
Arsenic	21 ug/L
Barium	2,000 ug/L
Beryllium	4 ug/L
Cadmium	5 ug/L
Chromium	100 ug/L
Cobalt	15 ug/L
Fluoride	4,000 ug/L
Lead	15 ug/L
Lithium	180 ug/L
Mercury	2 ug/L
Molybdenum	100 ug/L
Radium-226/228	5 pCi/L
Selenium	50 ug/L
Thallium	2 ug/L

MW-03
MW-06
MW-06 Arsenic
MW-01
POREWATER SAMPLES COLLECTED UNDER MICHIGAN P115 PROGRAM TO DEMONSTRATE COMPLIANCE WITH THE GSI PATHWAY IN THIS AREA
Lake Huron
MW-08
MW-08 Arsenic
INTAKE CHANNEL
DEK-MW-15004 Arsenic *
DEK-MW-15004
KARN BOTTOM ASH POND
DEK-MW-15003 Arsenic *
OW-11
OW-11 Arsenic
MW-10
MW-10 Arsenic
DEK-MW-15003
DEK-MW-15005 Arsenic *
DEK-MW-15005
OW-12
KARN LINED IMPOUNDMENT
MW-12
DEK-MW-15001
OW-12 Arsenic
DEK-MW-15006 Arsenic
DEK-MW-15006
DEK-MW-15002
DEK-MW-18001
OW-10
MW-12 Arsenic
DEK-MW-18001 Arsenic *
MW-14
MW-14 Arsenic
DE KARN GENERATING FACILITY
MW-16
KARN LANDFILL
Saginaw River
DISCHARGE CHANNEL
WEADOCK LANDFILL
FORMER JC WEADOCK GENERATING FACILITY
SLURRY WALL

LEGEND

- DEK BOTTOM ASH POND MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- NATURE AND EXTENT WELL
- NO EXCEEDANCES
- TWO OR MORE EXCEEDANCES (NOTES 4 + 5)
- STATISTICALLY SIGNIFICANT GWPS EXCEEDANCE (NOTE 6)
- SLURRY WALL (APPROXIMATE)
- LINED IMPOUNDMENT (COVENANT BOUNDARY)
- POREWATER SAMPLING AREA
- * GWPS EXCEEDANCE TRIGGERED ASSESSMENT OF CORRECTIVE MEASURES PURSUANT TO §257.96

WELL ID
CONSTITUENT(S) EXCEEDING GWPS

NOTES

1. BASE MAP IMAGERY FROM NEARMAP, (10/3/2022).
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018.
3. GWPS (GROUNDWATER PROTECTION STANDARD) IS THE HIGHER OF THE MAXIMUM CONTAMINANT LEVEL (MCL)/REGIONAL SCREENING LEVEL FROM 83 FR 36435 (RSL) AND UPPER TOLERANCE LIMIT (UTL) AS ESTABLISHED IN TRC'S TECHNICAL MEMORANDUM DATED OCTOBER 15, 2018.
4. GROUNDWATER DATA FROM JULY 2023 TO MAY 2024 ARE SCREENED AGAINST THE GWPS FOR EVALUATION PURPOSES ONLY. AN EXCEEDANCE IS DEFINED AS A SINGLE DETECTION ABOVE THE GWPS, HOWEVER, CONFIDENCE INTERVALS WILL BE USED TO DETERMINE COMPLIANCE PER THE CCR RULES.
5. AN EXCEEDANCE OF THE GWPS DOES NOT INDICATE UNACCEPTABLE RISK FROM GROUNDWATER EXPOSURE; THE DRINKING WATER PATHWAY IS NOT COMPLETE ON THE PROPERTY. GROUNDWATER CONDITIONS CONTINUE TO BE MONITORED TO INFORM THE KARN BOTTOM ASH POND REMEDY SELECTION.
6. LOWER CONFIDENCE LIMIT IS ABOVE GWPS BASED UPON MOST RECENT ASSESSMENT MONITORING STATISTICAL EVALUATION USING THE MOST RECENT EIGHT SAMPLING EVENTS.

N

0 600 1,200 Feet

1 " = 600 '
1:7,200

PROJECT:
CONSUMERS ENERGY COMPANY
DE KARN POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:
NATURE AND EXTENT SUMMARY GWPS EXCEEDANCES

DRAWN BY:	A. FOJTIK	PROJ NO.:	553814.0001
CHECKED BY:	K. LOWERY		
APPROVED BY:	D. LITZ		**FIGURE 1**
DATE:	JULY 2024		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
www.trccompanies.com

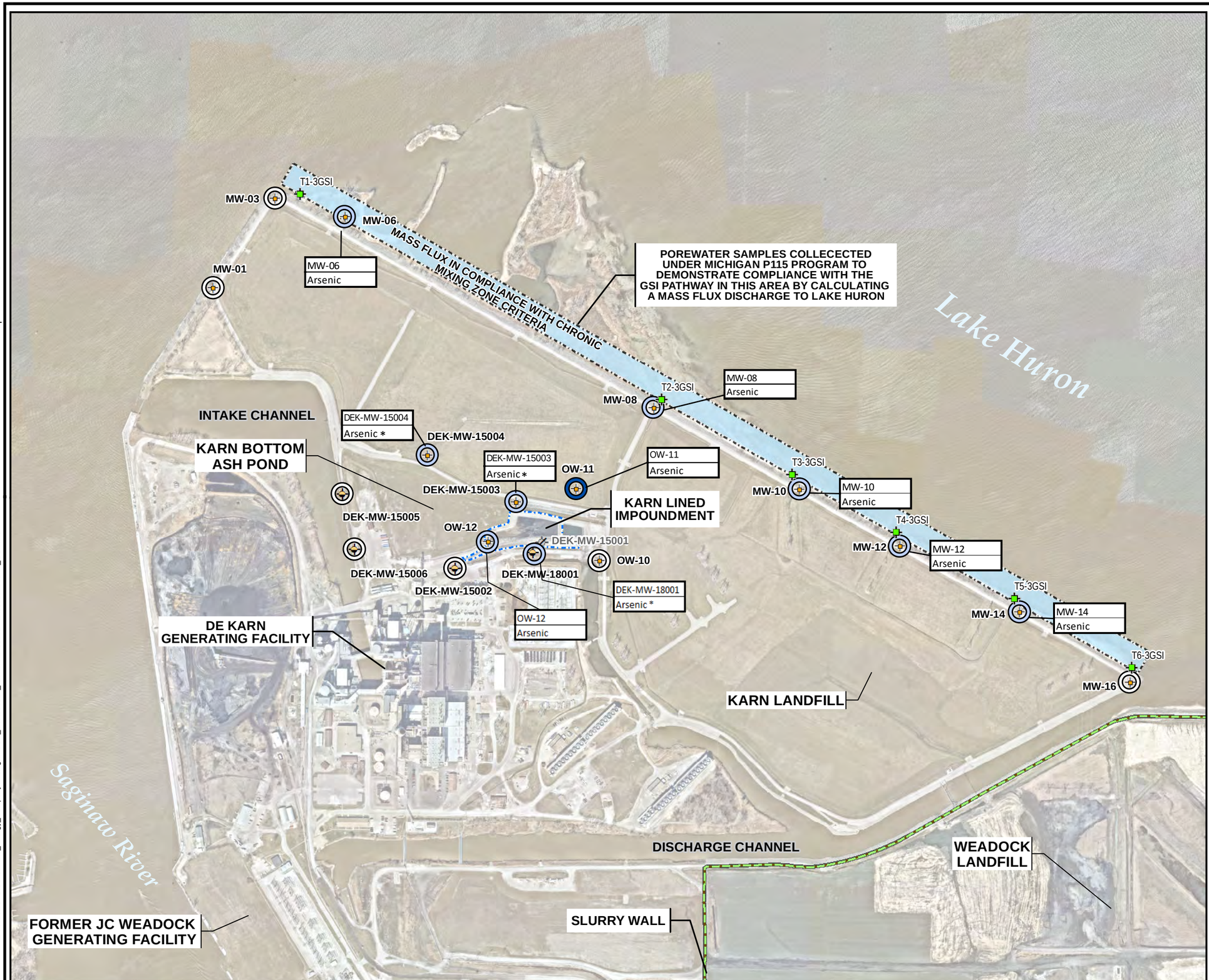
FILE NO.: 553814-ExceedancesNE_ACM.mxd

Plot Date: 7/10/2024, 13:16:38 PM by AFOJTIK -- LAYOUT: ANSI B(11"x17")
Path: T:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\553814 Karn\MXD\553814-ExceedancesNE_ACM.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

TRC - GIS

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0

Plot Date: 7/10/2024, 13:28:02 PM by AFOJTIK -- LAYOUT: ANSI B(11"x17")
Path: T:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\553814_KarnMXD\553814-ExceedancesNE_GSI.mxd



LEGEND

- DEK BOTTOM ASH POND MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- NATURE AND EXTENT WELL
- GSI TRANSECT LOCATION/POREWATER SAMPLE
- NO EXCEEDANCES
- TWO OR MORE DATA POINTS EXCEED CHRONIC MIXING ZONE GSI CRITERION (100 UG/L) (NOTES 3 + 4)
- TWO OR MORE DATA POINTS EXCEED ACUTE MIXING ZONE GSI CRITERION (FAV, 680 UG/L) (NOTES 3 + 4)
- SLURRY WALL (APPROXIMATE)
- LINED IMPOUNDMENT (COVENANT BOUNDARY)
- POREWATER SAMPLING AREA

WELL ID
CONSTITUENT(S) EXCEEDING GSI

* GROUNDWATER PROTECTION STANDARD (GWPS) EXCEEDANCE TRIGGERED ASSESSMENT OF CORRECTIVE MEASURES PURSUANT TO §257.96

NOTES

1. BASE MAP IMAGERY FROM NEARMAP, (10/3/2022).
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018.
3. MIXING ZONE GROUNDWATER SURFACE WATER INTERFACE (GSI) CRITERIA FROM MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY (MDEQ) APPROVAL LETTER DATED DECEMBER 23, 2015.
4. GROUNDWATER CONCENTRATION DATA FROM JULY 2023 TO MAY 2024 ARE SCREENED AGAINST THE MIXING ZONE CRITERIA. AN EXCEEDANCE IS DEFINED AS TWO DETECTIONS ABOVE CRITERIA. COMPLIANCE WITH THE CHRONIC MIXING ZONE CRITERIA CAN BE DEMONSTRATED ON A MASS FLUX BASIS.

0 600 1,200 Feet

1 " = 600 '
1:7,200

N

PROJECT:
CONSUMERS ENERGY COMPANY
DE KARN POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:
ARSENIC NATURE AND EXTENT SUMMARY GSI PATHWAY COMPLIANCE

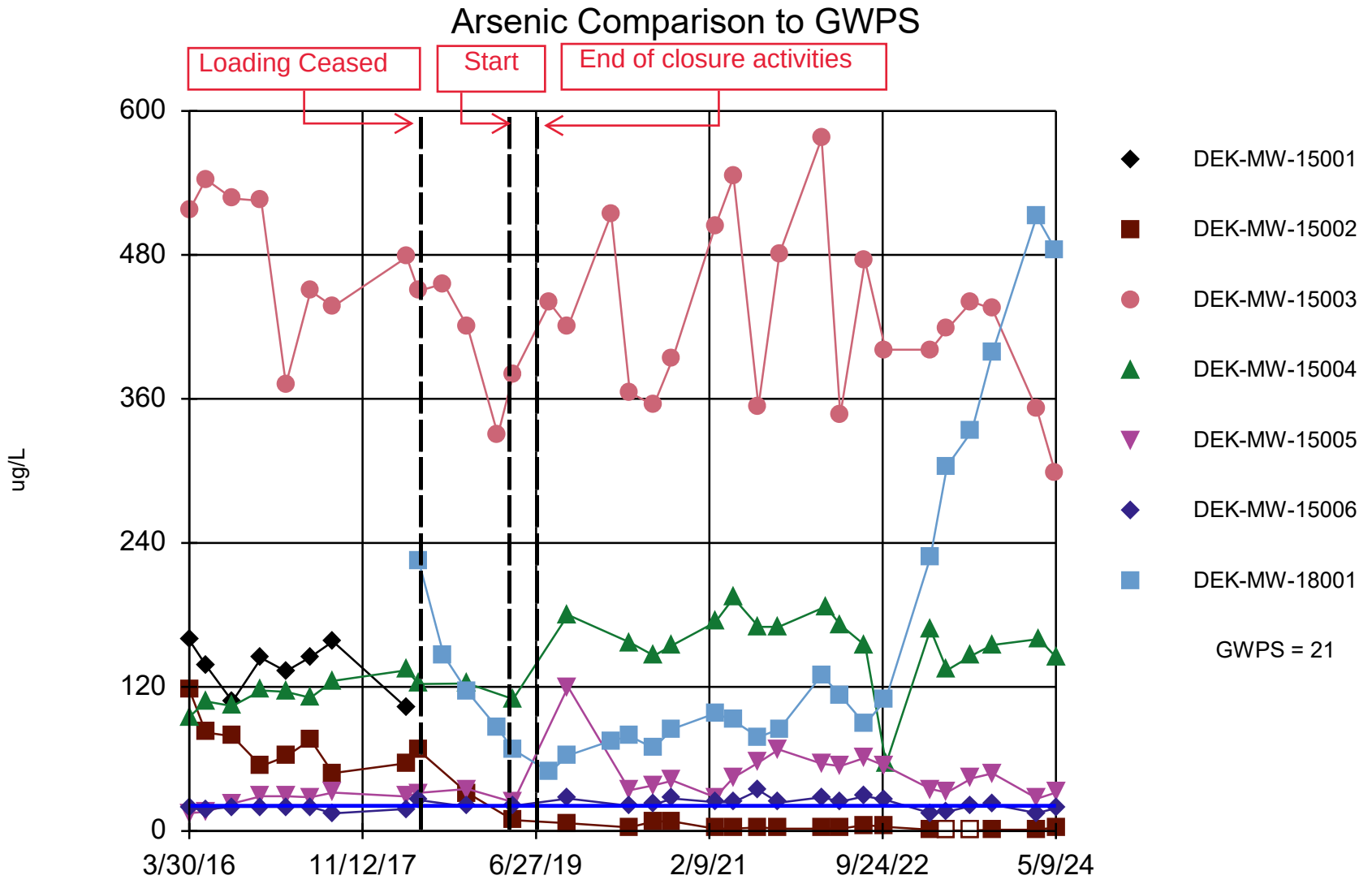
DRAWN BY:	A. FOJTIK	PROJ NO.:	553814.0001
CHECKED BY:	K. LOWERY		
APPROVED BY:	D. LITZ		**FIGURE 2**
DATE:	JULY 2024		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
www.trccompanies.com

FILE NO.: 553814-ExceedancesNE_GSI.mxd

Attachment A
Statistical Evaluation

Sanitas™ v.10.0.16 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.



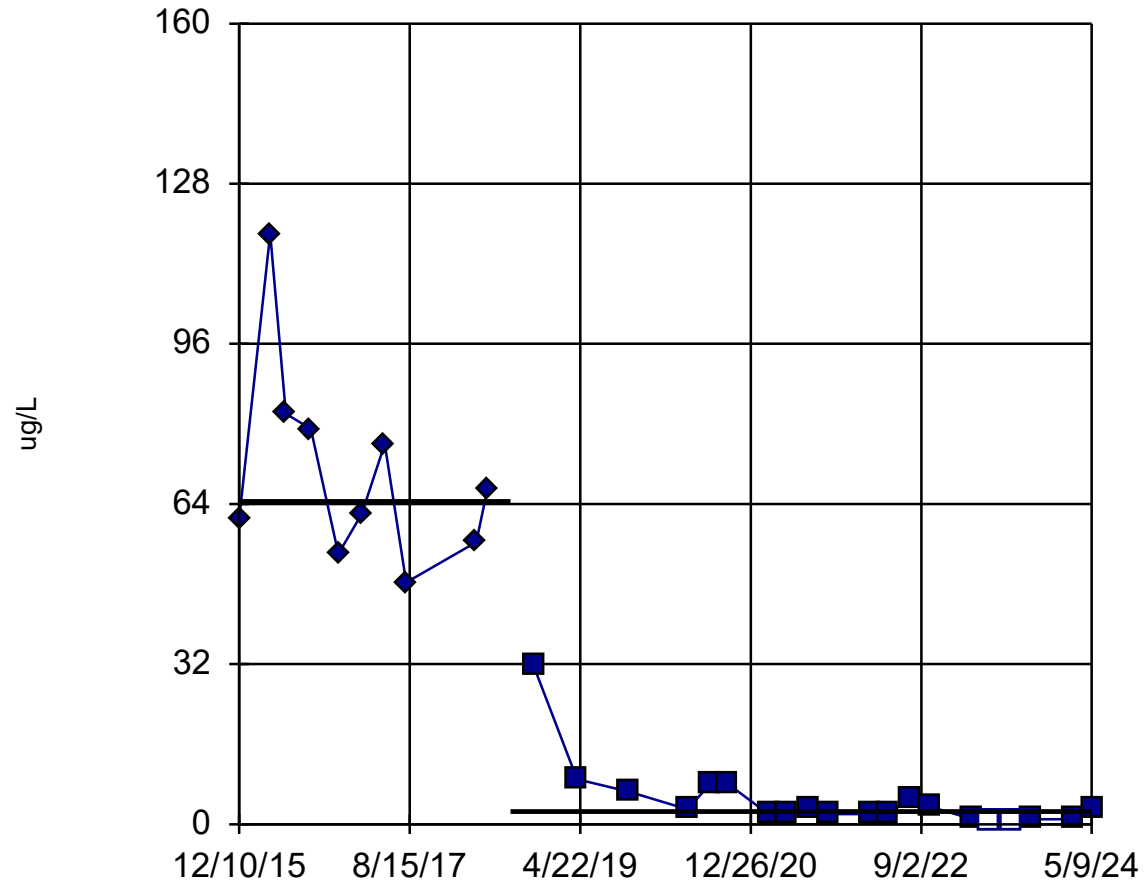
Time Series Analysis Run 6/20/2024 1:24 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2_NE_rev

Hollow symbols indicate censored values.

Arsenic, Total

DEK-MW-15002



DEK-MW-15002 background

DEK-MW-15002 compliance

background median = 64.5

compliance median = 2.5

t = -10.05 (two-tail)

Alpha	Table	Sig.
0.2	0.879	Yes
0.1	1.372	Yes
0.05	1.812	Yes
0.02	2.359	Yes
0.01	2.764	Yes

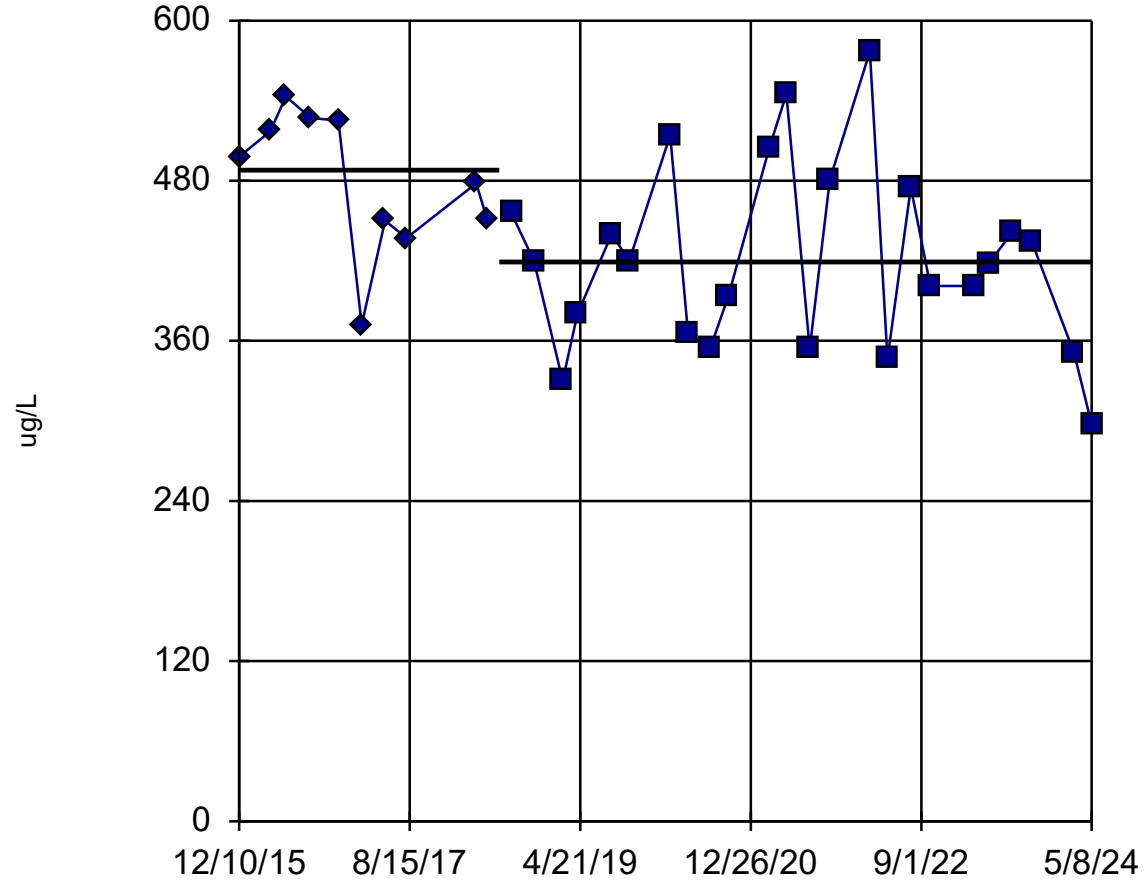
Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8668, critical = 0.842.

Welch's t-test Analysis Run 6/20/2024 1:40 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2_NE_rev

Arsenic, Total

DEK-MW-15003



DEK-MW-15003 background

DEK-MW-15003 compliance

background median = 488

compliance median = 419

t = -2.672 (two-tail)

Alpha	Table	Sig.
0.2	0.858	Yes
0.1	1.321	Yes
0.05	1.717	Yes
0.02	2.183	Yes
0.01	2.508	Yes

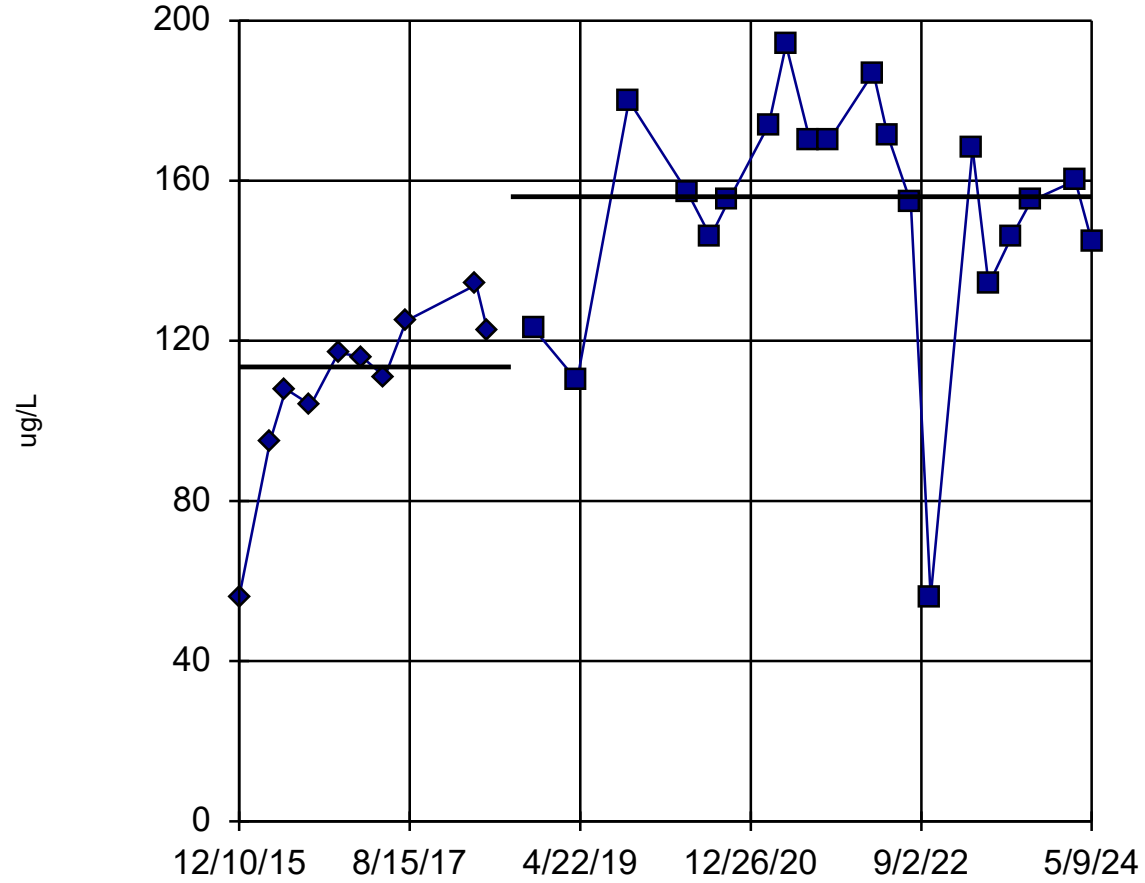
Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9262, critical = 0.842.

Welch's t-test Analysis Run 6/20/2024 1:42 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2_NE_rev

Arsenic, Total

DEK-MW-15004



◆ DEK-MW-15004 background

■ DEK-MW-15004 compliance

background median = 113.5

compliance median = 156

t = 4.535 (two-tail)

Alpha	Table	Sig.
0.2	0.857	Yes
0.1	1.318	Yes
0.05	1.711	Yes
0.02	2.172	Yes
0.01	2.492	Yes

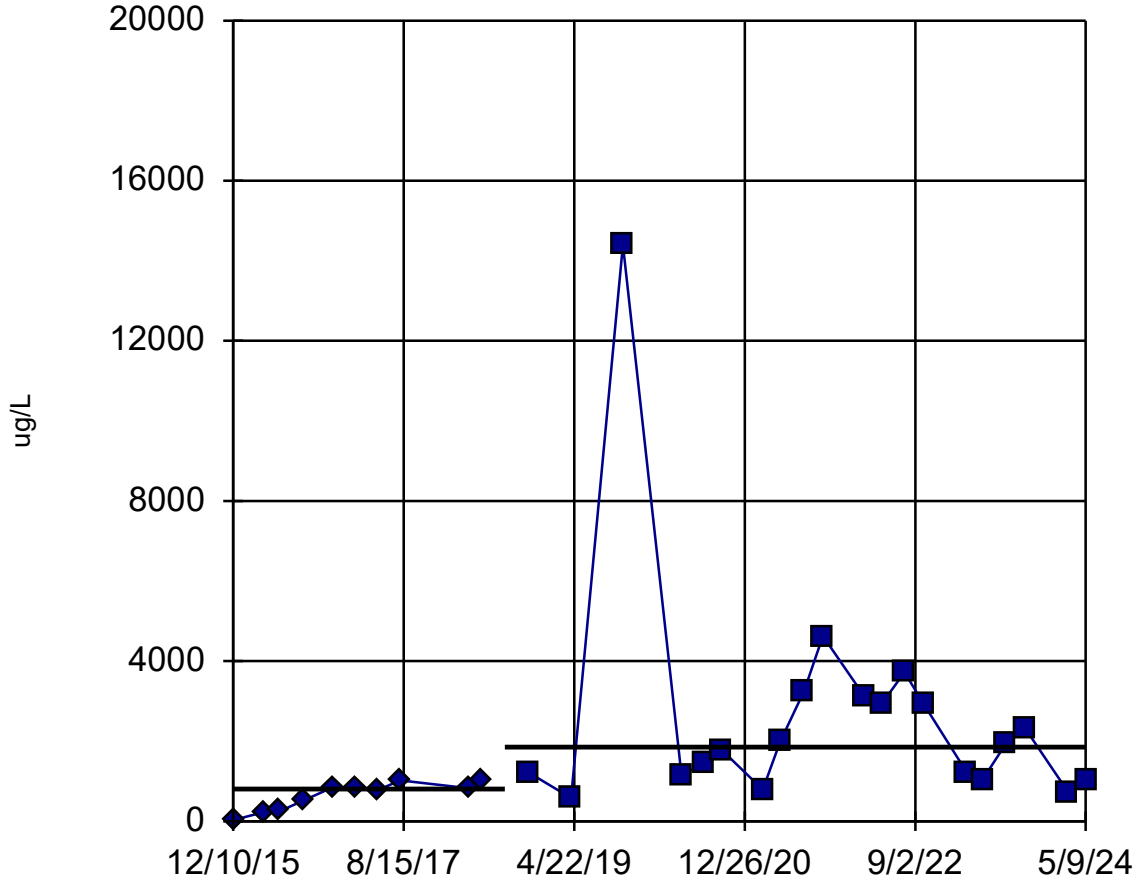
Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.852, critical = 0.842.

Welch's t-test Analysis Run 6/20/2024 1:43 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2_NE_rev

Arsenic, Total

DEK-MW-15005



◆ DEK-MW-15005 background

■ DEK-MW-15005 compliance

background median = 803.8

compliance median = 1850

t = 2.907 (two-tail)

Alpha	Table	Sig.
0.2	0.86	Yes
0.1	1.325	Yes
0.05	1.725	Yes
0.02	2.197	Yes
0.01	2.528	Yes

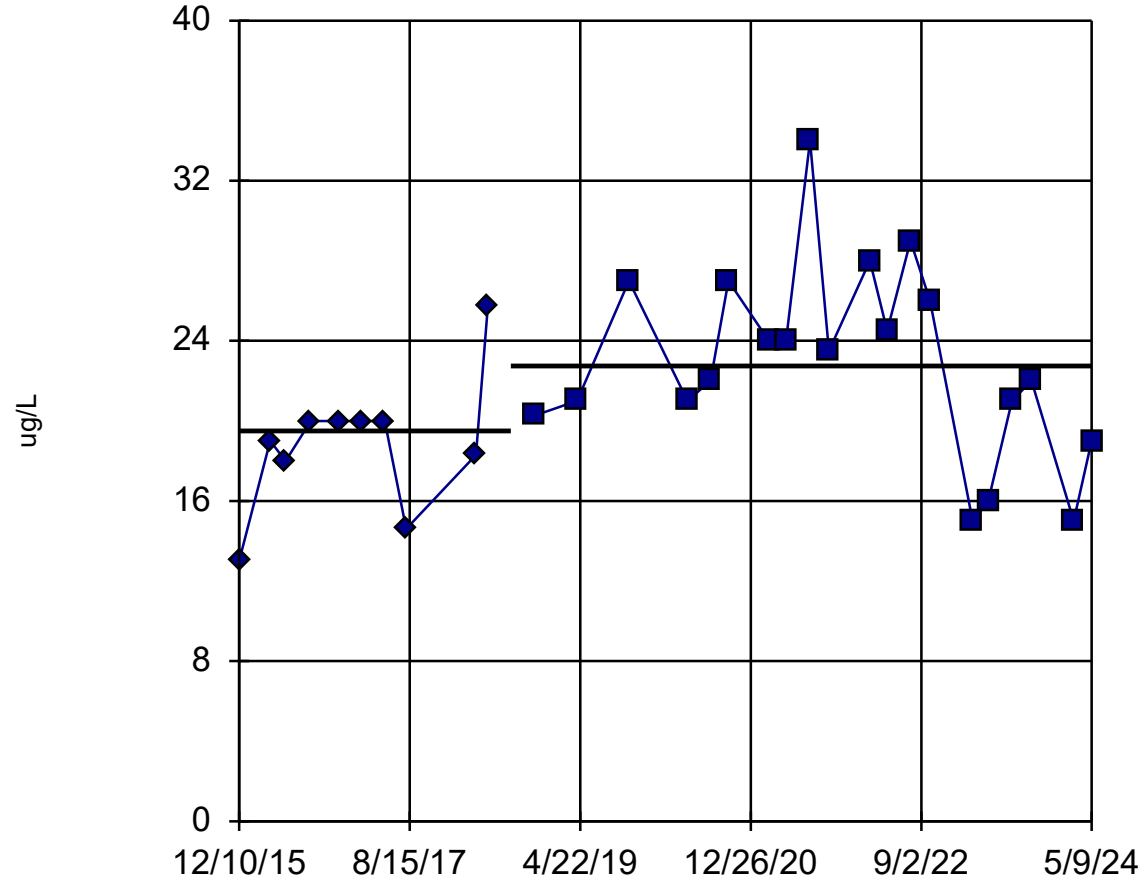
Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8767 after square transformation, critical = 0.842.

Welch's t-test Analysis Run 6/20/2024 1:44 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2_NE_rev

Arsenic, Total

DEK-MW-15006



◆ DEK-MW-15006 background

■ DEK-MW-15006 compliance

background median = 19.5

compliance median = 22.75

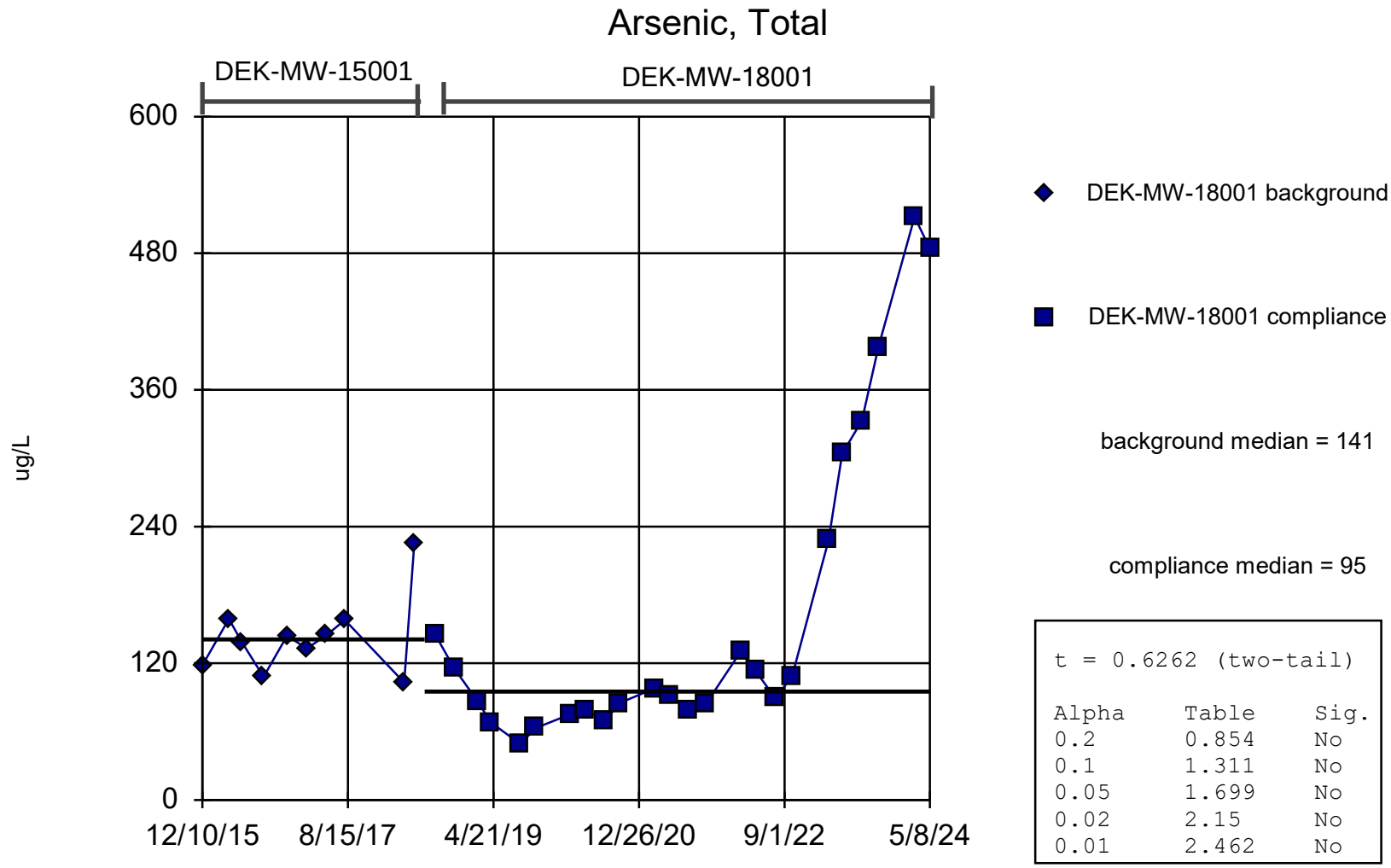
t = 2.684 (two-tail)

Alpha	Table	Sig.
0.2	0.857	Yes
0.1	1.318	Yes
0.05	1.711	Yes
0.02	2.172	Yes
0.01	2.492	Yes

Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8992, critical = 0.842.

Welch's t-test Analysis Run 6/20/2024 1:44 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2_NE_rev



Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8737, critical = 0.842.

Welch's t-test Analysis Run 6/20/2024 1:45 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2_NE_rev

Welch's t-test

Constituent: Arsenic, Total (ug/L) Analysis Run 6/20/2024 2:15 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2_NE_rev

	DEK-MW-15002	DEK-MW-15002
12/10/2015	61	
3/30/2016	118	
5/26/2016	82	
8/24/2016	79	
12/1/2016	54	
2/23/2017	62	
5/18/2017	76	
8/3/2017	48.3	
4/12/2018	56.4	
5/23/2018	67	
11/5/2018		31.7
4/11/2019		9
10/15/2019		6.5
5/13/2020		3
8/3/2020		8
10/6/2020		8 (D)
3/1/2021		2
5/3/2021		2
7/28/2021		3 (D)
10/4/2021		2
3/1/2022		2 (D)
5/3/2022		2
7/26/2022		5
10/4/2022		3.5 (D)
3/8/2023		1 (D)
5/2/2023		<1
7/26/2023		<1 (D)
10/4/2023		1 (D)
3/5/2024		1
5/9/2024		3 (D)

ND substitution: RL or RL/2 if <15% NDs.

Welch's t-test

Constituent: Arsenic, Total (ug/L) Analysis Run 6/20/2024 2:15 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2_NE_rev

	DEK-MW-15003	DEK-MW-15003
12/10/2015	498	
3/30/2016	517	
5/26/2016	543	
8/24/2016	527	
12/1/2016	525	
2/23/2017	372	
5/18/2017	450	
8/4/2017	437	
4/12/2018	478	
5/23/2018	450	
8/16/2018		456
11/6/2018		420
2/18/2019		330
4/11/2019		380
8/13/2019		440
10/15/2019		420
3/11/2020		514 (D)
5/14/2020		365
8/3/2020		355
10/6/2020		393
3/2/2021		504
5/3/2021		545
7/27/2021		354
10/7/2021		481
2/28/2022		577
5/3/2022		346.5 (D)
7/26/2022		475
10/4/2022		401
3/8/2023		401
5/2/2023		418
7/26/2023		441
10/4/2023		435
3/5/2024		351 (D)
5/8/2024		297.5 (D)

Welch's t-test

Constituent: Arsenic, Total (ug/L) Analysis Run 6/20/2024 2:15 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2_NE_rev

	DEK-MW-15004	DEK-MW-15004
12/10/2015	56	
3/30/2016	95	
5/26/2016	108	
8/24/2016	104	
12/1/2016	117	
2/23/2017	116	
5/18/2017	111	
8/3/2017	125 (D)	
4/12/2018	134	
5/23/2018	122.5 (D)	
11/6/2018		123
4/11/2019		110
10/15/2019		180
5/14/2020		157
8/4/2020		146
10/7/2020		155
3/2/2021		174
5/3/2021		194
7/28/2021		170
10/4/2021		170
3/14/2022		187
5/4/2022		171.5 (D)
7/27/2022		154.5 (D)
10/6/2022		56
3/7/2023		168
5/3/2023		134
7/25/2023		146
10/3/2023		155
3/11/2024		160
5/9/2024		145

Welch's t-test

Constituent: Arsenic, Total (ug/L) Analysis Run 6/20/2024 2:15 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2_NE_rev

	DEK-MW-15005	DEK-MW-15005
12/10/2015	5	
3/30/2016	15	
5/26/2016	16	
8/24/2016	23	
12/1/2016	29	
2/23/2017	29	
5/18/2017	28	
8/3/2017	31.9	
4/11/2018	28.7 (D)	
5/24/2018	31.7	
11/6/2018		35
4/11/2019		24 (D)
10/15/2019		120 (D)
5/13/2020		34 (D)
8/3/2020		38 (D)
10/7/2020		42
3/2/2021		28 (D)
5/3/2021		44.5 (D)
7/28/2021		57
10/4/2021		68
3/1/2022		56
5/3/2022		54
7/26/2022		61 (D)
10/4/2022		54
3/7/2023		35
5/2/2023		32 (D)
7/26/2023		44
10/5/2023		48
3/6/2024		27 (D)
5/9/2024		32

Welch's t-test

Constituent: Arsenic, Total (ug/L) Analysis Run 6/20/2024 2:15 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2_NE_rev

	DEK-MW-15006	DEK-MW-15006
12/10/2015	13	
3/30/2016	19	
5/25/2016	18	
8/24/2016	20	
12/1/2016	20	
2/23/2017	20	
5/18/2017	20	
8/3/2017	14.6	
4/11/2018	18.3	
5/24/2018	25.7	
11/5/2018		20.25 (D)
4/11/2019		21
10/15/2019		27
5/13/2020		21
8/4/2020		22
10/7/2020		27
3/2/2021		24
5/3/2021		24
7/28/2021		34
10/4/2021		23.5 (D)
3/1/2022		28
5/3/2022		24.5 (D)
7/26/2022		29
10/4/2022		26
3/7/2023		15
5/2/2023		16
7/26/2023		21
10/5/2023		22
3/5/2024		15
5/9/2024		19

Welch's t-test

Constituent: Arsenic, Total (ug/L) Analysis Run 6/20/2024 2:15 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_24Q2_NE_rev

	DEK-MW-18001	DEK-MW-18001
12/10/2015	118	
3/30/2016	159	
5/26/2016	138	
8/24/2016	108	
12/1/2016	144	
2/23/2017	133	
5/18/2017	145	
8/3/2017	158	
4/10/2018	103	
5/23/2018	225	
8/17/2018		146
11/6/2018		116
2/18/2019		85.5 (D)
4/10/2019		68
8/14/2019		49
10/15/2019		63
3/9/2020		75
5/14/2020		79
8/3/2020		69
10/6/2020		85
3/2/2021		98
5/3/2021		92
7/27/2021		78
10/7/2021		85
3/1/2022		130
5/3/2022		113
7/26/2022		89
10/4/2022		109
3/7/2023		228
5/3/2023		304
7/26/2023		333
10/4/2023		398
3/4/2024		512
5/8/2024		484