

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<sup>1</sup>, 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 <u>known</u> 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

<sup>&</sup>lt;sup>1</sup> TRC. 2019. Assessment of Corrective Measures – DE Karn Bottom Ash Pond Coal Combustion Residual Unit. Prepared for Consumers Energy Company. September 11.

DE Karn Bottom Ash Pond Semiannual Progress Report Ms. Lori Babcock July 30, 2024



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 highresolution 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<sup>2</sup>. 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

<sup>&</sup>lt;sup>2</sup> Discharge to this ditch was completed under authorization of the National Pollutant Discharge Elimination System (NPDES) permit.

DE Karn Bottom Ash Pond Semiannual Progress Report Ms. Lori Babcock July 30, 2024



drinking water pathway is not complete. Monitoring performed under the Michiganapproved 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 monitoringonly, 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.

DE Karn Bottom Ash Pond Semiannual Progress Report Ms. Lori Babcock July 30, 2024



Sincerely,

Harold D. Keyste

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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

Darby Litz Hydrogeologist/Project Manager

**Prepared For:** Consumers Energy Company

Prepared By: TRC 1540 Eisenhower Place Ann Arbor, Michigan 48108

Andrew Whaley Project Geologist



### TABLE OF CONTENTS

1.0	Intro	oduction	.1
	1.1	Program Summary	. 1
	1.2	Site Overview	.3
	1.3	Geology/Hydrogeology	.4
2.0	Grou	undwater Monitoring	.5
	2.1	Monitoring Well Network	.5
	2.2	May 2024 Assessment Monitoring	.5
		2.2.1 Groundwater Flow Rate and Direction	. 6
		2.2.2 Data Quality	.7
3.0	Ass	essment Monitoring Statistical Evaluation	. 8
	3.1	Establishing Groundwater Protection Standards	. 8
	3.2	Data Comparison to Groundwater Protection Standards	. 8
4.0	Con	clusions and Recommendations	0
5.0	Refe	erences	1

#### TABLES

Table 1	Summary of Groundwater Elevation Data
Table 2	Summary of Field Parameters
Table 3	Summary of Background Wells Groundwater Sampling Results (Analytical)
Table 4	Summary of Groundwater Sampling Results (Analytical)
Table 5	Summary of Assessment Monitoring Statistical Evaluation – May 2024

#### FIGURES

Figure 1	Site Location Map
Figure 2	Karn and Weadock Complex Map
Figure 3	Shallow Groundwater Contour Map – May 2024

#### APPENDICES

- Appendix A Data Quality Reviews
- Appendix B Statistical Evaluation of May 2024 Assessment Monitoring Sampling Event
- Appendix C Laboratory Analytical Reports



## 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:

jj									
Apper	ndix IV								
Antimony	Mercury								
Arsenic	Molybdenum								
Barium	Radium 226/228								
Beryllium	Selenium								
Cadmium	Thallium								
Chromium									
Cobalt									
Fluoride									
Lead									
Lithium									
	Arsenic Barium Beryllium Cadmium Chromium Cobalt Fluoride Lead								

### **CCR Rule Monitoring Constituents**

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



0 /
Assessment Monitoring
Copper
Nickel
Silver
Vanadium
Zinc

#### Additional Monitoring Constituents (Michigan Part 115/PA 640)

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.

<sup>&</sup>lt;sup>1</sup> 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.



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## **Tables**

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

	тос		Screen Interval	May 6, 2023			
Well Location	Elevation (ft) Geologic Unit o Screen Interval		Elevation (ft)	Depth to Water	Groundwater Elevation		
				(ft BTOC)	(ft)		
DEK Bottom Ash Pon	d		•				
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 Pon	d & Karn Lined Im	poundment					
DEK-MW-18001	593.47	Sand	579.2 to 574.2	9.48	583.99		
Karn Lined Impoundr	nent						
DEK-MW-15003	602.74	Sand	578.8 to 574.8	18.95	583.79		
OW-10			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 Exter	nt						
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 Lev	el						
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 2Summary of Field ParametersDE Karn Bottom Ash Pond – RCRA CCR Monitoring ProgramEssexville, Michigan

Sample Location	Sample Date	Dissolved Oxygen	Oxidation Reduction Potential	рН	Specific Conductivity	Temperature	Turbidity
		(mg/L)	(mV)	(SU)	(umhos/cm)	(°C)	(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 Po	ond						
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 3Summary of Groundwater Sampling Results (Analytical)DE Karn JC Weadock Background - RCRA CCR Monitoring ProgramEssexville, Michigan

					Sample Location:	MW-15002	MW-15008	MW-15016	
					Sample Date:	5/8/2024	5/8/2024	5/8/2024	
				MI Non-			Poole	ground	
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^		Dackų	ground	
Appendix III <sup>(1)</sup>									
Boron	ug/L	NC	500	500	4,000	21	142	398	
Calcium	mg/L	NC	NC	NC	500 <sup>EE</sup>	55.9	121	243	
Chloride	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	50	28.3	395	175	
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	
Sulfate	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	7.53	2.57	194	
Total Dissolved Solids	mg/L	500**	500 <sup>E</sup>	500 <sup>E</sup>	500	358	1,280	1,190	
pH, Field	SÜ	6.5 - 8.5**	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	6.5 - 9.0	7.7	7.0	7.1	
Appendix IV <sup>(1)</sup>									
Antimony	ug/L	6	6.0	6.0	2.0	< 1	< 1	< 1	
Arsenic	ug/L	10	10	10	10	< 1	3	17	
Barium	ug/L	2,000	2,000	2,000	1,200	43	93	157	
Beryllium	ug/L	4	4.0	4.0	33	< 1	< 1	< 1	
Cadmium	ug/L	5	5.0	5.0	2.5	< 0.2	< 0.2	< 0.2	
Chromium	ug/L	100	100	100	11	< 1	1	1	
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	
Lead	ug/L	NC	4.0	4.0	14	< 1	< 1	< 1	
Lithium	ug/L	NC	170	350	440	< 10	22	68	
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	
Molybdenum	ug/L	NC	73	210	120	< 5	< 5	< 5	
Radium-226	pCi/L	NC	NC	NC	NC	< 0.0742	0.589	< 0.149	
Radium-228	pCi/L	NC	NC	NC	NC	< 0.512	< 0.847	< 0.715	
Radium-226/228	pCi/L	5	NC	NC	NC	< 0.512	1.03	< 0.715	
Selenium	ug/L	50	50	50	5.0	< 1	< 1	1	
Thallium	ug/L	2	2.0	2.0	2.0	< 2	< 2	< 2	
Additional MI Part 1	15 <sup>(2)</sup>								
Iron	ug/L	300**	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	526	16,900	21,900	
Copper	ug/L	1,000**	1,000 <sup>E</sup>	1,000 <sup>E</sup>	20	2	1	2	
Nickel	ug/L	NC	100	100	120	2	4	10	
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	
Vanadium	ug/L	NC	4.5	62	27	< 2	9	2	
Zinc	ug/L	5,000**	2,400	5,000 <sup>E</sup>	260	< 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.

MW-15019
5/8/2024
241
241 173
173
374
< 1,000
93.8
1,340
7.0
< 1
2
364
< 1
< 0.2
< 1
< 6
< 1,000
< 1
14
14 < 0.2 < 5
< 5
0.332
< 0.638
0.822
< 1
<2
23,100
< 1
5
< 0.2
3
< 10
-

# Table 4Summary of Groundwater Sampling Results (Analytical)DE Karn Bottom Ash Pond - RCRA CCR Monitoring ProgramEssexville, 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
				MI Non-					
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^				
Appendix III <sup>(1)</sup>									
Boron	ug/L	NC	500	500	4,000	1,310	1,030	1,110	917
Calcium	mg/L	NC	NC	NC	500 <sup>EE</sup>	94.3	158	196	52.5
Chloride	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	60.3	358	545	226
Total Dissolved Solids	mg/L	500**	500 <sup>E</sup>	500 <sup>E</sup>	500	694	1,400	1,220	670
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>⊑</sup>	6.5 - 9.0	7.4	7.4	7.7	7.4
Appendix IV <sup>(1)</sup>									
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 11	5 <sup>(2)</sup>								
Iron	ug/L	300**	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	33	836	1,770	458
Copper	ug/L	1,000**	1,000 <sup>E</sup>	1,000 <sup>E</sup>	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 <sup>E</sup>	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-M\	N-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.

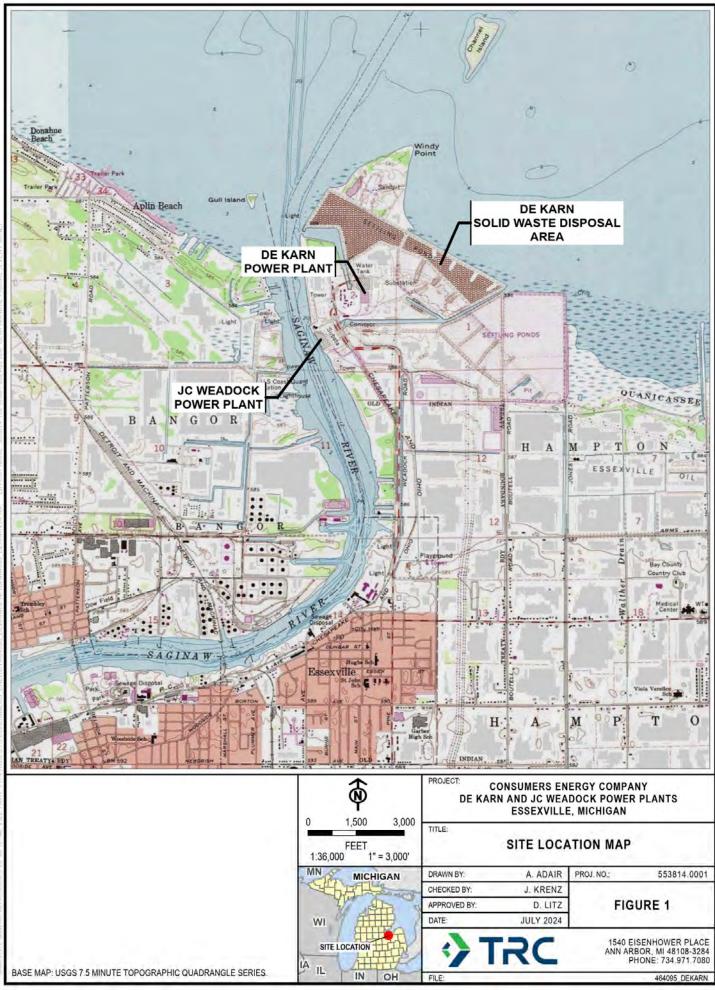
UCL - Upper Confidence Limit ( $\alpha = 0.01$ ) of the downgradient data set.

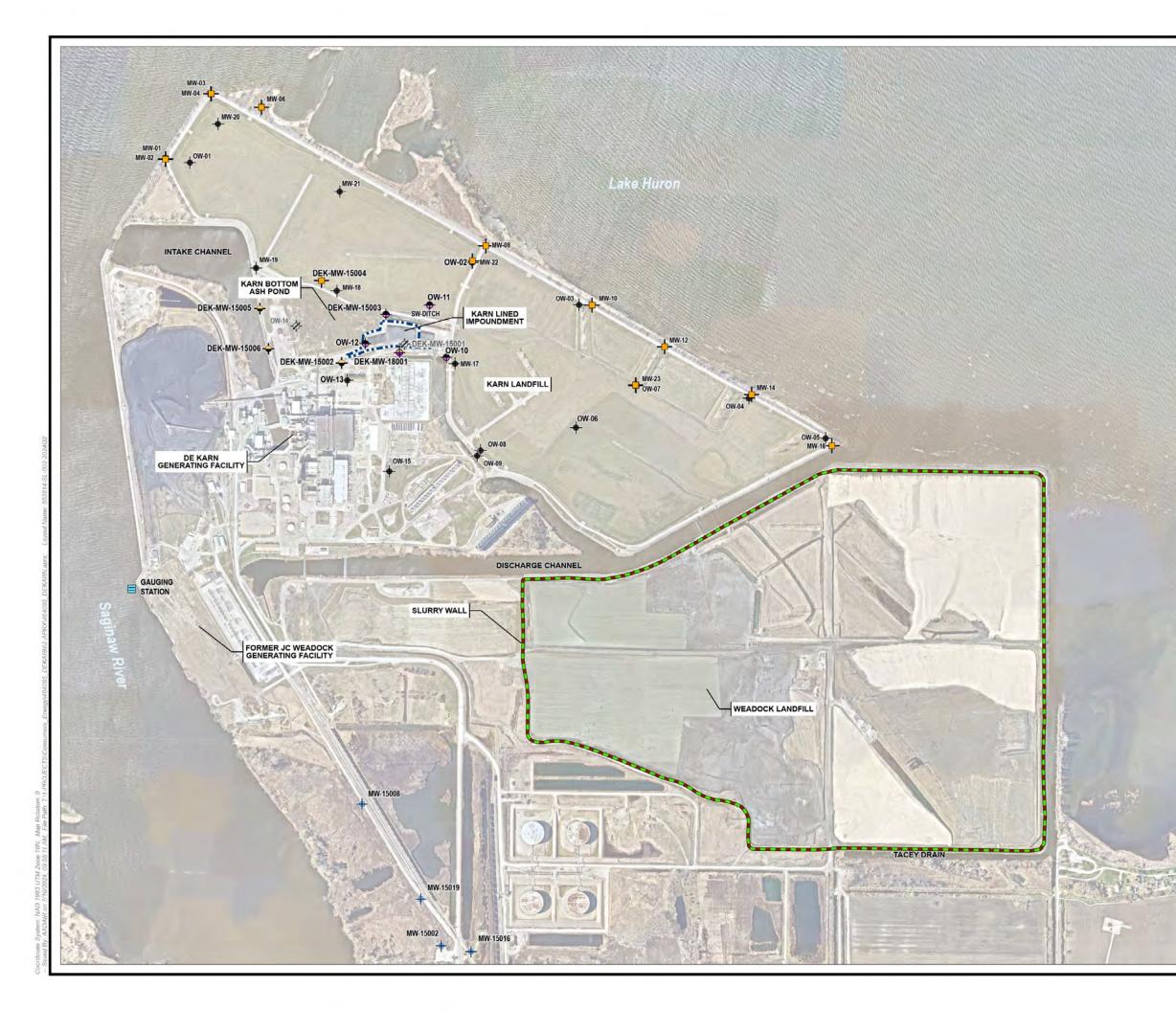
LCL - Lower Confidence Limit ( $\alpha = 0.01$ ) of the downgradient data set.

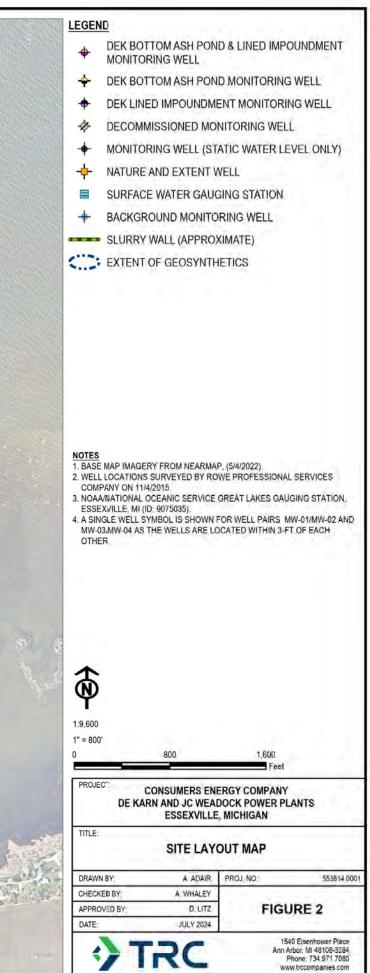
Indicates a statistically significant exceedance of the GWPS. An exceedance occurs when the LCL is greater than the GWPS.



# **Figures**

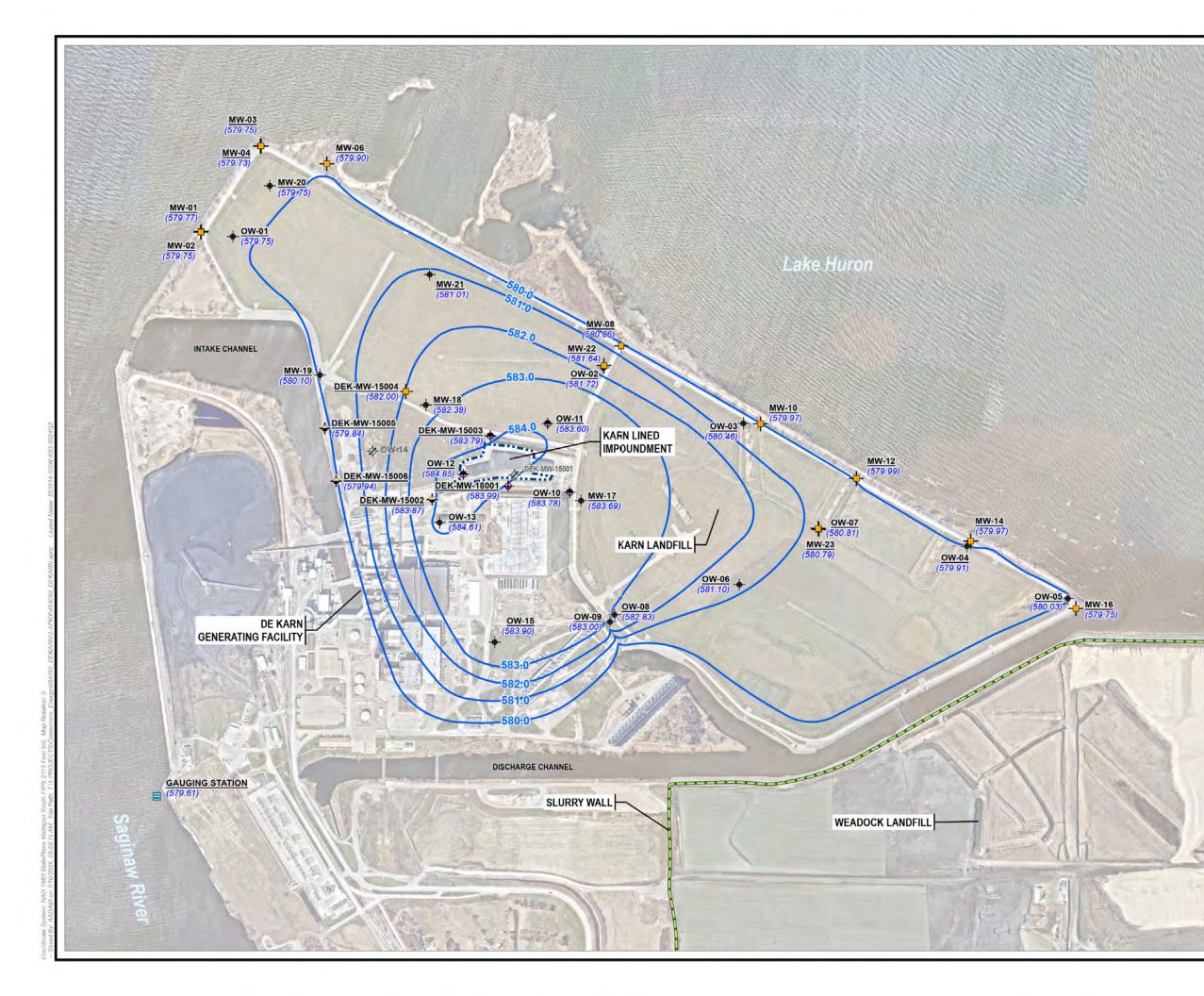




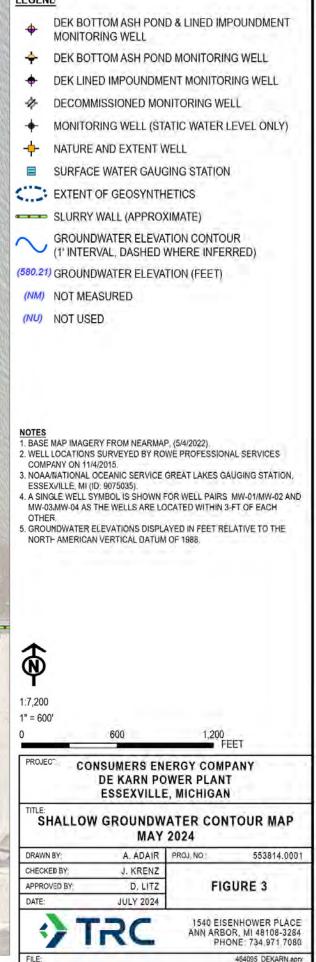


EILE:

464095 DEKARN.aprx









## 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	
DEK-MW-15005	5/9/2024		Field black contamination: potential false positive
DEK-MW-15006	5/9/2024		Field blank contamination; potential false positive.
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



### **Technical Memorandum**

Date:	July 30, 2024
То:	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 <sup>1</sup> 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 -

<sup>&</sup>lt;sup>1</sup> 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-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 <sup>2</sup>, 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

<sup>&</sup>lt;sup>2</sup> USEPA. 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance*. Office of Conservation and Recovery. EPA 530/R-09-007.

### **Technical Memorandum**

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

Groundwater data were then evaluated utilizing Sanitas<sup>TM</sup> statistical software. Sanitas<sup>TM</sup> is a software tool that is commercially available for performing statistical evaluation consistent with procedures outlined in the Unified Guidance. Within the Sanitas<sup>TM</sup> 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<sup>3</sup> 99 percent confidence level, i.e., a significance level ( $\alpha$ ) of 0.01. The following narrative describes the methods employed, the results obtained and the Sanitas<sup>TM</sup> 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<sup>™</sup> 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<sup>™</sup> 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

<sup>&</sup>lt;sup>3</sup> Confidence level is assessed for each individual comparison (i.e. per well and per constituent).

### **Technical Memorandum**

to provide an indication of current condition. The tests were run with a per-test significance of  $\alpha = 0.01$ . 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<sup>™</sup> 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<sup>™</sup> Output Files

## Table

				Sa	ample Location:						DEK-MV	V-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						downg	radient					
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.

 $^{\star}$  - 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.

				S	ample Location:					DEK-M	N-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					downg	radient				
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.

 $\mathsf{GWPS}$  - Groundwater Protection Standard.  $\mathsf{GWPS}$  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.

				Sa	ample Location:					DEK-M	W-15006				
	T				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					downg	gradient				
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.

TRUS Technical Memorandum dated October 15, 20

\* - 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.

				Sa	ample Location:				DEK-M	W-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				downg	radient			
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.

 $\mathsf{GWPS}$  - Groundwater Protection Standard.  $\mathsf{GWPS}$  is the higher of the MCL/RSL and UTL as established in

TRC's Technical Memorandum dated October 15, 2018.

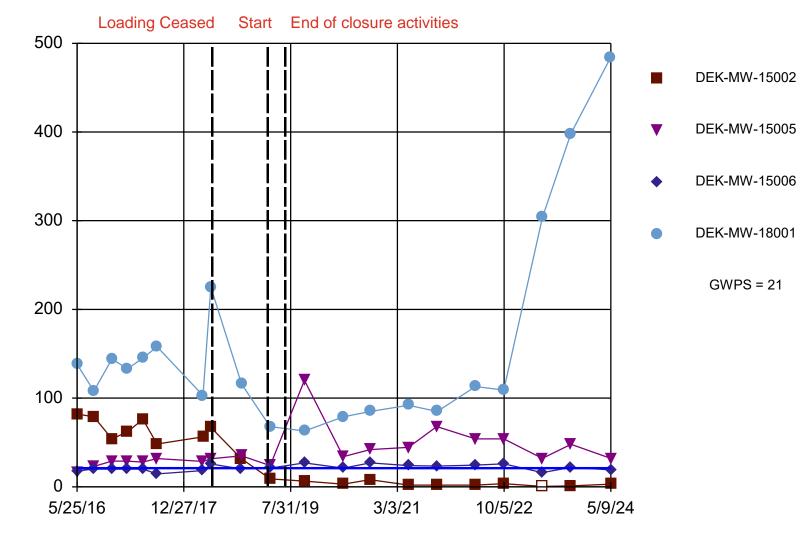
\* - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR) April 2012.

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.

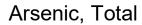
## Attachment 1 Sanitas™ Output Files

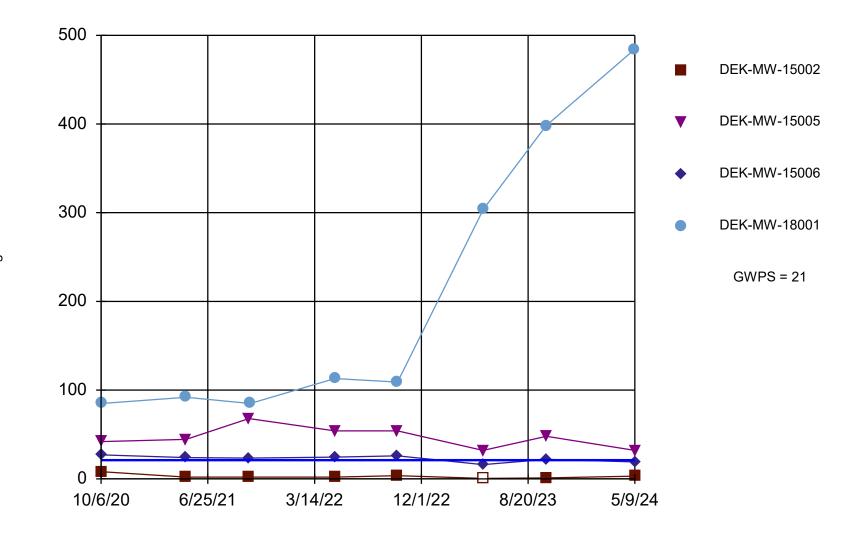
## Arsenic Comparison to GWPS

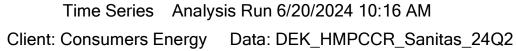


Time Series Analysis Run 6/20/2024 10:06 AM Client: Consumers Energy Data: DEK\_HMPCCR\_Sanitas\_24Q2

Sanitas<sup>™</sup> v.10.0.16 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.





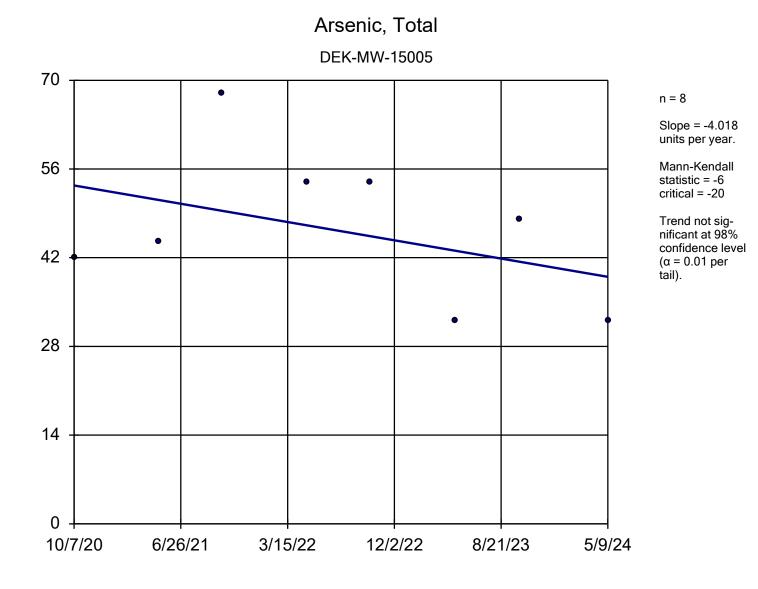


### **Summary Report**

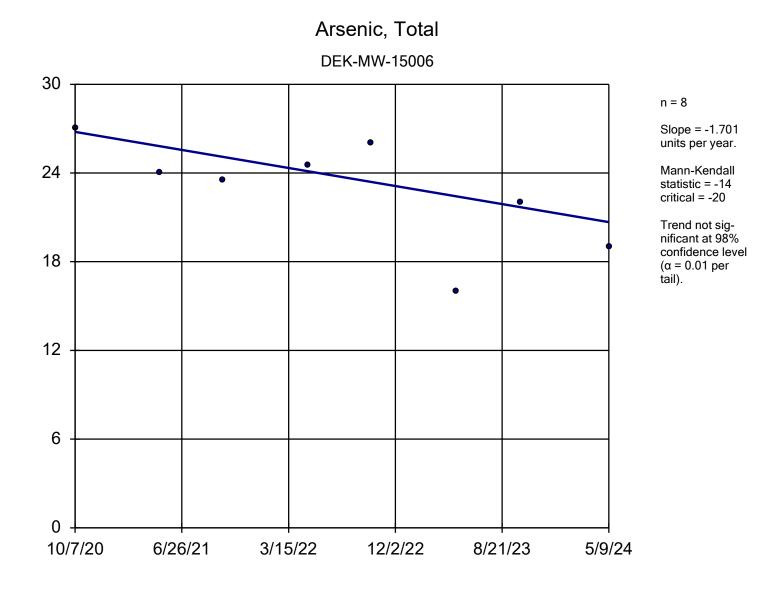
Constituent: Arsenic, Total Analysis Run 6/20/2024 10:17 AM Client: Consumers Energy Data: DEK\_HMPCCR\_Sanitas\_24Q2

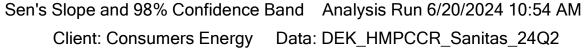
For observations made between 10/6/2020 and 5/9/2024, a summary of the selected data set:

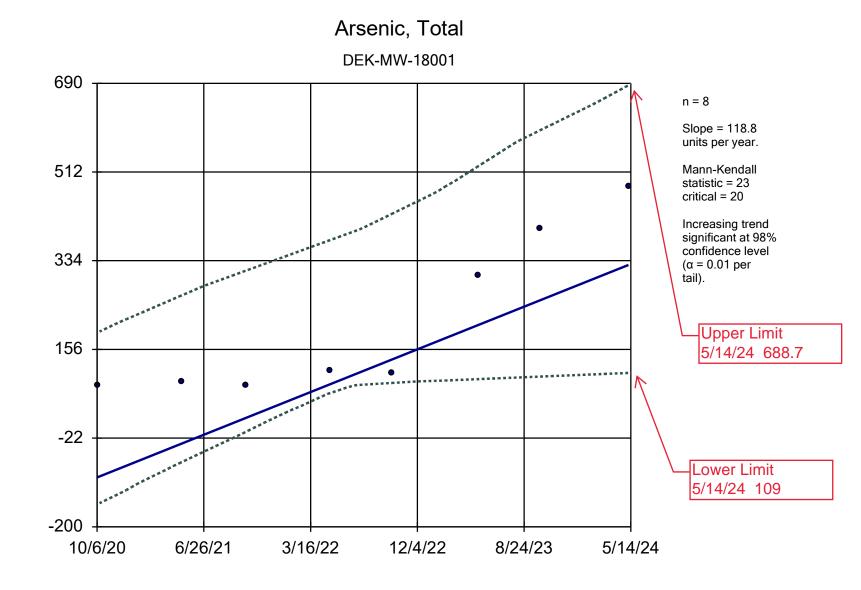
Observations = 32 NDs = 3% Wells = 4 Minimum Value = 1 Maximum Value = 484 Mean Value = 70.28 Median Value = 29.5 Standard Deviation = 113 Coefficient of Variation = Skewness = 2.606									
<u>Well</u>	<u>#Obs.</u>	<u>NDs</u>	<u>Min</u>	<u>Max</u>	<u>Mean</u>	<u>Median</u>	<u>Std.Dev.</u>	<u>CV</u>	<u>Skewness</u>
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



## Sen's Slope and 98% Confidence Band Analysis Run 6/20/2024 10:54 AM Client: Consumers Energy Data: DEK\_HMPCCR\_Sanitas\_24Q2



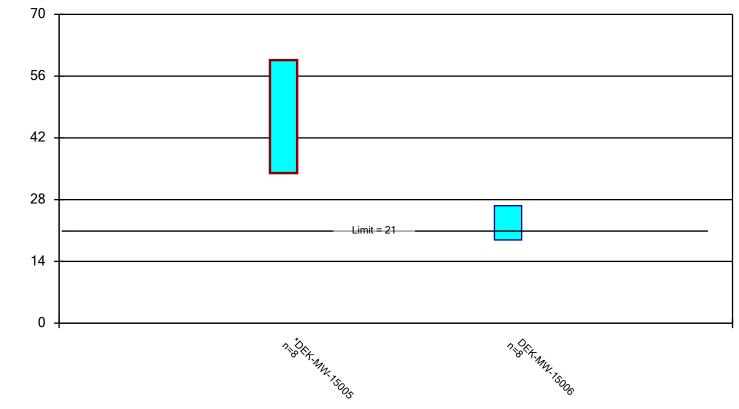




Sen's Slope and 98% Confidence Band Analysis Run 6/20/2024 10:55 AM Client: Consumers Energy Data: DEK\_HMPCCR\_Sanitas\_24Q2

### 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



135 W. Trail St. Jackson, MI 49201

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 2<sup>nd</sup> 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



Testing performed in accordance with the A2LA scope of accredidation specified in the listed certificate. The information contained in this report is the sole property of Consumers Energy. It cannot be reproduced except in full, and with consent from Consumers Energy, or the customer for which this report was issued.

### **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, 22<sup>nd</sup> Edition, 2012.

### III. <u>Results/Quality Control</u>

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
В	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
Н	The maximum recommended hold time was exceeded
Ι	Dilution required due to matrix interference; reporting limit elevated
J	Estimated due to result found above MDL but below PQL (or RL)
Κ	Reporting limit raised due to matrix interference
Μ	The precision for duplicate analysis was not met; RPD outside acceptance criteria
Ν	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
Х	Other notation required; comment listed in sample notes and/or case narrative



# Customer Name:Karn/Weadock ComplexWork Order ID:Q2-2024 DEK Bottom Ash Pond WellsDate Received:5/10/2024Chemistry Project:24-0339

Sample #	Field Sample ID	<u>Matrix</u>	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



Analyst: EB

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

Aliquot #: 24-0339-01-C01-A01

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

			-	Allquot #. 24-0	339-01-C01-A01	Allalyst. ED
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, To	tal, Aqueous			Aliquot #: 24-0	339-01-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 Aque	ous, NO2, NO3			Aliquot #: 24-0	339-01-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, S	5O4, Aqı	leous	Aliquot #: 24-0	339-01-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

24-0339 Page 5 of 19



Sample Site:	DEK Bottom Ash Pond	Laboratory Project:	24-0339
Field Sample ID:	DEK-MW-15002	Collect Date:	05/09/2024
Lab Sample ID:	24-0339-01	Collect Time:	10:31 AM
Matrix:	Groundwater		

Anions by EPA 300.0 CCR Rule Analy	/te List, Cl, F,	SO4, Aqu	leous	Aliquot #: 24-0	339-01-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)	), Groundwate	er HL		Aliquot #: 24-0	339-01-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 #: 24-0	339-01-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 #: 24-0	339-01-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 #: 24-0	339-01-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



Analyst: EB

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

Aliquot #: 24-0339-02-C01-A01

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

			-	Aliquot #: 24-0	339-02-C01-A01	Analyst: ED
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, T	otal, Aqueous			Aliquot #: 24-0	339-02-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 Aqu	ieous, NO2, NO3			Aliquot #: 24-0	339-02-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 CCF	R Rule Analyte List, Cl, F, S	04, Aqı	leous	Aliquot #: 24-0	339-02-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

24-0339 Page 7 of 19

**24-0339** 05/09/2024 08:37 AM



Sample Site:	DEK Bottom Ash Pond	Laboratory Project:
Field Sample ID:	DEK-MW-15005	Collect Date:
Lab Sample ID:	24-0339-02	Collect Time:
Matrix:	Groundwater	

Anions by EPA 300.0 CCR Rule Analyte List, CI, 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 #: 24-0	339-02-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 #: 24-0	339-02-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	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

Aliquot #: 24-0339-03-C01-A01

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

			-	Aliquol #. 24-0	339-03-C01-A01	Analysi. ED
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, A	queous			Aliquot #: 24-0	339-03-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, I	NO2, NO3			Aliquot #: 24-0	339-03-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, Aqı	leous	Aliquot #: 24-0	339-03-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

24-0339 Page 9 of 19

**24-0339** 05/09/2024 11:38 AM



Sample Site:	DEK Bottom Ash Pond	Laboratory Project:
Field Sample ID:	DEK-MW-15006	Collect Date:
Lab Sample ID:	24-0339-03	Collect Time:
Matrix:	Groundwater	

Anions by EPA 300.0 CCR Rule An	alyte List, Cl, F,	SO4, Aqı	ieous	Aliquot #: 24-0	339-03-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), Groundwate	r HL		Aliquot #: 24-0	339-03-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 2540	с			Aliquot #: 24-0	339-03-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 #: 24-0	339-03-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 #: 24-0	339-03-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



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

Aliquot #: 24-0339-04-C01-A01

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

			-	Allquot #: 24-0	339-04-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, To	otal, Aqueous			Aliquot #: 24-0	339-04-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 Aque	eous, NO2, NO3			Aliquot #: 24-0	339-04-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, S	04, Aqı	leous	Aliquot #: 24-0	339-04-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

24-0339 Page 11 of 19



Sample Site:	DEK Bottom Ash Pond	Laboratory Project:	24-0339
Field Sample ID:	DUP-DEK-BAP-01	Collect Date:	05/09/2024
Lab Sample ID:	24-0339-04	Collect Time:	12:00 AM
Matrix:	Groundwater		

Anions by EPA 300.0 CCR Rule Analy	te List, Cl, F, S	604, Aqı	ieous	Aliquot #: 24-0	339-04-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 #: 24-0	339-04-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 #: 24-0	339-04-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 #: 24-0	339-04-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 #: 24-0	339-04-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



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

05/14/2024

25.0

AB24-0514-02

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

Metals by EPA 6020B: CCR Rule A	ppendix III-IV To	tal Metals	s Exp	Aliquot #: 24-0	339-05-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, Aqu	ieous			Aliquot #: 24-0	339-05-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, NO	D2, NO3			Aliquot #: 24-0	339-05-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	B(h), Groundwate	er HL		Aliquot #: 24-0	339-05-C03-A01	Analyst: CLE
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking

ug/L

ND

Ammonia



**24-0339** 05/09/2024 11:38 AM

Sample Site:	DEK Bottom Ash Pond	Laboratory Project:
Field Sample ID:	FB-DEK-BAP	Collect Date:
Lab Sample ID:	24-0339-05	Collect Time:
Matrix:	Water	

Sulfide, Total by SM 4500 S2D	liquot #: 24-0	Analyst: Merit			
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Sulfide	ND	ug/L	20.0	05/13/2024	AB24-0513-15

24-0339 Page 14 of 19



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

05/14/2024

25.0

AB24-0514-02

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

Metals by EPA 6020B: CCR Rule Ap	pendix III-IV To	otal Metals	s Ехр	Aliquot #: 24-0	339-06-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, Aque	ous			Aliquot #: 24-0	339-06-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 #: 24-0	339-06-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	n), Groundwate	er HL		Aliquot #: 24-0	339-06-C03-A01	Analyst: CLE
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking

24-0339 Page 15 of 19

ug/L

ND

Ammonia



**24-0339** 05/09/2024 12:00 PM

Sample Site: Field Sample ID:	DEK Bottom Ash Pond EB-DEK-BAP	Laboratory Project: Collect Date:
Lab Sample ID:		Collect Time:
Matrix:	Water	

Sulfide, Total by SM 4500 S2D	AI	iquot #: 24-0	Analyst: Merit		
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Sulfide	ND	ug/L	20.0	05/13/2024	AB24-0513-15

24-0339 Page 16 of 19



Exception Summary

D = RL increased due to dilution.

No other exceptions occurred.

CONSUMERS ENERGY Chemistry Department

General Standard Operating Procedure

PROC CHEM-1.2.01 PAGE 1 OF 2 REVISION 4 ATTACHMENT A

## TITLE: SAMPLE LOG-IN - SHIPMENT INSPECTION FORM

		Sec. 143				
	t Log-In Number:					
Inspec	ction Date:OSL	0/24	-	Inspection By:		
Samp	e Origin/Project Name:	DEK	BAP			
Shipn	ent Delivered By: Enter	the type of	shipment ca	rrier.		
	Pony Fe	dEx	LIP	S USPS	Airb	orne
	Other/Hand Carry (who					
	Tracking Number:				a state of the second se	
Shipp				ipping containers received.		
	Cooler <u>C</u>			66, 6,	Envelope	Mailer
	Loose/Unpackaged Cor					
Cond				n of the shipment container.		
Cond						
	Damaged Shipment Ob				_ Leak	cing
	Other					
Shipn	nent Security: Enter if an	y of the shi	pping contai	ners were opened before rece	sipt.	
	Shipping Containers Re	eceived: Oj	pened	Sealed	-	
Enclo	sed Documents: Enter th	e type of do	ocuments end	losed with the shipment.		
1000				Air Data Sheet	Other	
				Contraction of Contraction		
Temp				of several sample containers		
	As-Received Temperat	ure Range_	0.9-3.2	Samples Received on	Ice: Yes 🗠 N	0
	M&TE # and Expiratio	DISH	62			
Numl	per and Type of Contains	5-2	3.24 he total num	ber of sample containers rece	eived	
		Water 8	Soil	Other	Broken	Leaking
	VOA (40mL or 60mL) Quart/Liter (g/p)					
	9-oz (amber glass jar)					
FSP 0.14pH	2-oz (amber glass)					
# 13.640-508	125 mL (plastic)	24				
16+:205522	24 mL vial (glass)					
exp: 2.15.25	500 mL (plastic)	4				
and the second	Other					

PG. 282 not needed

# **CHAIN OF CUSTODY**



## **CONSUMERS ENERGY COMPANY – LABORATORY SERVICES**

Q2-2024 DEK Bottom Ash Pond Wells SAMPLING TEAM: TURNAROUN		PROJECT NUMBER:	SAP CC or	SAP CC or WO#:								NAI	VSI	a a bara a statute tart a					
		24-0339	REQUESTI	REQUESTER: Harold Register						ANALYSIS REQUESTED (Attach List if More Space is Needed)							QA REQUIREMENT		
		TURNAROUND TIME REQUIRED:	TANDARD 🛛	OTHER_													□ NPDES ⊠ TNI		
SEND REPORT TO:	Joseph Firlit			emaîl:	phone:														□ ISO 17025
COPY TO:	Harold Regist	ter		MATRIX CODES: GW = Groundwater OX = Othe	er		co	ONT	AIN	VER	s			6					□ 10 CFR 50 APP. B
	TRC			WW = Wastewater SL = Slue W = Water / Aqueous Liquid A = Air			F	RE	SER	VA	TIVE	als							□ INTERNAL INFO
LAB	SAMPLE COLL	ECTION	XIX	S = Soil / General Solid WP = W	ipe meral Waste	#TV				_	-	Total Metals	ns	Ammonia		Alkalinity	ide		OTHER
SAMPLE ID	DATE	TIME	MATRIX	FIELD SAMPLE ID / LOCATION		Z	None HNO <sub>3</sub>		H <sub>2</sub> SO NaOH		MeO	Tota	Anions	Ami	TDS	Alka	Sulfide		REMARKS
24-0339-01	5-9-24	1031	GW	DEK-MW-15002		7	4	1	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	1178	GW	DEK-MW-15006		7	4	1	1 1	1		x	x	x	x	x	x		
-04	5-9-24	-	GW	DUP-DEK-BAP-01		7	4	ĩ	1 1	I		x	x	x	x	x	x		
-05	5-9-24	1138	w	FB-DEK-BAP		4	1	I.	1 1	1		x	x	x			x		
<b>↓</b> -06	5-9-24	1200	W	EB-DEK-BAP		4	I	1	1 1	I		x	x	x			x		
									-	-		1							
			-							+		1							
ELINQUISHED BY:	$\sim$			rime: 0-24/0759	RECEIVED BY:							CO	MME	ENTS					

RECEIVED BY:

Temperature: 0.9-3.2 °C

Cal. Due Date: 5-23-24



135 W. Trail St. Jackson, MI 49201

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 2<sup>nd</sup> 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



Testing performed in accordance with the A2LA scope of accredidation specified in the listed certificate. The information contained in this report is the sole property of Consumers Energy. It cannot be reproduced except in full, and with consent from Consumers Energy, or the customer for which this report was issued.

### **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. <u>Methodology</u>

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, 22<sup>nd</sup> Edition, 2012.

### III. <u>Results/Quality Control</u>

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

<u>Qualifier</u>	Description
*	Generic data flag, applicable description added in the corresponding notes section
В	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
Н	The maximum recommended hold time was exceeded
Ι	Dilution required due to matrix interference; reporting limit elevated
J	Estimated due to result found above MDL but below PQL (or RL)
Κ	Reporting limit raised due to matrix interference
Μ	The precision for duplicate analysis was not met; RPD outside acceptance criteria
Ν	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
Х	Other notation required; comment listed in sample notes and/or case narrative



# Customer Name:Karn/Weadock ComplexWork Order ID:Q2-2024 DEK Bottom Ash Pond & Lined ImpoundmentDate Received:5/9/2024Chemistry Project:24-0340

Sample #	Field Sample ID	<u>Matrix</u>	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



Sample Site:	DEK Bottom Ash Pond & Lined Impoundment	Laboratory Project:	24-0340
Field Sample ID:	DEK-MW-18001	Collect Date:	05/08/2024
Lab Sample ID: 2	24-0340-01	Collect Time:	01:03 PM
Matrix: C	Groundwater		

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

Metals by EPA 6020B: CCR Rule Appen	ndix III-IV Tota	al Metals	s Exp	Aliquot #: 24-0	340-01-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	8			Aliquot #: 24-0	340-01-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, N	03			Aliquot #: 24-0	340-01-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	e List, Cl, F, S	ο4, Aqι	leous	Aliquot #: 24-0	340-01-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

24-0340 Page 5 of 13



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

Anions by EPA 300.0 CCR Rule Analyte List, CI, 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)	, Groundwat	er HL		Aliquot #: 24-0	340-01-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 #: 24-0	340-01-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 #: 24-0	340-01-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 #: 24-0	340-01-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



Sample Site:	DEK Bottom Ash Pond & Lined Impoundment	Laboratory Project:	24-0340
Field Sample ID:	DEK-MW-18001 MS	Collect Date:	05/08/2024
Lab Sample ID:	24-0340-02	Collect Time:	01:03 PM
Matrix:	Groundwater		

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

Metals by EPA 6020B: CCR Rule Appen	dix III-IV Tot	al Metals	s Ехр	Aliquot #: 24-0	340-02-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 #: 24-0	340-02-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, NO	03			Aliquot #: 24-0	340-02-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, S	604 <u>,</u> Aqu	ieous	Aliquot #: 24-0	340-02-C02-A02	Analyst: KDR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	105		%	1000.0	05/14/2024	AB24-0513-11



Sample Site:	DEK Bottom Ash Pond & Lined Impoundment	Laboratory Project:	24-0340
Field Sample ID:	DEK-MW-18001 MS	Collect Date:	05/08/2024
Lab Sample ID:	24-0340-02	Collect Time:	01:03 PM
Matrix:	Groundwater		

Anions by EPA 300.0 CCR Rule Ar	nalyte List, Cl, F,	SO4, Aqu	Jeous	Aliquot #: 24-0	340-02-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	B(h), Groundwate	er HL		Aliquot #: 24-0	340-02-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 #: 24-0	340-02-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 #: 24-0	340-02-C06-A01	Analyst: Merit
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfide	92		%	20.0	05/10/2024	AB24-0510-05



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		

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

dix III-IV Tot	al Metals	s Exp	Aliquot #: 24-0	340-03-C01-A01	Analyst: EB
Result	Flag	Units	RL	Analysis Date	Tracking
107		%	1.0	05/13/2024	AB24-0513-12
106		%	1.0	05/13/2024	AB24-0513-12
106		%	5.0	05/13/2024	AB24-0513-12
99		%	1.0	05/13/2024	AB24-0513-12
105		%	20.0	05/13/2024	AB24-0513-12
105		%	0.2	05/13/2024	AB24-0513-12
95.8		%	1000.0	05/13/2024	AB24-0513-12
96		%	1.0	05/13/2024	AB24-0513-12
96		%	6.0	05/13/2024	AB24-0513-12
91		%	1.0	05/13/2024	AB24-0513-12
103		%	20.0	05/13/2024	AB24-0513-12
100		%	1.0	05/13/2024	AB24-0513-12
101		%	10.0	05/13/2024	AB24-0513-12
104		%	1000.0	05/13/2024	AB24-0513-12
101		%	5.0	05/13/2024	AB24-0513-12
110		%	5.0	05/13/2024	AB24-0513-12
94		%	2.0	05/13/2024	AB24-0513-12
102		%	100.0	05/13/2024	AB24-0513-12
108		%	1.0	05/13/2024	AB24-0513-12
98.0		%	0.2	05/13/2024	AB24-0513-12
105		%	1000.0	05/13/2024	AB24-0513-12
98		%	2.0	05/13/2024	AB24-0513-12
99		%	2.0	05/13/2024	AB24-0513-12
91		%	10.0	05/13/2024	AB24-0513-12
			Aliquot #: 24-0	340-03-C01-A02	Analyst: CLE
Result	Flag	Units	RL	Analysis Date	Tracking
101		%	0.2	05/20/2024	AB24-0515-03
<b>D</b> 3			Aliquot #: 24-0	340-03-C02-A01	Analyst: KDR
Result	Flag	Units	RL	Analysis Date	Tracking
94		%	100.0	05/09/2024	AB24-0509-16
105		%	100.0	05/09/2024	AB24-0509-16
List, Cl, F, S	504 <u>,</u> Aqı	ieous	Aliquot #: 24-0	340-03-C02-A02	Analyst: KDR
Result	Flag	Units	RL	Analysis Date	Tracking
103		%	1000.0	05/14/2024	AB24-0513-11
	Result         107         106         106         99         105         105         105         99         105         90         91         103         100         101         104         101         104         101         104         105         98         99         91         105         98         99         91         105         98         99         91         03         Result         94         105         94         105         94         105         Elist, CI, F, S         Result	Result       Flag         107       106         106       99         105       105         105       99         105       96         96       96         91       103         100       101         101       104         101       101         104       101         105       98         98.0       105         105       98         99       91         105       98         99       91         105       98         99       91         105       Flag         101       105         98       99         91       Flag         101       Flag         105       Flag	107       %         106       %         106       %         99       %         105       %         105       %         96       %         96       %         96       %         91       %         103       %         104       %         101       %         104       %         101       %         104       %         105       %         94       %         95       %         91       %         101       %         102       %         98.0       %         98.0       %         99       %         91       %         92       %         93       %         94       %         101       %         94       %         101       %         94       %         105       %         94       %         105       %         94       %	Result         Flag         Units         RL           107         %         1.0           106         %         5.0           99         %         1.0           105         %         20.0           105         %         20.0           105         %         0.2           95.8         %         1000.0           96         %         1.0           96         %         1.0           97         %         1.0           96         %         1.0           96         %         1.0           96         %         1.0           96         %         1.0           103         %         20.0           104         %         10.0           105         %         100.0           104         %         2.0           105         %         100.0           98.0         %         2.0           98.0         %         2.0           99         %         2.0           99         %         2.0           99         %         2.0	Result         Flag         Units         RL         Analysis Date           107         %         1.0         05/13/2024           106         %         1.0         05/13/2024           106         %         5.0         05/13/2024           106         %         20.0         05/13/2024           105         %         20.0         05/13/2024           105         %         20.0         05/13/2024           105         %         0.2         05/13/2024           96         %         1.0         05/13/2024           96         %         1.0         05/13/2024           96         %         1.0         05/13/2024           91         %         1.0         05/13/2024           103         %         20.0         05/13/2024           104         %         10.0         05/13/2024           104         %         1000.0         05/13/2024           104         %         1000.0         05/13/2024           104         %         1000.0         05/13/2024           104         %         2.0         05/13/2024           102         % <t< td=""></t<>



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 A	nalyte List, Cl, F,	SO4, Aqu	Jeous	Aliquot #: 24-0	340-03-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 SM4500NH	3(h), Groundwate	er HL		Aliquot #: 24-0	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 #: 24-0	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 #: 24-0	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.

Chemistry Department

PROC CHEM-1.2.01 PAGE 1 OF 2 **REVISION 4** ATTACHMENT A

General Standard Operating Procedure

### TITLE: SAMPLE LOG-IN - SHIPMENT INSPECTION FORM

	Project Log-In Number: _	24-034	0						
	Inspection Date:5	5.9.24	I	nspection By:	· · · · ·				
	Sample Origin/Project Nan	ne: DEK	BAP	+ KI					
	Shipment Delivered By: En								
				USPS		orne			
				Shipping Form Atta		No			
	Shipping Containers: Ente								
	Cooler (1)	Cardboard Box _	_	Custom Case					
	Loose/Unpackaged			Other					
	Condition of Shipment: En	ter the as-received	condition of	the shipment container.					
	Damaged Shipment Other			Dented		ing			
	Shipment Security: Enter i	f any of the shippin	g containers	were opened before rece	eipt.				
			71	Sealed					
	Enclosed Documents: Ente	r the type of docum	ents enclose	d with the shipment.					
	CoC /	Vork Request		Air Data Sheet	Other				
	Temperature of Containers: Measure the temperature of several sample containers.								
	As-Received Temp	erature Range	- 2.0°c	Samples Received on	Ice: Yes <u> </u>	0			
	M&TE # and Expir								
	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	·) ·			1.				
120 10 10	Quart/Liter (g/p)					_			
FSP 0-14	9-oz (amber glass ja	ur)							
# 13 -640-508	2-oz (amber glass)								
104: 205522	125 mL (plastic)	12	_						
exp: 2-15-25	24 mL vial (glass)					-			
	250500 mL (plastic)	<u> </u>	2						
	Other								

# **CHAIN OF CUSTODY**



Fed-Ex

5.9.24

1130

# **CONSUMERS ENERGY COMPANY – LABORATORY SERVICES**

Page 1 of ]

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

SAMPLING SITE / CUSTOMER: Q2-2024 DEK Bottom Ash Pond & Lined Impound. SAMPLING TEAM:				PROJECT NUMBER: SAP CC or WC		VO#:	D#:				ANALYSIS REQUESTED																		
			bound.	24-0340	REQUESTER	REQUESTER: Harold Register				(Attach List if More Space is Needed)					QA REQUIREMEN														
				TURNAROUND TIME REQUIRED;																□ NPDES									
	J. Krenz			□ 24 HR □ 48 HR □ 3 DAYS □ S	TANDARD 🛛 O	THER_				_	_																		🖾 TNI
SEND REPORT TO:				email:	phone:		· · · · · · · · · · · · · · · · · · ·												□ ISO 17025										
COPY TO:	Harold Regist	ter		MATRIX CODES: GW = Groundwater OX = Othe	ar -		C	ONT	AIN	ERS	5																D 10 CFR 50 APP, B		
	TRC				WW = Wastewater SL = Sludge		F	PRE	SERV	VAT	IVE	als								INTERNAL INFO									
LAB	SAMPLE COLI	LECTION	RIX	S = Soil / General Solid O = Oil WP = Wipe WT = General Waste FIELD SAMPLE ID / LOCATION		TOTAL #	TT.		Total Metals	suc	Amnonia		Alkalinity	de			OTHER												
SAMPLE ID	DATE	TIME	MATRIX			TOTA None HNO <sub>5</sub> H <sub>5</sub> SO <sub>4</sub> H <sub>5</sub> SO <sub>4</sub> H <sub>5</sub> SO <sub>4</sub> HCI MeOH AcO	Tota	Anions	Amr	TDS	Alka	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	1		ĠW	DEK-MW-18001 MS		6	3	ı	1 1			x	x	x		x	x												
-03	J	J	GW	DEK-MW-18001 MSD		6	3	1	1 1			x	x	x		x	x												
										1		1																	
												1		-					1										
												1			-		-												
							1			-		-		-		-													
									1		-																		
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RELINQUISHED BY:			DATE	DIME:	RECEIVED BY:							0	MMI	TAITS		1.1													
KELINQUISHO BT.	1 .				RECEIVED DI.								AVIIVII	CIN 1 3	6														
allan / no	hut		5/8	124 1700	Fed - EX		_									1													
RELINQUISHED BY:	X	1	DATE/	TIME:	RECEIVED BY:							Re	ceived	d on l	ce? [	Yes	s 🗆 1	No		TE #: 015402									
					S. S. S. 19							Ter	прега	ture:	0.2	2.0	°C		Cal. I	Due Date: 5-23-24									

340 Page 13



135 W. Trail St. Jackson, MI 49201

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 2<sup>nd</sup> 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



Testing performed in accordance with the A2LA scope of accredidation specified in the listed certificate. The information contained in this report is the sole property of Consumers Energy. It cannot be reproduced except in full, and with consent from Consumers Energy, or the customer for which this report was issued.

### **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. <u>Methodology</u>

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, 22<sup>nd</sup> Edition, 2012.

### III. <u>Results/Quality Control</u>

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

SM Standard Methods Compendium

#### 24-0343 Page 2 of 13

<u>Qualifier</u>	Description
*	Generic data flag, applicable description added in the corresponding notes section
В	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
Н	The maximum recommended hold time was exceeded
Ι	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
Μ	The precision for duplicate analysis was not met; RPD outside acceptance criteria
Ν	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
Х	Other notation required; comment listed in sample notes and/or case narrative



# Customer Name:Karn/Weadock ComplexWork Order ID:Q2-2024 DEK-JCW Background WellsDate Received:5/10/2024Chemistry Project:24-0343

Sample #	Field Sample ID	<u>Matrix</u>	Sample Date	<u>Site</u>
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



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

Aliquot #: 24-0343-01-C01-A01

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

			-	Allqu01 #. 24-0	343-01-C01-A01	Allalysi. ED
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, A	Aqueous			Aliquot #: 24-0	343-01-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, Aqı	ieous	Aliquot #: 24-0	343-01-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 2	540C			Aliquot #: 24-0	343-01-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



Sample Site:DEK JCW BackgroundField Sample ID:MW-15008Lab Sample ID:24-0343-02Matrix:Groundwater

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

Aliquot #: 24-0343-02-C01-A01

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

		-	Aliquot #: 24-0	343-02-C01-A01	Analyst: ED
Result	Flag	Units	RL	Analysis Date	Tracking
ND		ug/L	1.0	05/14/2024	AB24-0515-01
3		ug/L	1.0	05/14/2024	AB24-0515-01
93		ug/L	5.0	05/14/2024	AB24-0515-01
ND		ug/L	1.0	05/14/2024	AB24-0515-01
142		ug/L	20.0	05/14/2024	AB24-0515-01
ND		ug/L	0.2	05/14/2024	AB24-0515-01
121000		ug/L	1000.0	05/14/2024	AB24-0515-01
1		ug/L	1.0	05/14/2024	AB24-0515-01
ND		ug/L	6.0	05/14/2024	AB24-0515-01
1		ug/L	1.0	05/14/2024	AB24-0515-01
16900		ug/L	20.0	05/14/2024	AB24-0515-01
ND		ug/L	1.0	05/14/2024	AB24-0515-01
22		ug/L	10.0	05/14/2024	AB24-0515-01
19300		ug/L	1000.0	05/14/2024	AB24-0515-01
ND		ug/L	5.0	05/14/2024	AB24-0515-01
4		ug/L	2.0	05/14/2024	AB24-0515-01
3180		ug/L	100.0	05/14/2024	AB24-0515-01
ND		ug/L	1.0	05/14/2024	AB24-0515-01
ND		ug/L	0.2	05/14/2024	AB24-0515-01
221000		ug/L	1000.0	05/14/2024	AB24-0515-01
ND		ug/L	2.0	05/14/2024	AB24-0515-01
9		ug/L	2.0	05/14/2024	AB24-0515-01
ND		ug/L	10.0	05/14/2024	AB24-0515-01
Aqueous			Aliquot #: 24-0	343-02-C01-A02	Analyst: CLE
Result	Flag	Units	RL	Analysis Date	Tracking
ND		ug/L	0.2	05/20/2024	AB24-0515-05
Analyte List, Cl, F,	SO4, Aqı	leous	Aliquot #: 24-0	343-02-C02-A01	Analyst: KDR
Result	Flag	Units	RL	Analysis Date	Tracking
395000		ug/L	1000.0	05/16/2024	AB24-0514-08
ND		ug/L	1000.0	05/15/2024	AB24-0514-08
2570		ug/L	1000.0	05/15/2024	AB24-0514-08
540C			Aliquot #: 24-0	343-02-C03-A01	Analyst: CLE
Result	Flag	Units	RL	Analysis Date	Tracking
1280		mg/L	10.0	05/10/2024	AB24-0510-10
	ND         3         93         ND         142         ND         121000         1         ND         1         10900         1         10900         1         10900         ND         1         10900         ND         22         19300         ND         4         3180         ND         4         3180         ND         2210000         ND         2210000         ND         2210000         ND         9         ND         221000         ND         9         ND         9         ND         9         ND         Paleyte         Kesult         395000         ND         2570	ND         3         93         ND         142         ND         121000         1         ND         121000         1         ND         1         16900         ND         22         19300         ND         22         19300         ND         4         3180         ND         4         3180         ND         221000         ND         221000         ND         221000         ND         9         ND         221000         ND         9         ND         221000         ND         9         ND         Pesuit       Flag         395000         ND         2570         540C	ND       ug/L         3       ug/L         93       ug/L         ND       ug/L         142       ug/L         121000       ug/L         121000       ug/L         1       ug/L	Result         Flag         Units         RL           ND         ug/L         1.0           3         ug/L         5.0           ND         ug/L         5.0           ND         ug/L         20.0           ND         ug/L         20.0           ND         ug/L         0.2           121000         ug/L         1.0           ND         ug/L         1.0           16900         ug/L         1.0           16900         ug/L         1.0           22         ug/L         1.0           19300         ug/L         1.0           19300         ug/L         1.0           ND         ug/L         1.00           MQueous <td>Result         Flag         Units         RL         Analysis Date           ND         ug/L         1.0         05/14/2024           3         ug/L         5.0         05/14/2024           93         ug/L         5.0         05/14/2024           ND         ug/L         1.0         05/14/2024           ND         ug/L         20.0         05/14/2024           142         ug/L         0.2         05/14/2024           ND         ug/L         1.0         05/14/2024           142         ug/L         1.0         05/14/2024           121000         ug/L         1.0         05/14/2024           1         ug/L         1.0         05/14/2024           1         ug/L         1.0         05/14/2024           1         ug/L         1.0         05/14/2024           1         ug/L         100.0         05/14/2024           1         ug/L         100.0         05/14/2024           1         ug/L         100.0         05/14/2024           ND         ug/L         100.0         05/14/2024           ND         ug/L         1.0         05/14/2024           ND</td>	Result         Flag         Units         RL         Analysis Date           ND         ug/L         1.0         05/14/2024           3         ug/L         5.0         05/14/2024           93         ug/L         5.0         05/14/2024           ND         ug/L         1.0         05/14/2024           ND         ug/L         20.0         05/14/2024           142         ug/L         0.2         05/14/2024           ND         ug/L         1.0         05/14/2024           142         ug/L         1.0         05/14/2024           121000         ug/L         1.0         05/14/2024           1         ug/L         1.0         05/14/2024           1         ug/L         1.0         05/14/2024           1         ug/L         1.0         05/14/2024           1         ug/L         100.0         05/14/2024           1         ug/L         100.0         05/14/2024           1         ug/L         100.0         05/14/2024           ND         ug/L         100.0         05/14/2024           ND         ug/L         1.0         05/14/2024           ND

24-0343 Page 6 of 13



Sample Site:DEK JCW BackgroundField Sample ID:MW-15016Lab Sample ID:24-0343-03Matrix:Groundwater

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

Aliquot #: 24-0343-03-C01-A01

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

			-	Aliquot #: 24-0	343-03-C01-A01	Analyst: ED
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, Ad	queous			Aliquot #: 24-0	343-03-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, Aqı	leous	Aliquot #: 24-0	343-03-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 25	40C			Aliquot #: 24-0	343-03-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

24-0343 Page 7 of 13



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

Metals by EPA 6020B: CCR Rule Appe	endix III-IV To	tal Metals	s Exp	Aliquot #: 24-0	343-04-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, Aqueou	IS			Aliquot #: 24-0	343-04-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 Analy	te List, Cl, F,	SO4, Aqı	ieous	Aliquot #: 24-0	343-04-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 #: 24-0	343-04-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

24-0343 Page 8 of 13



24-0343

05/08/2024

Analyst: EB

12:00 AM

Laboratory Project:

Collect Date:

Collect Time:

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

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp	Aliquot #: 24-0343-05-C01-A01
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					Analyst: ED
Result	Flag	Units	RL	Analysis Date	Tracking
ND		ug/L	1.0	05/14/2024	AB24-0515-01
3		ug/L	1.0	05/14/2024	AB24-0515-01
92		ug/L	5.0	05/14/2024	AB24-0515-01
ND		ug/L	1.0	05/14/2024	AB24-0515-01
140		ug/L	20.0	05/14/2024	AB24-0515-01
ND		ug/L	0.2	05/14/2024	AB24-0515-01
124000		ug/L	1000.0	05/14/2024	AB24-0515-01
1		ug/L	1.0	05/14/2024	AB24-0515-01
ND		ug/L	6.0	05/14/2024	AB24-0515-01
ND		ug/L	1.0	05/14/2024	AB24-0515-01
17300		ug/L	20.0	05/14/2024	AB24-0515-01
ND		ug/L	1.0	05/14/2024	AB24-0515-01
22		ug/L	10.0	05/14/2024	AB24-0515-01
19400		ug/L	1000.0	05/14/2024	AB24-0515-01
ND		ug/L	5.0	05/14/2024	AB24-0515-01
4		ug/L	2.0	05/14/2024	AB24-0515-01
3970		ug/L	100.0	05/14/2024	AB24-0515-01
ND		ug/L	1.0	05/14/2024	AB24-0515-01
ND		ug/L	0.2	05/14/2024	AB24-0515-01
223000		ug/L	1000.0	05/14/2024	AB24-0515-01
ND		ug/L	2.0	05/14/2024	AB24-0515-01
8		ug/L	2.0	05/14/2024	AB24-0515-01
ND		ug/L	10.0	05/14/2024	AB24-0515-01
Aqueous			Aliquot #: 24-0	343-05-C01-A02	Analyst: CLE
Result	Flag	Units	RL	Analysis Date	Tracking
ND		ug/L	0.2	05/20/2024	AB24-0515-05
e Analyte List, Cl, F, S	SO4, Aqı	ieous	Aliquot #: 24-0	343-05-C02-A01	Analyst: KDR
Result	Flag	Units	RL	Analysis Date	Tracking
395000		ug/L	1000.0	05/16/2024	AB24-0514-08
ND		ug/L	1000.0	05/15/2024	AB24-0514-08
2520		ug/L	1000.0	05/15/2024	AB24-0514-08
2540C			Aliquot #: 24-0	343-05-C03-A01	Analyst: CLE
Result	Flag	Units	RL	Analysis Date	Tracking
1210		mg/L	10.0	05/10/2024	AB24-0510-10
	ND 3 92 ND 140 ND 124000 1 ND 124000 1 ND 22 19400 ND 22 19400 ND 4 3970 ND 4 3970 ND 4 3970 ND 223000 ND 4 3970 ND 223000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 23000 ND 2520 2520 2540C <b>F</b> <b>F</b> <b>F</b> <b>F</b> <b>F</b> <b>F</b> <b>F</b> <b>F</b>	ND         3         92         ND         140         ND         124000         1         ND         12400         12400         1         ND         22         19400         ND         22         19400         ND         223000         ND         223000         ND         8         ND         8         ND         e Analyte         List, CI, F, SO4, Aqu         395000         ND         2520	ND       ug/L         3       ug/L         92       ug/L         ND       ug/L         ND       ug/L         140       ug/L         124000       ug/L         124000       ug/L         124000       ug/L         124000       ug/L         10       ug/L         124000       ug/L         17300       ug/L         ND       ug/L         17300       ug/L         17300       ug/L         19400       ug/L         19400       ug/L         19400       ug/L         3970       ug/L         3970       ug/L         ND       ug/L         ND       ug/L         223000       ug/L         ND       ug/L	ND         ug/L         1.0           3         ug/L         1.0           92         ug/L         5.0           ND         ug/L         1.0           140         ug/L         20.0           ND         ug/L         0.2           124000         ug/L         1.0           ND         ug/L         1.0           17300         ug/L         1.0           17300         ug/L         1.0           19400         ug/L         100.0           ND         ug/L         1.0           19400         ug/L         2.0           3970         ug/L         1.0           ND         ug/L	ND         ug/L         1.0         05/14/2024           3         ug/L         1.0         05/14/2024           92         ug/L         5.0         05/14/2024           ND         ug/L         1.0         05/14/2024           ND         ug/L         20.0         05/14/2024           ND         ug/L         20.0         05/14/2024           ND         ug/L         0.2         05/14/2024           ND         ug/L         1000.0         05/14/2024           124000         ug/L         1.0         05/14/2024           ND         ug/L         1.0         05/14/2024           ND         ug/L         1.0         05/14/2024           ND         ug/L         1.0         05/14/2024           ND         ug/L         100.0         05/14/2024           ND         ug

24-0343 Page 9 of 13



Field Sample ID: FB- Background

24-0343-06

Water

Sample Site:

Matrix:

Lab Sample ID:

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

**DEK JCW Background** 

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 #: 24-0	)343-06-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.

**Chemistry Department** 

General Standard Operating Procedure

PROC CHEM-1.2.01 PAGE 1 OF 2 REVISION 4 ATTACHMENT A

### TITLE: SAMPLE LOG-IN - SHIPMENT INSPECTION FORM

Р	roject Log-In Number:	24-03	43					
	a second s			Inspection By:	CIE			
S				and the second se				
	ample Origin/Project Name:							
	Pony Other/Hand Carry (			PSUS	PS	Airborne		
	Tracking Number:				m Attached: Yes	No		
s	hipping Containers: Ente	er the type and r	umber of s	hipping containers rece	ved.			
	Cooler Cardboard Box Custom Case Envelope/Mailer							
	Loose/Unpackaged							
0	condition of Shipment: E							
6	Damaged Shipmen					Leaking		
	Other							
s	hipment Security: Enter	if any of the shi	pping conta	iners were opened befo	re receipt.			
	Shipping Container	rs Received: Or	bened	Sealed	-			
T	nclosed Documents: Ent							
r.	1							
	CoC	Work Request _		Air Data Sheet	Other			
г	emperature of Container	s: Measure the	temperature	e of several sample cont	ainers.			
	As-Received Temp	erature Range_	6.4-2.4	℃ Samples Receiv	ved on Ice: Yes 🛩	No		
	M&TE # and Expin	ration 015	402					
N	umber and Type of Cont	5.23	3-24 he total nur	- nher of cample containe	rs received			
1								
	Container Type	Water	Soil	Other	Broken	Leaking		
	VOA (40mL or 60m	L)				-		
	Quart/Liter (g/p)		-					
FSP pit 0-14	9-oz (amber glass j	ar)	_					
+ 13-640-508 107:205522 4xp:2-15-25	2-oz (amber glass) 125 mL (plastic)	11		-	_			
	24 mL vial (glass)		-	-				
	2 \$ 500 mL (plastic)	5	_					
	Other							

PG. 282 not needed

## **CHAIN OF CUSTODY**



#### **CONSUMERS ENERGY COMPANY – LABORATORY SERVICES**

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

Page	of

÷.

SAMPLING SITE / CUSTOMER:				PROJECT NUMBER:	SAP CC or V	VO#:							ANALYSIS REQUESTED					D		
Q2-2024 JCW-DEK	Background W	ells		24-0343	REQUESTE	R: Hard	blo	Reg	iste	r			(A		h List if					QA REQUIREMENT:
SAMPLING TEAM:				TURNAROUND TIME REQUIRED:	ANDARD 🛛 O	THER_														□ NPDES ⊠ TNI
SEND REPORT TO:	Joseph Firlit			email:	phone:														□ ISO 17025	
COPY TO: Harold Register			MATRIX CODES: GW = Groundwater OX = Other	r		CONTAINERS												□ 10 CFR 50 APP. B		
	TRC			WW = Wastewater SL = Sludg W = Water / Aqueous Liquid A = Air		PRESERVATIVE				- lo	SIB							INTERNAL INFO		
LAB	SAMPLE COLLECTION		RIX	S = Soil / General Solid WP = Wipe O = Oil WT = General Waste		TOTAL #		H D		н	H	I May	A minut	SIIC				OTHER		
SAMPLE ID	DATE	MPLE COLLECTION     XI     S - Sol / General Solid     WP = wipe       DATE     TIME     FIELD SAMPLE ID / LOCATION     FIELD SAMPLE ID / LOCATION		TOT	None		HNO <sub>3</sub> H <sub>2</sub> SO <sub>4</sub> NaOH HCl MeOH Other		Tots	1 016	TDS				REMARKS					
24-0343-01	5/8/24	1451	GW	MW-15002		3	2	1				x	. >	¢	x					
-02	3/8/24	1315	GW	MW-15008		3	ż	1				x	x	¢	x					
-03	5/8/24	1497	GW	MW-15016		3	2	1				x	x	(	x					
-04	5/elay	1413	GW	MW-15019		3	2	1				x	x	(	x					
-05	5/8/24	-	GW	DUP-Background		3	2	1				x	x	:	x					
-06	slelay	1607	W	FB- Background		1						x								
							1							1				-		
							1		T			1					-			
											Ħ									
						-			-	1		1	1							
			-		_	-					++	1	-	1						
RELINQUISHED BY:		Ι	DATE/	rime: R	ECEIVED BY:	_	-		_	-		C	OMN	AEN	JTS:	_				
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0					0										re:9.4					ie Date: 5-23-24



**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

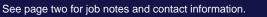
Karn/Weadock CCR DEK Botton Ash Pond

## **JOB NUMBER**

240-204357-1

n: Darby Corporat hower Pl 48108-7 2024 10:52:3 CRIPTIC on Ash P

Eurofins Cleveland 180 S. Van Buren Avenue Barberton OH 44203







#### 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

Sroohs

Generated 6/14/2024 10:52:31 AM 1

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12 13

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

## **Table of Contents**

Cover Page	1
Table of Contents	3
Definitions/Glossary	4
Case Narrative	5
Method Summary	6
Sample Summary	7
Client Sample Results	8
Tracer Carrier Summary	13
QC Sample Results	14
QC Association Summary	16
Lab Chronicle	17
Certification Summary	19
Chain of Custody	20
Receipt Checklists	27

#### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

3

#### Qualifiers

	<b>.</b>
TC C	IU.

Rad Qualifier		
	Qualifier Description 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	8
DER	Duplicate Error Ratio (normalized absolute difference)	
Dil Fac	Dilution Factor	Ş
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. Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Job ID: 240-204357-1

	nvironmental Corporation.		Job ID: 240-204357-1					
roject/Site: Ka	arn/Weadock CCR DEK Botton Ash Pond							
Vethod	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 Refe								
	Environmental Protection Agency							
None = No								
TAL-STL =	= TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.							
Laboratory Re								
EET SL = I	Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566							

#### Laboratory References:

#### Sample Summary

#### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Job ID: 240-204357-1

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: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

0.541

0.322

0.324

5.00

0.511 pCi/L

Job ID: 240-204357-1

06/13/24 11:50

1

Lab Sample ID: 240-204357-1 Client Sample ID: DEK-MW-15002 Date Collected: 05/09/24 10:31 Matrix: Water Date Received: 05/11/24 08:00 Method: EPA 903.0 - Radium-226 (GFPC) Count Total Uncert. Uncert. Analyte Result Qualifier (2**σ**+/-) (2**σ**+/-) 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 Carrier %Yield Qualifier Limits Prepared Dil Fac Analyzed Ba Carrier 89.1 30 - 110 05/16/24 09:22 06/12/24 09:58 1 Method: EPA 904.0 - Radium-228 (GFPC) Count Total Uncert. Uncert. Result Qualifier Analyte (2**σ**+/-) (2**σ**+/-) MDC Unit Prepared Analyzed RL 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 30 - 110 05/16/24 09:27 05/22/24 16:21 89.1 1 80.7 30 - 110 05/16/24 09:27 05/22/24 16:21 Y Carrier 1 Method: TAL-STL Ra226 Ra228 - Combined Radium-226 and Radium-228 Total Count Uncert. Uncert. Analyte Result Qualifier (2**σ**+/-) (2**σ**+/-) RL MDC Unit Prepared Analyzed Dil Fac

226 + 228

**Combined Radium** 

#### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Job ID: 240-204357-1

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) Count Total Uncert. Uncert. Analyte Result Qualifier (2**σ**+/-) (2**σ**+/-) 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 Carrier %Yield Qualifier Limits Prepared Dil Fac Analyzed Ba Carrier 91.8 30 - 110 05/16/24 09:22 06/12/24 09:58 1 Method: EPA 904.0 - Radium-228 (GFPC) Count Total Uncert. Uncert. Result Qualifier Analyte (2**σ**+/-) (2**σ**+/-) MDC Unit Prepared Analyzed RL 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 80.7 30 - 110 05/16/24 09:27 05/22/24 16:22 Y Carrier 1 Method: TAL-STL Ra226 Ra228 - Combined Radium-226 and Radium-228 Total Count

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

#### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Job ID: 240-204357-1

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) Count Total Uncert. Uncert. Analyte Result Qualifier (2**σ**+/-) (2**σ**+/-) 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 Carrier %Yield Qualifier Limits Prepared Dil Fac Analyzed Ba Carrier 88.6 30 - 110 05/16/24 09:22 06/12/24 09:58 1 Method: EPA 904.0 - Radium-228 (GFPC) Count Total Uncert. Uncert. Analyte Result Qualifier (2**σ**+/-) (2**σ**+/-) MDC Unit Prepared Analyzed RL 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 30 - 110 05/16/24 09:27 05/22/24 16:22 88.6 1 85.2 30 - 110 05/16/24 09:27 05/22/24 16:22 Y Carrier 1 Method: TAL-STL Ra226 Ra228 - Combined Radium-226 and Radium-228 Total Count

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

#### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Job ID: 240-204357-1

Matrix: Water

Lab Sample ID: 240-204357-4

7
8
9
19

Client Sample ID: DUP-DEK-BAP-01 Date Collected: 05/09/24 00:00 Date Received: 05/11/24 08:00 Method: EPA 903.0 - Radium-226 (GFPC) Count Total Uncert. Uncert.

Analyte	Result	Qualifier	(2σ+/-)	(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

#### Uncert. Uncert. (2**σ+/-**) Analyte Result Qualifier (2**σ**+/-) MDC Unit Prepared Analyzed Dil Fac RL 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 86.7 30 - 110 05/16/24 09:27 05/22/24 16:22 Y Carrier 1

#### Method: TAL-STL Ra226\_Ra228 - Combined Radium-226 and Radium-228

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

#### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Client Sample ID: EB-DEK-BAP

Lab Sample ID: 240-204357-5 Matrix: Water

Method: EPA 903.	0 - Radium-226	GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(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

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(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 Method: EPA 904.(	84.6 <mark>0 - Radium-228</mark>	(GFPC)	30 - 110 Count Uncert.	Total Uncert.				05/16/24 09:22	06/12/24 09:59	1
		(GFPC)	Count					05/16/24 09:22	06/12/24 09:59	1
Method: EPA 904.( Analyte	0 - Radium-228	Qualifier	Count Uncert. (2σ+/-)	Uncert. (2σ+/-)	RL	MDC		Prepared	Analyzed	1 Dil Fac
	0 - Radium-228	Qualifier	Count Uncert.	Uncert.	<b>RL</b>		Unit pCi/L			1 1
Method: EPA 904.( Analyte	0 - Radium-228	Qualifier	Count Uncert. (2σ+/-)	Uncert. (2σ+/-)				Prepared	Analyzed	1 Dil Fac 1 Dil Fac
Method: EPA 904.( Analyte Radium-228	0 - Radium-228	Qualifier	Count Uncert. (2σ+/-) 0.307	Uncert. (2σ+/-)				Prepared 05/16/24 09:27	Analyzed 05/22/24 16:22	1

#### Method: TAL-STL Ra226\_Ra228 - Combined Radium-226 and Radium-228

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(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. Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Job ID: 240-204357-1

Prep Type: Total/NA

#### Method: 903.0 - Radium-226 (GFPC)

Matrix: Water

			Percent Yield (Acceptance Limits)	
		Ва		
Lab Sample ID	Client Sample ID	(30-110)		5
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		8
LCS 160-662015/2-A	Lab Control Sample	89.6		0
MB 160-662015/1-A	Method Blank	94.3		0
				3
Tracer/Carrier Legend				

Ba = Ba Carrier

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

Matrix: Water

				Percent Yield (Acceptance Limits)	
		Ва	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

#### Project/Site: Karn/Weadock CCR DEK Botton Ash Pond Method: 903.0 - Radium-226 (GFPC)

Lab Sample I Matrix: Water		-662015/1	<b>-A</b>							Client Sa	mple ID: Metho	
Analysis Bate											Prep Type: 1 Prep Batch:	
Allalysis Dati				Count	Total						Frep Baten.	00201
		МВ	МВ	Uncert.	Uncert.							
Analyte		Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit		Prepared	Analyzed	Dil Fa
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	
		МВ	МВ									
Carrier		%Yield	Qualifier	Limits						Prepared	Analyzed	Dil F
Ba Carrier		94.3		30 - 110					05	/16/24 09:22	06/12/24 09:56	
Lab Sample I	D: LCS 160	)-662015/	2-A						Clier	nt Sample I	D: Lab Control	Samp
Matrix: Water											Prep Type: 1	Total/N
Analysis Bate	ch: 665824										Prep Batch:	6620 <sup>-</sup>
						Total						
			Spike	LCS	LCS	Uncert.					%Rec	
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Radium-226			11.3	11.29		1.15	1.00	0.0974	pCi/L	100	75 - 125	
	LCS	LCS										
Carrier	%Yield	Qualifier	Limits	-								
Ba Carrier	89.6		30 - 110									
Lab Sample I	D: 240-204	357-5 DU	I							Client Sa	mple ID: EB-DI	EK-BA
Matrix: Water	•										Prep Type: 1	Fotal/N
Analysis Bate	ch: 665824										Prep Batch:	6620 <sup>°</sup>
						Total						
	Sampl	e Sample		DU	DU	Uncert.						RE
Analyte	Resu	lt Qual		Result	Qual	(2σ+/-)	RL	MDC	Unit		REF	R Lin
Radium-226	0.034	1 U		0.03874	U	0.0493	1.00	0.0811	pCi/L		0.04	4
	DU	DU										
Carrier	%Yield	Qualifier	Limits									
Ba Carrier	82.6		30 - 110	-								

Lab Sample ID: MB Matrix: Water Analysis Batch: 662		I <b>-A</b>						Client Sa	mple ID: Metho Prep Type: 1 Prep Batch:	Total/NA
			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(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
	MB	МВ								
Carrier	%Yield	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

### **QC Sample Results**

Job ID: 240-204357-1

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

Lab Sample I	D: LCS 160-662016/2	- <b>A</b>						Clier	nt Sample I	D: Lab Control S	ample
Matrix: Water	r									Prep Type: To	tal/NA
Analysis Bate	ch: 662959									Prep Batch: 6	62016
					Total						
		Spike	LCS	LCS	Uncert.					%Rec	
Analyte		Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Radium-228		8.92	10.45		1.39	1.00	0.473	pCi/L	117	75 - 125	
	LCS LCS										
Carrier	%Yield Qualifier	Limits									
Ba Carrier	89.6	30 _ 110									
Y Carrier	81.5	30 _ 110									
Lab Sample I	D: 240-204357-5 DU								Client Sa	ample ID: EB-DE	K-BAF
Matrix: Water										Prep Type: To	
Analysis Bat										Prep Batch: 6	
,,					Total						
	Sample Sample		DU	DU	Uncert.						REF
Analyte	Result Qual		Result	Qual	(2σ+/-)	RL	MDC	Unit		RER	Limi
Radium-228	0.141 U		-0.03889	U	0.313	1.00	0.603	pCi/L		0.29	
	DU DU										
Carrier	%Yield Qualifier	Limits									
Ba Carrier	82.6	30 - 110									
Y Carrier	76.6	30 - 110									

#### **QC Association Summary**

#### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Job ID: 240-204357-1

Rad Prep Batch: 662015

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
40-204357-1	DEK-MW-15002	Total/NA	Water	PrecSep STD	
40-204357-2	DEK-MW-15005	Total/NA	Water	PrecSep STD	
40-204357-3	DEK-MW-15006	Total/NA	Water	PrecSep STD	
40-204357-4	DUP-DEK-BAP-01	Total/NA	Water	PrecSep STD	
40-204357-5	EB-DEK-BAP	Total/NA	Water	PrecSep STD	
IB 160-662015/1-A	Method Blank	Total/NA	Water	PrecSep STD	
CS 160-662015/2-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
40-204357-5 DU	EB-DEK-BAP	Total/NA	Water	PrecSep STD	
ep Batch: 662016					
ep Batch: 662016					
ab Sample ID	Client Sample ID	Ргер Туре	Matrix	Method	Prep Batch
ab Sample ID	Client Sample ID DEK-MW-15002	Prep Type Total/NA	Matrix Water	Method PrecSep_0	Prep Batch
ab Sample ID 40-204357-1					Prep Batch
ab Sample ID 40-204357-1 40-204357-2	DEK-MW-15002	Total/NA	Water	PrecSep_0	Prep Batch
ab Sample ID 40-204357-1 40-204357-2 40-204357-3	DEK-MW-15002 DEK-MW-15005	Total/NA Total/NA	Water Water	PrecSep_0 PrecSep_0	Prep Batch
ab Sample ID 40-204357-1 40-204357-2 40-204357-3 40-204357-4	DEK-MW-15002 DEK-MW-15005 DEK-MW-15006	Total/NA Total/NA Total/NA	Water Water Water	PrecSep_0 PrecSep_0 PrecSep_0	Prep Batch
ab Sample ID 40-204357-1 40-204357-2 40-204357-3 40-204357-4 40-204357-5	DEK-MW-15002 DEK-MW-15005 DEK-MW-15006 DUP-DEK-BAP-01	Total/NA Total/NA Total/NA Total/NA	Water Water Water Water	PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0	Prep Batch
ep Batch: 662016 ab Sample ID 40-204357-1 40-204357-2 40-204357-3 40-204357-4 40-204357-5 //B 160-662016/1-A .CS 160-662016/2-A	DEK-MW-15002 DEK-MW-15005 DEK-MW-15006 DUP-DEK-BAP-01 EB-DEK-BAP	Total/NA Total/NA Total/NA Total/NA Total/NA	Water Water Water Water Water	PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0	Prep Batch

#### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

Matrix: Water

Lab Sample ID: 240-204357-1

5

### Lab Sample ID: 240-204357-3

Lab Sample ID: 240-204357-4

Matrix: Water

Matrix: Water

#### Client Sample ID: DEK-MW-15002 Date Collected: 05/09/24 10:31

Date Received: 05/11/24 08:00

	Batch	Batch		Dilution	Batch			Prepared
Prep Type	Туре	Method	Run	Factor	Number	Analyst	Lab	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 Samp	le ID: DEK-N	IW-15005						Lab Sample ID: 240-204357-2
Date Collected	I: 05/09/24 08:3	7						Matrix: Water
Date Received	: 05/11/24 08:00	D						

			Dilution	Batch			Prepared	
Туре	Method	Run	Factor	Number	Analyst	Lab	or Analyzed	
Prep	PrecSep STD			662015	MLT	EET SL	05/16/24 09:22	1
Analysis	903.0		1	665824	SWS	EET SL	06/12/24 09:58	
Prep	PrecSep_0			662016	MLT	EET SL	05/16/24 09:27	
Analysis	904.0		1	662959	SCB	EET SL	05/22/24 16:22	4
Analysis	Ra226_Ra228		1	666196	FLC	EET SL	06/13/24 11:50	
	Prep Analysis Prep Analysis	Prep     PrecSep STD       Analysis     903.0       Prep     PrecSep_0       Analysis     904.0	Prep     PrecSep STD       Analysis     903.0       Prep     PrecSep_0       Analysis     904.0	PrepPrecSep STDAnalysis903.01PrepPrecSep_0Analysis904.01	Prep         PrecSep STD         662015           Analysis         903.0         1         665824           Prep         PrecSep_0         662016           Analysis         904.0         1         662959	Prep         PrecSep STD         662015         MLT           Analysis         903.0         1         665824         SWS           Prep         PrecSep_0         662016         MLT           Analysis         904.0         1         662959         SCB	PrepPrecSep STD662015MLTEET SLAnalysis903.01665824SWSEET SLPrepPrecSep_0662016MLTEET SLAnalysis904.01662959SCBEET SL	Prep         PrecSep STD         662015         MLT         EET SL         05/16/24 09:22           Analysis         903.0         1         665824         SWS         EET SL         06/12/24 09:58           Prep         PrecSep_0         662016         MLT         EET SL         05/16/24 09:22           Analysis         904.0         1         662959         SCB         EET SL         05/16/24 09:27

#### Client Sample ID: DEK-MW-15006 Date Collected: 05/09/24 11:38 Date Received: 05/11/24 08:00

	Batch	Batch		Dilution	Batch			Prepared
Ргер Туре	Туре	Method	Run	Factor	Number	Analyst	Lab	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

Date Received: 05/11/24 08:00

	Batch	Batch		Dilution	Batch			Prepared
Prep Type	Туре	Method	Run	Factor	Number	Analyst	Lab	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

Date Collected: 05/09/24 00:00

#### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Botton Ash Pond

#### Lab Sample ID: 240-204357-5 Matrix: Water

#### Date Collected: 05/09/24 12:00 Date Received: 05/11/24 08:00

Client Sample ID: EB-DEK-BAP

	Batch	Batch		Dilution	Batch			Prepared
Ргер Туре	Туре	Method	Run	Factor	Number	Analyst	Lab	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. 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
H - RadChem Recognition	State	n/a	06-30-24
Illinois	NELAP	200023	11-30-24
lowa	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
_ouisiana	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
II - 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.

#### Chain of Custody Record



eurofins Environment Testing

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

Client Information	Sampler:				ab PM: rooks.	. Kris	s M					ľ	Carrier	Tracki	ng No(	s):			COC No: 240-120142-2905	2.1	
Client Contact:	Phone:			E.	-Mail:								State o	f Origir	1:				Page:		
Jacob Krenz Company:			PWSID:	к	ris.Bro	ooks	@et.	.euro	insus.	com									Page 1 of 1		
TRC Environmental Corporation.										Anal	ysis	Req	uest	ed							
Address: 1540 Eisenhower Place	Due Date Request	ed:																	Preservation Codes D - HNO3	5:	
City: Ann Arbor	TAT Requested (d	ays):																			
State, Zip: MI, 48108-7080	Compliance Proje	ct: <u>A</u> Yes	A No		- 11														<b>,</b>		
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD																				
Email:	WO#:				- Î																
JKrenz@trccompanies.com	553814.0001				so	No)												ers			
Project Name: Karn/Weadock CCR DEK Bottom Ash Pond	Project #: 24024154				Ś	os or	S C	t List									a la la	Itain			
Site:	SSOW#:				Sample	SD (Ye	228_GF	l Targe								•	100	of con	Other:		
		Sample	Sample Type (C=comp,	Matrix (w-water, 3-solid, 0-waste/ol	eld Filte	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List									and Murchae	Total Number of containers			
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DEK-MW-15005	5-9-24	0837	G	Water	-	N	X	X	-	+-	+-			+				2			
DEK-MW-15006	5-9-24	1138		Water	- <u> </u> -	N	X	x					+		-			2			
DUP-DEK-BAP-01	5-9-24	10-	G	Water	- <u> </u>	N	X	x		+	$\vdash$							2			
EB-DEK-BAP	5-9-24	1200	6	Water	N	N	x	x			1							2			
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Deliverable Requested: I, II, III, IV, Other (specify)						Spe	ecial	Instru	uctions	/QC R	equire	ement	s:								
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WI-NC-099 Cooler Receipt Form Page 2 – Multiple Coolers



# Temperature readings

	₽	Plastic 1 liter - Nitric Acid	240-204357-B-5	EB-DEK-BAP
	\$	Plastic 1 liter - Nıtrıc Acıd	240-204357-A-5	EB-DEK-BAP
	۵	Plastic 1 liter - Nitric Acid	240-204357-B-4	DUP-DEK-BAP-01
	\$	Plastic 1 liter - Nitric Acid	240-204357-A-4	DUP-DEK-BAP-01
	\$	Plastic 1 liter - Nitric Acid	240 204357-B-3	DEK-MW 15006
	۵	Plastic 1 liter - Nitric Acid	240-204357-A-3	DEK-MW-15006
	₽	Plastic 1 liter - Nitric Acid	240-204357 B-2	DEK-MW-15005
	۵	Plastic 1 liter - Nitric Acid	240-204357-A-2	DEK-MW-15005
	\$	Plastic 1 liter - Nitric Acid	240-204357-B-1	DEK-MW-15002
	۵	Plastic 1 liter - Nitric Acid	240-204357-A-1	DEK-MW-15002
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Barberton, OH 44203 Phone: 330-497-9396 Fax: 330-497-0772					5	5									Environment Testing
Client Information (Sub Contract Lab)	Sampler			Lab PM Brooks	Lab PM: Brooks, Kris M	Σ				Carrier Tr	Carrier Tracking No(s)	;;	24 CC	COC No. 240-184583.1	
client contact. Shipping/Receiving	Phone:			E-Mail: Kris.B	rooks@	get.eu	E-Mail: Kris.Brooks@et.eurofinsus.com	s.com		State of Origin Michigan	Drigin: IN		Pa Ba	Page: Page 1 of 1	
Company TestAmerica Laboratories, Inc.				4	ccreditat	ions Re	Accreditations Required (See note)	ee note):						Job #:	
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Site	SSOW#:				en) de									Other:	
Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, B1	Matrix (w-water, s=solid, O-wastvid, BT-Tisun Astr)	Pield Filtered S W/SM mone	2_9823919\0.506 0323919\0.406 0_9823919\0.406	39226Ra228_GF						o tedmuM listo		
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DEK-MW-15005 (240-204357-2)	5/9/24	08:37		Water		×	+	$\left  \right $	-		╞			5.0 pCi/L. TVA protocol - I	5.0 pCi/L. TVA protocol - Ra-226+228 action limit at
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Note: Since laboratory accreditations are subject to change. Eurofins Environ	nent Testing North Centr.	al 11 C nlaces	he ownershin of	method analytic				_			i				
laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/teets/matrix being analyzed. the samples must be shipped tack to the Eurofiment Laboratory or other instructions will be provided. Any changes to acceditation status should be brought to Eurofime Environment Testing North Central. LLC laboratory or other instructions will be provided. Any changes to acceditation status should be brought to Eurofime Environment Testing North Central. LLC laboratory or other instructions will be provided. Any changes to acceditation status should be brought to Eurofime 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 Eurofine Environment Testing North Central. LLC	I above for analysis/tests Central, LLC attention im	/matrix being a mediately. If al	nalyzed, the sam I requested accre	ples must be sh editations are cu	ipped ba	ck to th late, re	e Eurofin turn the s	s Environm igned Chair	autoniu ant Testing of Custoc	I North Cer y attesting	ntes. Ints htral, LLC la to said con	sample sni boratory or 1pliance to	pment is for other instri Eurofins Er	warded under uctions will be rvironment Te	chain-of-custody. If the provided. Any changes to sting North Central, LLC.
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Eurofins Cleveland 180 S. Van Buren Avenue Barberton, OH 44203 Phone: 330-497-9386 Fax: 330-497-0772	Chain		of Custody Record	ecord					🔅 eurofins	Environment Testing
Client Information (Sub Contract Lab)	Sampler		Lab PM Brooks	Lab PM: Brooks, Kris M			Carrier Tracking No(s)	:(s)c	COC No: 240-184585 1	
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Possible Hazard Identification				Sample	Disposal (	A fee may be	assessed if sam	ples are reta	Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)	1 month)
Uncommend Deliverable Requested: I, II, III, IV, Other (specify)	Primary Deliverable Rank:	tank: 2		Special	Return To Client al Instructions/QC	Return To Client Dis	Disposal By Lab ents:	]	Archive For	Months
Empty Kit Relinquished by:	Date:			Time:	2		Method of Shipment	ipment		
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Relinquished by:	Date/Time:		Company			1000	ł	Date/Time:		Company
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Custody Seals Intact: Custody Seal No.:				Coole	r Temperature	Cooler Temperature(s) <sup>o</sup> C and Other Remarks	Remarks			
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				4	3	1 2	) 0			

Client: TRC Environmental Corporation.

#### Login Number: 204357 List Number: 2

Creator: Thornley, Richard W

Answer	Comment
True	
True	
True	
True	
N/A	
True	
N/A	
True	
N/A	
True	
True	
N/A	
	True True True True True True True True

Job Number: 240-204357-1

List Source: Eurofins St. Louis

List Creation: 05/14/24 05:18 PM

Client: TRC Environmental Corporation.

#### Login Number: 204357 List Number: 3

Creator: Pinette, Meadow L

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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	

Job Number: 240-204357-1

List Source: Eurofins St. Louis

List Creation: 05/15/24 01:55 PM



**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







#### 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

Sroohs

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12 13

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

## **Table of Contents**

Cover Page	1
Table of Contents	3
Definitions/Glossary	4
Case Narrative	5
Method Summary	6
Sample Summary	7
Client Sample Results	8
Tracer Carrier Summary	9
QC Sample Results	10
QC Association Summary	11
Lab Chronicle	12
Certification Summary	13
Chain of Custody	14
Receipt Checklists	18

#### **Definitions/Glossary**

## Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

3

#### Qualifiers

Rad

U       Result is less than the sample detection limit.         Glossary         Abbreviation       These commonly used abbreviations may or may not be present in this report.         as       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       Contains No Free Liquid         DER       Duplicate Error Ratio (normalized absolute difference)         Dil Faco       Dilution Factor         DL       Detection Limit (DoD/DCE)         DL       Decision Level Concentration (Radiochemistry)         EDL       Estimated Detection Limit (DoD/DCE)         LOQ       Limit of Detection (DoD/DCE)         LOQ       Limit of Detection (DoD/DCE)         MDA       Minimum Detectable Activit (Radiochemistry)         MDC       Minimum Detectable Activit (Radiochemistry)         MDC       Minimum Detectable Concentration (Radiochemistry)         MDC       Minimum Detectable Concentration (Radiochemistry)         MDC       Minimum Detectable Concentration (Radiochemistry)         MDL       Method Quantitation Limit         NO       Not Calculated         NN       Not Detection Limit         NDL       Method Quantitation L	Rad Qualifier	Qualifier Description	4
Closesary           Abbreviation         These commonly used abbreviations may or may not be present in this report.           a         Listed under the "D" column to designate that the result is reported on a dry weight basis           %R         Percent Recovery           CFL         Contains Free Liquid           CPU         Contains No Free Liquid           DER         Duplicate Error Ratio (mornalized absolute difference)           DII Fac         Dilution Factor           DL         Detection Limit (DoD/DE)           DL, RA, RE, IN         Indicates a Dilution, Re-analysis, Re-extraction, or additional initial metals/anion analysis of the sample           DLC         Detection Limit (DoD/DE)           DL, RA, RE, IN         Indicates a Dilution, Re-analysis, Re-extraction, or additional initial metals/anion analysis of the sample         Proceeding           DLC         Detection Limit (DoD/DE)         Detection Limit (DoD/DE)         Proceeding         Proceeding           Limit of Quantitation (DoD/DE)         Eastmated Detection Limit (DoD/DE)         Proceeding         Proceeding         Proceeding           MDA         Minimum Detectable Activity (Radiochemistry)         MDC         Minimum Detectable Activity (Radiochemistry)         Proceeding           MDA         Minimum Detectable Activity (Radiochemistry)         Proceeding         Proceeding		Qualifier Description Result is less than the sample detection limit	*
Abbreviation         These commonly used abbreviations may or may not be present in this report.           a         Listed under the "D" column to designate that the result is reported on a dry weight basis           %R         Percent Recovery           CFL         Contains Free Liquid           CFL         Contains Free Liquid           CFW         Contains Free Liquid           DFW         Duplicate Error Ratio (normalized absolute difference)           DII Fac         Dilution Factor           DOL         Detection Limit (DOD/DOE)           DL         Detection Limit (DOD/DOE)           DL         Detection Limit (DOD/DOE)           DL         Detection Limit (DOD/DOE)           LCO         Estimated Detection Limit (DOD/DOE)           LCQ         Limit of Detection Limit (DOD/DOE)           LCQ         Limit of Quantitation (DoD/DOE)           LCQ         Limit of Quantitation (DOD/DOE)           LCQ         Limit of Quantitation (DOD/DOE)           MCL         EPA recommeded "Maximum Contaminant Level"           MDA         Minimum Detectable Concentration (Radiochemistry)           MDL         Method Detection Limit (Colorin)           MDL         Method Detection Limit (Colorin)           MDL         Method Detection Limit (Colorin)	<u> </u>		5
a       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         DL       Decision Level Concentration (Radiochemistry)         EDL       Estimated Detection Limit (DioXin)         LOQ       Limit of Detection (DoD/DOE)         LOQ       Limit of Detection (Adiochemistry)         MDA       Minimum Detectable Activity (Radiochemistry)         MDC       Minimum Detectable Concentration (Radiochemistry)         MDL       Mehod Detection Limit         ML       Minimum Level (DioXin)         MPN       Most Probable Number         MQL       Mehod Quantitation Limit         ND       Not Detected at the reporting limit (or MDL or EDL if shown)         NEG       Negative / Absent         POS       Positive / Present         POL       Practical Quanu	Glossary		3
%K     Percent Recovery       CFL     Contains Free Liquid       CFU     Colony Forming Unit       CNF     Contains No Free Liquid       CNF     Contains No Free Liquid       DER     Dilution Factor       DI Face     Dilution Factor       DL     Detection Limit (DoD/DOE)       DL     Detection Limit (DoD/DOE)       DL     Decision Level Concentration (Radiochemistry)       EDL     Estimated Detection (DoD/DOE)       LOQ     Limit of Detection (DoD/DOE)       LOQ     Limit of Countiation (Radiochemistry)       EDL     Estimated Detection Limit (DoD/DOE)       LOQ     Limit of Countiation (Radiochemistry)       MDA     Minimum Detectable Activity (Radiochemistry)       MDA     Minimum Detectable Concentration (Radiochemistry)       MDC     Minimum Detectable Concentration (Radiochemistry)       MDA     Method Detection Limit       MDA     Methore Detectable Number       MDA     Methore Detectable Number       MQL     Method Quantitation Limit       NC     Not Calculated at the reporting limit (or MDL or EDL if shown)       NEG     Negative / Absent       POS     Positive / Present       POL     Practical Quantitation Limit       PRES     Presuptive       PRES     Pre	Abbreviation	These commonly used abbreviations may or may not be present in this report.	6
CFL     Contains Free Liquid       CFU     Conty Forming Unit       CFU     Contains No Free Liquid       DER     Duplicate Error Ratio (normalized absolute difference)       DER     Diliton Factor       Dotton Limit (DoD/DOE)     Detection Limit (DoD/DOE)       DLR, RA, RI     Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample       DLC     Detection Limit (DoD/DOE)       DLC     Estimated Detection Limit (Dioxin)       EDL     Estimated Detection (DoD/DOE)       LOQ     Limit of Quantitation (DoD/DOE)       LOQ     Estimated Detection (DoD/DOE)       LOQ     Limit of Quantitation (DoD/DOE)       MCL     EA recommended "Maximum Contaminant Level"       MDL     Minimum Detectable Activity (Radiochemistry)       MDL     Minimum Detectable Concentration (Radiochemistry)       MDL     Minimum Detectable Concentration (Radiochemistry)       MDL     Minimum Detectable Concentration (Radiochemistry)       MDL     Minimum Detectable Activity (Radiochemistry)       MDL     Minimum Detectable Activity (Radiochemistry)       MDL     Minimum Detectable Activity (Radiochemistry)       MDL     Most Probable Number       NC     Not Calculated       NDL     Not Detection Limit       NDL     Not Detectable Activity	¤	Listed under the "D" column to designate that the result is reported on a dry weight basis	
CFU       Colony Forming Unit         CNF       Contains No Free Liquid         DER       Duplicate Error Ratio (normalized absolute difference)         Dillation Factor       Dillution Factor         DL       Detection Limit (Dob/DOE)         DL, RA, RL, 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 Custitation (DoD/DOE)         LOQ       Limit of Custitation (DoD/DOE)         LOQ       EPA recommended 'Maximum Contaminant Level"         MDL       Minimum Detectable Activity (Radiochemistry)         MDL       Minimum Detectable Concentration (Radiochemistry)         MDL       Minimum Level (Dioxin)         MIL       Minimum Level (Dioxin)         MPN       Most Probable Number         MQL       Mot Potected at the reporting limit (or MDL or EDL if shown)         NEG       Positive / Present         POS       Positive / Present         POS       Positive / Present         PQL       Pactical Quantitation Limit         PRS       Positive / Present	%R	Percent Recovery	
CNFContains No Free LiquidDERDuplicate Error Ratio (normalized absolute difference)Dill FaceDilution FactorDLDetection Limit (DoD/DCE)DL, RA, RE, INIndicates a Dilution, Re-enalysis, Re-extraction, or additional Initial metals/anion analysis of the sampleDLCDecision Level Concentration (Radiochemistry)EDLEEstimated Detection Limit (DoD/DOE)LOQLimit of Obtection (DoD/DOE)LOQLimit of Obtection (DoD/DOE)LOQLimit of Quantitation (DoD/DOE)MCLEPA recommended "Maximum Contaminant Level"MDAMinimum Detectable Activity (Radiochemistry)MDCMinimum Detectable Concentration (Radiochemistry)MDLMethod Detection Limit (Radiochemistry)MDLMothod Detection Limit (Noll N)MDLMothod Quantitation LimitMONNot Probable NumberMQLNot CalculatedNDNot Detected at the reporting limit (or MDL or EDL if shown)NEGPagitive / AbsentPOSPositive / PresentPOSPositive / PresentPOSPositive / PresentPRESPositive / ResentPRESRelative Error Ratio (Radiochemistry)RLRelative Error Ratio (Radiochemistry)RLRelative Precent Difference, a measure of the relative difference between two pointsREFToxicity Equivalent Factor (Dioxin)REFToxicity Equivalent Coloxin)	CFL	Contains Free Liquid	
DERDuplicate Error Ratio (normalized absolute difference)DIF FacDuplicate Error Ratio (normalized absolute difference)DIF FacDuplicate Error Ratio (normalized absolute difference)DLDetection Limit (DoD/DCE)DL, RA, RE, INIndicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sampleDLCDecision Level Concentration (Radiochemistry)EDLStimated Detection Limit (Dioxin)LODLimit of Detection (DoD/DCE)LOQLimit of Quantitation (DOD/DCE)MCLEPA recommended "Maximum Contaminant Level"MDAMinimum Detectable Activity (Radiochemistry)MDCMinimum Detectable Concentration (Radiochemistry)MDLMinimum Detectable Concentration (Radiochemistry)MDLMinimum Detectable Concentration (Radiochemistry)MDLMont Detectable Concentration (Radiochemistry)MDLNot CalculatedNDNNot Calculated	CFU	Colony Forming Unit	0
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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)           LOQ         Limit of Quantitation (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 Detectable Concentration (Radiochemistry)           MDL         Method Quantitation Limit           ML         Minimum Detectable Concentration (Radiochemistry)           MDL         Method Quantitation Limit           ND         Mot Calculated           NPN         Mot Calculated           ND         Not Detected at the reporting limit (or MDL or EDL if shown)           NC         Not Calculated           POS         Positive / Present           POS         Positive / Present <tr< td=""><td>DER</td><td></td><td></td></tr<>	DER		
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 Detectable Concentration (Radiochemistry)         MDL       Method Detection Limit         ML       Minimum Detectable Concentration (Radiochemistry)         MDL       Method Detection Limit         ML       Minimum Detectable Concentration (Radiochemistry)         MDL       Method Quantitation Limit         ML       Minimum Detectable Concentration (Radiochemistry)         MDL       Method Quantitation Limit (or MDL or EDL if shown)         NEG       Not Calculated         NDS       Postive / Present         POL       Practical Quantitation Limit         PAGL       Postive / Present         POL       Postip Limit Actin Limit         P	Dil Fac	Dilution Factor	9
DL, RA, RE, INIndicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sampleDLCDecision Level Concentration (Radiochemistry)EDLEstimated Detection Limit (Dioxin)EDLEstimated Detection Limit (Dioxin)LDOLimit of Quantitation (DoD/DOE)LOQLimit of Quantitation (DoD/DOE)MCLEPA recommended "Maximum Contaminant Level"MDAMinimum Detectable Activity (Radiochemistry)MDCMinimum Detectable Activity (Radiochemistry)MDCMinimum Detectable Concentration (Radiochemistry)MDLMethod Detection LimitMLMinimum Detectable Concentration (Radiochemistry)MDLMethod Quantitation LimitMLMinimum Level (Dioxin)MPNMoth Quantitation LimitMQLNot CalculatedNNNot CalculatedNCNot CalculatedNDNot Detected at the reporting limit (or MDL or EDL if shown)NEGNot CalculatedPOLPostive / PresentPOLPostive / PresentPOLPostive / PresentPOLQuality ControlREFReporting Limit or Radiochemistry)RLReporting Limit or Radiochemistry)RLReporting Limit or Radiochemistry)RLRelative Error Ratio (Radiochemistry)RLRelative Error Ratio (Radiochemistry)RLRelative Error Ratio (Radiochemistry)RLRelative Error Ratio (Intir (Radiochemistry)RLRelative Present Difference, a measure of the r	DL	Detection Limit (DoD/DOE)	
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EDLEstimated Detection Limit (Dioxin)LODLimit of Detection (DoD/DOE)LOQLimit of Quantitation (DoD/DOE)MCLEPA recommended "Maximum Contaminant Level"MDAMinimum Detectable Activity (Radiochemistry)MDCMinimum Detectable Activity (Radiochemistry)MDCMinimum Detectable Concentration (Radiochemistry)MDLMethod Detection LimitMLMoinimum Level (Dioxin)MDLMothod Quantitation LimitMDMost Probable NumberMQLMethod Quantitation LimitNCNot CalculatedNDNot Detected at the reporting limit (or MDL or EDL if shown)NEGNegative / AbsentPOSPositive / PresentPOLPractical Quantitation LimitPRESPresumptiveQCQuality ControlRERRelative Error Ratio (Radiochemistry)RLReporting Limit or Requested Limit (Radiochemistry)RLToxicity Equivalent Factor (Dioxin)TEQToxicity Equivalent Factor (Dioxin)	DLC	Decision Level Concentration (Radiochemistry)	
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MQLMethod Quantitation LimitNCNot CalculatedNDNot Detected at the reporting limit (or MDL or EDL if shown)NEGNegative / AbsentPOSPositive / PresentPQLPractical Quantitation LimitPRESPresumptiveQCQuality ControlRERRelative Error Ratio (Radiochemistry)RLReporting Limit or Requested Limit (Radiochemistry)RPDRelative Precent Difference, a measure of the relative difference between two pointsTEFToxicity Equivalent Factor (Dioxin)	ML	Minimum Level (Dioxin)	
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QCQuality ControlRERRelative Error Ratio (Radiochemistry)RLReporting Limit or Requested Limit (Radiochemistry)RPDRelative Percent Difference, a measure of the relative difference between two pointsTEFToxicity Equivalent Factor (Dioxin)TEQToxicity Equivalent Quotient (Dioxin)	PQL	Practical Quantitation Limit	
QCQuality ControlRERRelative Error Ratio (Radiochemistry)RLReporting Limit or Requested Limit (Radiochemistry)RPDRelative Percent Difference, a measure of the relative difference between two pointsTEFToxicity Equivalent Factor (Dioxin)TEQToxicity Equivalent Quotient (Dioxin)	PRES	Presumptive	
RERRelative Error Ratio (Radiochemistry)RLReporting Limit or Requested Limit (Radiochemistry)RPDRelative Percent Difference, a measure of the relative difference between two pointsTEFToxicity Equivalent Factor (Dioxin)TEQToxicity Equivalent Quotient (Dioxin)	QC		
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)	RER		
RPD       Relative Percent Difference, a measure of the relative difference between two points         TEF       Toxicity Equivalent Factor (Dioxin)         TEQ       Toxicity Equivalent Quotient (Dioxin)	RL		
TEF     Toxicity Equivalent Factor (Dioxin)       TEQ     Toxicity Equivalent Quotient (Dioxin)	RPD		
TEQ Toxicity Equivalent Quotient (Dioxin)	TEF		
	TEQ		
	TNTC		

#### 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. Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

903.0Radium-226 (GFPC)EPAEET904.0Radium-228 (GFPC)EPAEETRa226_Ra228Combined Radium-226 and Radium-228TAL-STLEETPrecSep STDPreparation, Precipitate Separation (Standard In-Growth)NoneEET
Ra226_Ra228 Combined Radium-226 and Radium-228 TAL-STL EET
—
PrecSep STD Preparation, Precipitate Separation (Standard In-Growth) None EET
PrecSep_0 Preparation, Precipitate Separation None EET
EPA = US Environmental Protection Agency None = None TAL-STL = TestAmerica Laboratories, St. Louis, Eacility Standard Operating Procedure

**Sample Summary** 

Client: TRC Environmental Corporation. 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: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

### Client Sample ID: DEK-MW-18001 Date Collected: 05/08/24 13:03 Date Received: 05/11/24 08:00

Date Received: 0:	5/11/24 00:00							
Method: EPA 90	3.0 - Radium	-226 (GFP	C)					
			Count	Total				
			Uncert.	Uncert.				
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared
Padium 226	0 220		0.0033	0.0058	1 00	0.0035	nCi/l	05/16/24 00:22

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
<b>Carrier</b> Ba Carrier	<u>%Yield</u> 79.1	Qualifier Limits 30 - 110				<b>Prepared</b> 05/16/24 09:22	Analyzed 06/12/24 09:58	Dil Fac

### Method: EPA 904.0 - Radium-228 (GFPC)

			Count Uncert.	Total Uncert.							
Analyte	Result	Qualifier	(2σ+/-)	(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

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(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

Job ID: 240-204354-1

Matrix: Water

Dil Fac

Lab Sample ID: 240-204354-1

Analyzed

7

### **Tracer/Carrier Summary**

Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

### Method: 903.0 - Radium-226 (GFPC)

### **Matrix: Water**

Γ			Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Ba (30-110)		ł
240-204354-1	DEK-MW-18001	79.1		_
LCS 160-662015/2-A	Lab Control Sample	89.6		
MB 160-662015/1-A Tracer/Carrier Leger	Method Blank	94.3		
Ba = Ba Carrier				G

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

### Matrix: Water

### Percent Yield (Acceptance Limits) Ва Υ (30-110) (30-110) Lab Sample ID **Client Sample ID** 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

Prep Type: Total/NA

Prep Type: Total/NA

8

### **QC Sample Results**

### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Job ID: 240-204354-1

Method: 903.0 - Radium-226 (GFPC)

Lab Sample		60-6620	15/1-A						Clie		ole ID: Method	
Matrix: Wat											Prep Type: T	
Analysis Ba	atch: 6658	24									Prep Batch:	662015
				Count	Total							
		MB		Uncert.	Uncert.							
Analyte			Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC			repared	Analyzed	Dil Fac
Radium-226		0.03763	U	0.0464	0.0466	1.00	0.0761	pCi/L	05/1	6/24 09:22	06/12/24 09:56	1
		MB	МВ									
Carrier			Qualifier	Limits						repared	Analyzed	Dil Fac
Ba Carrier		94.3		30 - 110					05/1	6/24 09:22	06/12/24 09:56	1
Lab Sample	e ID: LCS	160-662	015/2-A					Clie	ent Sar	mple ID:	Lab Control	Sample
Matrix: Wat	er										Prep Type: Te	otal/NA
Analysis Ba	atch: 6658	24									Prep Batch:	66201 <b>5</b>
						Total						
			Spike	LCS	LCS	Uncert.					%Rec	
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC		%Rec	Limits	
Radium-226			11.3	11.29		1.15	1.00	0.0974	pCi/L	100	75 - 125	
	LCS	LCS										
Carrier	%Yield	Qualifier	Limits									
			30 - 110	-								
lethod: 90 Lab Sample	e ID: MB 1		228 (GFPC	<b>;</b> )					Clie	ent Samp	ole ID: Methoo Prep Type: T	
lethod: 9( Lab Sample Matrix: Wat	04.0 - Ra e ID: MB 1 ter	60-6620	228 (GFPC		Total				Clie	ent Samp		otal/NA
lethod: 90 Lab Sample Matrix: Wat	04.0 - Ra e ID: MB 1 ter	60-6620	228 (GFPC	Count	Total Uncert.				Clie	ent Samp	Prep Type: Te	otal/NA
lethod: 90 Lab Sample Matrix: Wat Analysis Ba	04.0 - Ra e ID: MB 1 ter	60-6620 959 МВ	228 (GFPC 16/1-A MB	Count Uncert.	Uncert.	RL	MDC	Unit			Prep Type: T Prep Batch:	otal/NA 662016
lethod: 90 Lab Sample Matrix: Wat Analysis Ba Analyte	04.0 - Ra e ID: MB 1 ter	60-6620 959 МВ	228 (GFPC 16/1-A MB Qualifier	Count		RL 1.00	MDC 0.568		P	ent Samp repared 6/24 09:27	Prep Type: To Prep Batch: Analyzed	otal/NA 662016 Dil Fac
lethod: 90 Lab Sample Matrix: Wat Analysis Ba Analyte	04.0 - Ra e ID: MB 1 ter	60-6620 259 MB Result -0.02553	228 (GFPC 16/1-A MB Qualifier	Count Uncert. (2σ+/-)	Uncert. (2σ+/-)				P	repared	Prep Type: To Prep Batch: Analyzed	otal/NA 662016 Dil Fac
Aethod: 90 Lab Sample Matrix: Wat Analysis Ba Analyte Radium-228	04.0 - Ra e ID: MB 1 ter	60-6620 959 MB Result -0.02553 MB	228 (GFPC 16/1-A MB Qualifier U	Count Uncert. (2σ+/-)	Uncert. (2σ+/-)				— <b>Р</b> і 05/1	repared	Prep Type: To Prep Batch: Analyzed	otal/NA 662016 
Aethod: 90 Lab Sample Matrix: Wat Analysis Ba Analyte Radium-228 Carrier	04.0 - Ra e ID: MB 1 ter	60-6620 959 MB Result -0.02553 MB	228 (GFPC 16/1-A MB Qualifier U MB	Count Uncert. (2σ+/-) 0.303	Uncert. (2σ+/-)				Pi 05/1 	repared 6/24 09:27 repared	Prep Type: To Prep Batch: Analyzed 05/22/24 16:21	Dil Fac
lethod: 90 Lab Sample Matrix: Wat Analysis Ba Analyte Radium-228 Carrier Ba Carrier	04.0 - Ra e ID: MB 1 ter	60-6620 259 MB Result -0.02553 <i>MB</i> %Yield	228 (GFPC 16/1-A MB Qualifier U MB	Count Uncert. (2σ+/-) 0.303	Uncert. (2σ+/-)					repared 6/24 09:27 repared 6/24 09:27	Prep Type: To Prep Batch: Analyzed 05/22/24 16:21 Analyzed	Dil Fac
Aethod: 90 Lab Sample Matrix: Wat Analysis Ba Analyte Radium-228 Carrier Ba Carrier Y Carrier	04.0 - Ra e ID: MB 1 ter atch: 6629	60-6620 59 MB Result -0.02553 MB %Yield 94.3 81.9	228 (GFPC 16/1-A MB Qualifier U MB Qualifier	Count Uncert. (2σ+/-) 0.303 Limits 30 - 110	Uncert. (2σ+/-)			pCi/L	PI 05/1 05/1 05/1	repared 6/24 09:27 repared 6/24 09:27 6/24 09:27	Analyzed           05/22/24 16:21           Analyzed           05/22/24 16:21	Dil Fac
Iethod: 90 Lab Sample Matrix: Wat Analysis Ba Analyte Radium-228 Carrier Ba Carrier Y Carrier Lab Sample Matrix: Wat	04.0 - Ra e ID: MB 1 ter atch: 6629	60-6620 59 MB Result -0.02553 MB %Yield 94.3 81.9 160-662	228 (GFPC 16/1-A MB Qualifier U MB Qualifier	Count Uncert. (2σ+/-) 0.303 Limits 30 - 110	Uncert. (2σ+/-)			pCi/L	PI 05/1 05/1 05/1	repared 6/24 09:27 repared 6/24 09:27 6/24 09:27 6/24 09:27 mple ID:	Prep Type: Tr Prep Batch: 05/22/24 16:21 <u>Analyzed</u> 05/22/24 16:21 05/22/24 16:21	Dil Fac
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### **QC Association Summary**

Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond Job ID: 240-204354-1

### Rad

### Prep Batch: 662015

Lab Sample ID	Client Sample ID	Ргер Туре	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	
Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batcl
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	

### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

### Client Sample ID: DEK-MW-18001 Date Collected: 05/08/24 13:03 Date Received: 05/11/24 08:00

	Batch	Batch		Dilution	Batch			Prepared
Prep Type	Туре	Method	Run	Factor	Number	Analyst	Lab	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

Job ID: 240-204354-1

### Lab Sample ID: 240-204354-1 Matrix: Water

### **Accreditation/Certification Summary**

### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

### Job ID: 240-204354-1

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
lowa	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**

### Chain of Custody Record

eurofins Environment Testing

**MICHIGAN** 

190

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

Client Information	Sampler: Phone: Lab PM: Brooks, Kris E-Mail: Kris Construction				(ris M	ris M				C	Carrier Tracking No(s):				COC No: 240-120143-29	053.1		
Client Contact:										s	tate of (	Drigin:			Page:			
Jacob Krenz Company:			PWSID:	Kris.	.Broo	ks@e	t.eurof	finsus.c	om							Page 1 of 1 Job #:		
TRC Environmental Corporation.			FWSID.						Anal	ysis	Requ	ieste	d			300 #.		
Address: 1540 Eisenhower Place	Due Date Request	ed:														Preservation Co D - HNO3	des:	
City: Ann Arbor	TAT Requested (d	ays):																
State, Zip: MI, 48108-7080	Compliance Project	t:∆Yes	ΔΝο															
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD				,													
Email: JKrenz@trccompanies.com	WO <i>#</i> : 553814.0001				s or No	(oN							-		S			
Project Name: Karrn/Weadock CCR DEK Bottom Ash Pond & I	Project #: 24024154				le (Yes		et List								ntaine			
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Custody Seals Intact: Custody Seal No.:						Cool	er Tem	perature(	s) °C a	and Oth	er Rema	arks:						_

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Login # 204354

	See Temperature Excursion Form					
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Elitrofilis Cleveland Sample Receipt Multiple Cooler, Form         cooler Description       IR Gun #       Observed       Corrected         client       bx       oher       IR Gun #:       Observed       Corrected         client       bx       oher       IR Gun #:       Observed       Corrected         client       bx       oher       IR Gun #: $\mathcal{A}$ $\mathcal{A}$ $\mathcal{A}$ client       bx       oher       IR Gun #: $\mathcal{A}$ $\mathcal{A}$ $\mathcal{A}$ client       bx       oher       IR Gun #: $\mathcal{A}$ $\mathcal{A}$ $\mathcal{A}$ client       bx       oher       IR Gun #: $\mathcal{A}$ $\mathcal{A}$ $\mathcal{A}$ client       bx       oher       IR Gun #: $\mathcal{A}$ $\mathcal{A}$ $\mathcal{A}$ client       bx       oher       IR Gun #: $\mathcal{A}$ $\mathcal{A}$ $\mathcal{A}$ client       bx       oher       IR Gun #: $\mathcal{A}$ $\mathcal{A}$ $\mathcal{A}$ client       bx       oher       IR Gun #: $\mathcal{A}$ $\mathcal{A}$ $\mathcal{A}$ client       bx       oher       IR Gun #: $\mathcal{A}$ $\mathcal{A}$ <td>1.5</td> <td></td> <td>IR GUN #:</td> <td></td> <td></td> <td>F</td>	1.5		IR GUN #:			F
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Euroritins =::::::::::::::::::::::::::::::::::::	. ര		IR GUN #:			EC
Eurofilis Cleveland Sample Receipt Multiple Cooler Form         cooler Description       IR Gun #       Observed       Corrected         client       box       other       IR Gun #:       Observed       Corrected         client       box       other       IR Gun #: $\mathcal{O}$ $\mathcal{O}$ $\mathcal{O}$ client       box       other       IR Gun #: $\mathcal{O}$ $\mathcal{O}$ $\mathcal{O}$ $\mathcal{O}$ client       box       other       IR GUN #: $\mathcal{O}$ $\mathcal{O}$ $\mathcal{O}$ $\mathcal{O}$ client       box       other       IR GUN #: $\mathcal{O}$ $\mathcal{O}$ $\mathcal{O}$ $\mathcal{O}$ client       box       other       IR GUN #: $\mathcal{O}$ $\mathcal{O}$ $\mathcal{O}$ $\mathcal{O}$ client       box       other       IR GUN #: $\mathcal{O}$ $\mathcal{O}$ $\mathcal{O}$ $\mathcal{O}$ $\mathcal{O}$ client       box       other       IR GUN #: $\mathcal{O}$	Wei Ice Blue Ice Dry Ice Woler None		GUN			EC
Eurofins Cleveland Sample Receipt Multiple Cooler Form:         cooler Description       IR Gun #       Observed       Corrected         client       box       other       IR Gun #:       Observed       Corrected         client       box       other       IR Gun #: $\mathcal{C}$ $C$	Wet ice Blue ice Dry ice Water None		IR GUN #:			EC
Color Description       IR Gun #       Observed       Corrected         Client       box       Other       IR Gun #       Observed       Corrected         Client       box       Other       IR Gun *       Corrected       Corrected         Client       box       Other       IR GUN * $\mathcal{A}$ $\mathcal{A}$ $\mathcal{A}$ Client       box       Other       IR GUN * $\mathcal{A}$ $\mathcal{A}$ $\mathcal{A}$ $\mathcal{A}$ Client       box       Other       IR GUN * $\mathcal{A}$ </td <td>Wellice Blue toe Dry Ice Water None</td> <td></td> <td>IR GUN #:</td> <td></td> <td></td> <td>EC</td>	Wellice Blue toe Dry Ice Water None		IR GUN #:			EC
Eurofiles Cleveland Sample Receipt Multiple Cooler Form.         cooler Description       IR Gun #       Observed       Corrected         Client       box       Other       IR Gun #       Observed       Corrected         Client       box       Other       IR Gun #       Observed       Corrected         Client       box       Other       IR Gun #       State       State       Corrected         Client       box       Other       IR Gun #       State       State       State       State         Client       box       Other       IR Gun #       State       State       State       State       State         Client       box       Other       IR Gun #:       State       State       State       State         Client       box       Other       IR Gun #:       It Gun #:       State       State       State         Client       box       Other       IR Gun #:       It Gun #:       <	Wet Ice Blue Ice Dry Ice Water None		IR GUN 砦			EC
Eurofins:::Cleveland Sample: Receipt Multiple Cooler, Form:         coler Description       IR Gun # (Circle)       Observed (Circle)       Corrected Temp °C         client       box       Other       IR GUN #:       Corrected         client       box       Other       IR GUN #:       Corrected       Corrected         client       box       Other       IR GUN #:       Corrected       Corrected         client       box       Other       IR GUN #:       Corrected       Corrected         client       box       <	Wet Ice Blue Ice Dry Ice Water None		1R GUN #:			EC
Coler Description       IR Gun #       Observed       Corrected         (Circle)       IR Gun #       Observed       Corrected         Cilent       box       other       IR Gun *: $(Circle)$ Temp °C       Temp °C         Cilent       box       other       IR GUN *: $(Circle)$ $(Circle)$ $(Circle)$ $(Circle)$ Cilent       box       other       IR GUN *: $(Circle)$ <t< td=""><td>Wet ice Blue ice Dry ice Water None</td><td></td><td>IR GUN #:</td><td></td><td></td><td>EC</td></t<>	Wet ice Blue ice Dry ice Water None		IR GUN #:			EC
Coler Description       IR Gun # (Circle)       Observed (Circle)       Coler Form: Temp °C       Coler Form: Temp °C         client       box       other       IR Gun # IR Gun #:       Observed (Circle)       Corrected Temp °C       Coler Form: Temp °C       Coler Corrected Temp °C       Coler Corrected (Circle)       Coler None       In Gun #:       Coler None       In Gun #:       Coler None       In Gun #:       Circle)       Metice Blue ice Dr Wei ice Blue ice Dr Wei ice Blue ice Dr       D       Metice Blue ice Dr       D       Metice Blue ice Dr       D       Wei ice Blue ice Dr       D       Wei ice Blue ice Dr       Wei ice Bl	Wet ice Blue ice Dry ice Water None		IR GUN #:			Ë
Coler Description       IR Gun # (Circle)       Observed (Circle)       Cooler Form.       Cooler Form.         client       box       other       IR Gun #       Observed (Circle)       Corrected Temp °C       Correc	Blue fer		R GUN #:			Ē
Client       Box       Other       IR GUN #:       Observed       Corrected       Corrected       Coolant         Client       Box       Other       IR GUN #:       Observed       Temp °C       Temp °C       (Circle)       Coolant         Client       Box       Other       IR GUN #:	Blue Ice ter None		IR GUN #:			EC
Eurofins Cleveland Sample Receipt Multiple Cooler Form         coler Description       IR Gun #       Observed       Corrected       Coolant         (Circle)       IR Gun #       Observed       Corrected       Corrected       Coolant         Client       Box       Other       IR Gun #:       Observed       Corrected       Coolant       Coolant         Client       Box       Other       IR Gun #:       Observed       Corrected       Corrected       Coolant         Client       Box       Other       IR GUN #:       Stole       Stole       Observed       Circle       Blue ice       Dn         Client       Box       Other       IR GUN #:       Stole       Stole       Metice       Blue ice       Dn         Client       Box       Other       IR GUN #:       Wetice       Blue ice       Dn         Client       Box       Other       IR GUN #:       Wetice       Blue ice       Dn         Client       Box       Other       IR GUN #:       Wetice       Blue ice       Dn         Client       Box       Other       IR GUN #:       Wetice       Blue ice       Dn         Client       Box       Other       IR GUN #	Blue Ice Ier None		IR GUN #:			ĒĊ
Eurofins # Cleveland Sample Receipt Multiple Cooler Form.         coler Description       IR Gun # (Circle)       Observed Corrected Correc	Blue Ice fer None		IR GUN #:			Ē
Eurofins # Cleveland Sample Receipt Multiple Cooler Form         cooler Description       IR Gun #       Observed       Corrected       Coolant         (Circle)       IR Gun #       Observed       Corrected       Coolant       Coolant         Client       Box       Other       IR Gun #:       Observed       Temp °C       Gircle)       Circle)         Client       Box       Other       IR Gun #:       Sd       Sd       Wellce       Blue Ice       Dn         Client       Box       Other       IR GUN #:       Sd       Sd       Wellce       Blue Ice       Dn         Client       Box       Other       IR GUN #:       Wellce       Blue Ice       Dn         Client       Box       Other       IR GUN #:       Wellce       Blue Ice       Dn         Wellce       Blue Ice       Dn       Wellce       Blue Ice       Dn         Well Ice       Blue Ice       Dn       Wellce       Blue Ice       Dn         Well Ice       Blue Ice       Dn       Weller       Woler       Woler       Woler       Woler       Woler	≥ Ice None		IR GUN #:			ñ
Client       Box       Other       IR GUN #:       Cleveland Sample Receipt Multiple Cooler Form       Cooler Form         Client       Box       Other       IR GUN #:       Observed       Corrected       Cooler form       Cooler form       Cooler form         Client       Box       Other       IR GUN #:       Imp °C       Temp °C       Temp °C       Client Social form       Client       Box       Other       Blue ice       Dn         Client       Box       Other       IR GUN #:       Imp °C       Store       Store       Dn         Client       Box       Other       IR GUN #:       Store       Store       Dn       Welice       Blue ice       Dn         Client       Box       Other       IN GUN #:       Store       Store       Welice       Blue ice       Dn         Welice       Bive ice       Dn       Welice       Blue ice       Dn	≗ Ice None		IR GUN #:			Ē
Eurofins # Cleveland Sample Receipt Multiple Cooler Form         coler Description       IR Gun #       Observed       Corrected       Coolant         (Circle)       (Circle)       Temp °C       Temp °C       (Circle)       (Circle)         client       box       other       IR GUN #: -/K       3-0       Weilce       Blue Ice       Dr         client       box       other       IX GUN #: -/K       3-0       Weilce       Blue Ice       Dr	tice None		IR GUN #:			EC
Eurofins = Cleveland Sample Receipt Multiple Cooler Form:       Coolant         IR Gun #       Observed       Corrected       Coolant         (Circle)       Temp °C       Temp °C       Circle)       (Circle)         r       IR Gun #:X      Y      Y       Weiter None	) Blue Ice ater None	3.0,	1/2			(Fg)
Eurofins Cleveland Sample Receipt Multiple Cooler Form: IR Gun # Observed Corrected Coolant (Circle) / Temp °C Temp °C (Circle)	Q Wet Ice Blue Ice Water None	$ b ^{\sim}$	IR GUN #: &	×		R
	Coolant (Circle)	Observed Temp ºÇ	IR Gun # (Circle)	ription )	oler Deso (Circle	N <sup>S</sup>
		d Sample Receipt Mu	Eurofins - Clevelan			NAME OF T

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

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## Temperature readings

DEK-MW 18001	DEK-MW-18001	<u>Client Sample ID</u>
240-204354-B-1	240-204354-A-1	<u>Lab ID</u>
Plastic 1 liter - Nıtrıc Acıd	Plastic 1 liter - Nitric Acid	Container Type
۵	۵	<u>Cor</u> pH
		<u>Container</u> <u>pH Temp</u>
		<u>Preservatioi</u> Added
		<u>n Preservation</u> Lot Number

### Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

### Login Number: 204354 List Number: 2 Creator: Thornley, Richard W

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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	

List Source: Eurofins St. Louis

List Creation: 05/14/24 05:18 PM



**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

CCR Ba

Eurofins Cleveland 180 S. Van Buren Avenue Barberton OH 44203







### **Eurofins Cleveland**

### 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

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Generated 6/14/2024 11:02:48 AM 1

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

### **Table of Contents**

Cover Page	1
Table of Contents	3
Definitions/Glossary	4
Case Narrative	5
Method Summary	6
Sample Summary	7
Client Sample Results	8
Tracer Carrier Summary	14
QC Sample Results	15
QC Association Summary	16
Lab Chronicle	17
Certification Summary	19
Chain of Custody	20
Receipt Checklists	25

### **Definitions/Glossary**

### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR Background Well

3

### Qualifiers

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Qualifier Description	4
Result is less than the sample detection limit.	
	5
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	
Percent Recovery	
Contains Free Liquid	
Colony Forming Unit	
Contains No Free Liquid	ð
Duplicate Error Ratio (normalized absolute difference)	
Dilution Factor	9
Detection Limit (DoD/DOE)	
Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample	
Decision Level Concentration (Radiochemistry)	
Estimated Detection Limit (Dioxin)	
Limit of Detection (DoD/DOE)	
Limit of Quantitation (DoD/DOE)	
EPA recommended "Maximum Contaminant Level"	
Minimum Detectable Activity (Radiochemistry)	13
Minimum Detectable Concentration (Radiochemistry)	
Method Detection Limit	
Minimum Level (Dioxin)	
Most Probable Number	
Method Quantitation Limit	
Not Calculated	
Not Detected at the reporting limit (or MDL or EDL if shown)	
Negative / Absent	
Positive / Present	
Practical Quantitation Limit	
Presumptive	
Quality Control	
Relative Error Ratio (Radiochemistry)	
Reporting Limit or Requested Limit (Radiochemistry)	
Relative Percent Difference, a measure of the relative difference between two points	
Toxicity Equivalent Factor (Dioxin)	
Toxicity Equivalent Quotient (Dioxin)	
Too Numerous To Count	
	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         Percent Recovery         Contains Free Liquid         Contains Free Liquid         Qualitate Error Ratio (normalized absolute difference)         Dilution Factor         Detection Limit (DoD/DCE)         Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample         Decision Level Concentration (Radiochemistry)         Estimated Detection Limit (DioXin)         Limit of Detection (DoD/DOE)         Limit of Detection (DoD/DOE)         Limit of Detection (DoD/DOE)         EPR recommended "Maximum Contaminant Level"         Minimum Detectable Activity (Radiochemistry)         Method Detection Limit         Minimum Level (DioXin)         Minimum Level (DioXin)         Most Probable Number         Method Quantitation Limit         Not Detected at the reporting limit (or MDL or EDL if shown)         Negative / Absent         Practical Quantitation Limit         Presumptive         Quality Control         Relative Error Ratio (Radiochemistry)         Relative Error Ratio (Radiochemistry)         Relative Perceronality and Level (Limit (Radioc

### 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. Project/Site: Karn/Weadock CCR Background Well

Job ID: 240-204358-1

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 Ref	erences: Environmental Protection Agency		
None = No			
	TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.		
Laboratory R	eferences:		
EET SL =	Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566		

### Sample Summary

### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR Background Well

Job ID: 240-204358-1

Client Sample ID	Matrix	Collected	Received
MW-15002	Water	05/08/24 14:51	05/11/24 08:00
MW-15008	Water	05/08/24 13:15	05/11/24 08:00
MW-15016	Water	05/08/24 14:57	05/11/24 08:00
MW-15019	Water	05/08/24 14:13	05/11/24 08:00
DUP-BACKGROUND	Water	05/08/24 00:00	05/11/24 08:00
EQ-BACKGROUND	Water	05/08/24 16:05	05/11/24 08:00
	MW-15002 MW-15008 MW-15016 MW-15019 DUP-BACKGROUND	MW-15002WaterMW-15008WaterMW-15016WaterMW-15019WaterDUP-BACKGROUNDWater	MW-15002         Water         05/08/24 14:51           MW-15008         Water         05/08/24 13:15           MW-15016         Water         05/08/24 14:57           MW-15019         Water         05/08/24 14:13           DUP-BACKGROUND         Water         05/08/24 00:00

Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR Background Well

### Client Sample ID: MW-15002 Date Collected: 05/08/24 14:51 Date Received: 05/11/24 08:00

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(2 <b>σ+/-</b> )	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

### Uncert. Uncert. **Result Qualifier** (2**σ**+/-) Analyte (2**σ**+/-) RL MDC Unit Prepared Analyzed Dil Fac Radium-228 0.0468 U 0.277 0.277 0.512 pCi/L 05/16/24 09:27 05/22/24 16:22 1.00 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 82.2 30 - 110 05/16/24 09:27 05/22/24 16:22 Y Carrier 1

### Method: TAL-STL Ra226\_Ra228 - Combined Radium-226 and Radium-228

			Count	Total							
			Uncert.	Uncert.							
Analyte	Result	Qualifier	(2σ+/-)	(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	

Job ID: 240-204358-1

Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR Background Well

### **Client Sample ID: MW-15008** Date Collected: 05/08/24 13:15 **Date Rec**

Date Collected: 05/08/24 13:15								Matrix: Water		
Date Received: 05	5/11/24 08:00									
Method: EPA 903	3.0 - Radium-226 (GFP	C)								
		Count	Total							
		Uncert.	Uncert.							
Analyte	Result Qualifier	(2σ+/-)	(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)

			Count Uncert.	Total Uncert.							
Analyte	Result	Qualifier	(2σ+/-)	(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

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(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

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7

### Job ID: 240-204358-1

Lab Sample ID: 240-204358-2

### Lab Sample ID: 240-204358-3 Matrix: Water

Date Collected: 05/08/24 14:57 Date Received: 05/11/24 08:00

**Client Sample ID: MW-15016** 

		·	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2 <b>σ+/-</b> )	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)

			Count Uncert.	Total Uncert.							
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(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

			Count	Total							
			Uncert.	Uncert.							
Analyte	Result	Qualifier	(2σ+/-)	(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	

5

6 7

Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR Background Well

### Client Sample ID: MW-15019 Date Collected: 05/08/24 14:13 Date

Date Received: 05/	11/24 08:00	)								
Method: EPA 903.	0 - Radium	-226 (GFP	C)							
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(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

### Method: EPA 904.0 - Radium-228 (GFPC)

92.8

Ba Carrier

Analuta	Beeult	Qualifier	Count Uncert.	Total Uncert.	ы	MDC	11	Drenered	Analyzad		
Analyte	Result	Qualifier	(2σ+/-)	(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

30 - 110

			Count	Total							ï
			Uncert.	Uncert.							
Analyte	Result	Qualifier	(2σ+/-)	(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	

**Eurofins Cleveland** 

7

1

Job ID: 240-204358-1

Matrix: Water

Lab Sample ID: 240-204358-4

05/16/24 09:22 06/12/24 10:00

5 6 7

### 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 Matrix: Water Method: EPA 903.0 - Radium-226 (GFPC) Matrix: Water

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(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)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(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

			Count	Total							
			Uncert.	Uncert.							
Analyte	Result	Qualifier	(2σ+/-)	(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: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR Background Well

**Client Sample ID: EQ-BACKGROUND** 

### Job ID: 240-204358-1

5 6 7

### Lab Sample ID: 240-204358-6 Matrix: Water

Date Collected: 05/08/24 16:05 Date Received: 05/11/24 08:00

Method: EPA 903	3.0 - Radium	-226 (GFP	C)							
			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(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)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(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

			Count	Total					
			Uncert.	Uncert.					
Analyte	Result	Qualifier	(2 <del>σ+/-</del> )	(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. Project/Site: Karn/Weadock CCR Background Well Job ID: 240-204358-1

Prep Type: Total/NA

### Method: 903.0 - Radium-226 (GFPC) Matrix: Water

_			Percent Yield (Acceptance Limits)	
		Ва		
Lab Sample ID	Client Sample ID	(30-110)		5
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		8
LCS 160-662015/2-A	Lab Control Sample	89.6		0
MB 160-662015/1-A	Method Blank	94.3		0
				9
Tracer/Carrier Legen	.d			

Ba = Ba Carrier

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

Matrix: Water

				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

### Prep Type: Total/NA

### **QC Sample Results**

### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR Background Well

Job ID: 240-204358-1

### Method: 903.0 - Radium-226 (GFPC)

Lab Sample		60-6620	15/1-A						Clie	nt Samp	Die ID: Methoo Bron Type: T	
Matrix: Wate		24									Prep Type: T	
Analysis Ba	ICH: 0050	24		Count	Total						Prep Batch:	002013
		мв	MR	Uncert.	Uncert.							
Analyta			Qualifier			RL	MDC	Unit	р,	roparod	Applyzod	Dil Fa
Analyte Radium-226		0.03763		<u>(2σ+/-)</u> 0.0464	<b>(2σ+/-)</b> 0.0466	1.00	0.0761			repared	Analyzed 06/12/24 09:56	
Raulum-220		0.03703	0	0.0404	0.0400	1.00	0.0701	poi/L	05/10	0/24 09.22	00/12/24 09.50	
		MB	MB									
Carrier		%Yield	Qualifier	Limits					Pi	repared	Analyzed	Dil Fa
Ba Carrier		94.3		30 - 110					05/1	6/24 09:22	06/12/24 09:56	
								01				
Lab Sample		160-662	015/2-A					Clie	ent San	npie iD:	Lab Control	
Matrix: Wate		24									Prep Type: T	
Analysis Ba	ICU: 0020	24				Total					Prep Batch:	66201
			Spike	1.09	LCS	Uncert.					%Rec	
Analyte			Added	Result		(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Radium-226				11.29		1.15	1.00	0.0974		100	75 - 125	
			11.0	11.20		1.15	1.00	0.0074	poi/L	100	75-125	
	LCS	LCS										
Carrier	%Yield	Qualifier	Limits	_								
eanner	70 mona											
Ba Carrier lethod: 90 Lab Sample	<sup>89.6</sup> 4.0 - Ra ID: MB 1			C)					Clie	ent Samp	ole ID: Methoo Prep Type: T	otal/N/
Ba Carrier lethod: 90 Lab Sample Matrix: Wate	89.6 4.0 - Ra ID: MB 1 er	60-6620	228 (GFPC						Clie	ent Samp		otal/N/
Ba Carrier lethod: 90 Lab Sample Matrix: Wate	89.6 4.0 - Ra ID: MB 1 er	60-6620 59	228 (GFPC 16/1-A	Count	Total				Clie	ent Samp	Prep Type: T	otal/N/
Ba Carrier lethod: 90 Lab Sample Matrix: Wate Analysis Ba	89.6 4.0 - Ra ID: MB 1 er	60-6620 59 MB	228 (GFPC 16/1-А мв	Count Uncert.	Uncert.						Prep Type: T Prep Batch:	otal/N/ 662010
Ba Carrier Iethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte	89.6 4.0 - Ra ID: MB 1 er	60-6620 59 MB Result	228 (GFPC 16/1-A MB Qualifier	Count Uncert. (2σ+/-)	Uncert. (2σ+/-)		MDC		Pr	repared	Prep Type: T Prep Batch: Analyzed	otal/N/ 662010 Dil Fa
Ba Carrier lethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte	89.6 4.0 - Ra ID: MB 1 er	60-6620 59 MB	228 (GFPC 16/1-A MB Qualifier	Count Uncert.	Uncert.	RL 1.00	<b>MDC</b> 0.568		Pr		Prep Type: T Prep Batch: Analyzed	otal/N/ 662010 Dil Fa
Ba Carrier Iethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte	89.6 4.0 - Ra ID: MB 1 er	60-6620 59 MB Result	228 (GFPC 16/1-A MB Qualifier	Count Uncert. (2σ+/-)	Uncert. (2σ+/-)				Pr	repared	Prep Type: T Prep Batch: Analyzed	otal/N/ 662010 Dil Fa
Ba Carrier Iethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte Radium-228	89.6 4.0 - Ra ID: MB 1 er	60-6620 59 MB <u>Result</u> -0.02553 <i>MB</i>	228 (GFPC 16/1-A MB Qualifier U	Count Uncert. (2σ+/-)	Uncert. (2σ+/-)				Pr 05/10	repared	Prep Type: T Prep Batch: Analyzed	otal/N/ 662010 Dil Fa
Ba Carrier Iethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte Radium-228 Carrier	89.6 4.0 - Ra ID: MB 1 er	60-6620 59 MB <u>Result</u> -0.02553 <i>MB</i>	228 (GFPC 16/1-A MB Qualifier U MB	Count Uncert. (2σ+/-) 0.303	Uncert. (2σ+/-)				Pr 05/10	repared 6/24 09:27	Prep Type: T Prep Batch: Analyzed 05/22/24 16:21	Dil Fa
Ba Carrier Iethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte Radium-228 Carrier Ba Carrier	89.6 4.0 - Ra ID: MB 1 er	60-6620 59 MB Result -0.02553 MB %Yield	228 (GFPC 16/1-A MB Qualifier U MB	Count Uncert. (2σ+/-) 0.303	Uncert. (2σ+/-)				Pr 05/10 	repared 6/24 09:27 repared 6/24 09:27	Prep Type: T Prep Batch: Analyzed 05/22/24 16:21 Analyzed	Dil Fa
Ba Carrier lethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte Radium-228 Carrier Ba Carrier Y Carrier	89.6 44.0 - Ra ID: MB 1 er ttch: 6629	60-6620 59 MB Result -0.02553 MB %Yield 94.3 81.9	228 (GFPC 16/1-A MB Qualifier U MB Qualifier	Count Uncert. (2σ+/-) 0.303 Limits 30 - 110	Uncert. (2σ+/-)			pCi/L	Pr 05/10 05/10 05/10	repared 6/24 09:27 repared 6/24 09:27 6/24 09:27	Prep Type: T Prep Batch: 05/22/24 16:21 <u>Analyzed</u> 05/22/24 16:21 05/22/24 16:21	otal/N/ 662010 Dil Fa Dil Fa
Ba Carrier lethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte Radium-228 Carrier Ba Carrier Y Carrier Lab Sample	89.6 4.0 - Ra ID: MB 1 er tch: 6629	60-6620 59 MB Result -0.02553 MB %Yield 94.3 81.9	228 (GFPC 16/1-A MB Qualifier U MB Qualifier	Count Uncert. (2σ+/-) 0.303 Limits 30 - 110	Uncert. (2σ+/-)			pCi/L	Pr 05/10 05/10 05/10	repared 6/24 09:27 repared 6/24 09:27 6/24 09:27 6/24 09:27 nple ID:	Prep Type: T Prep Batch: 05/22/24 16:21 <i>Analyzed</i> 05/22/24 16:21 05/22/24 16:21 05/22/24 16:21 Lab Control S	otal/N/ 662010 <u>Dil Fa</u> <u>Dil Fa</u> Sample
Ba Carrier lethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte Radium-228 Carrier Ba Carrier Y Carrier Lab Sample Matrix: Wate	89.6 4.0 - Ra ID: MB 1 er tch: 6629 ID: LCS	60-6620 59 MB Result -0.02553 MB %Yield 94.3 81.9	228 (GFPC 16/1-A MB Qualifier U MB Qualifier	Count Uncert. (2σ+/-) 0.303 Limits 30 - 110	Uncert. (2σ+/-)			pCi/L	Pr 05/10 05/10 05/10	repared 6/24 09:27 repared 6/24 09:27 6/24 09:27 6/24 09:27 nple ID:	Prep Type: T Prep Batch: <u>Analyzed</u> 05/22/24 16:21 <u>Analyzed</u> 05/22/24 16:21 05/22/24 16:21 Lab Control S Prep Type: T	otal/N/ 662010 Dil Fa Dil Fa Sample otal/N/
Ba Carrier lethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte Radium-228 Carrier Ba Carrier Y Carrier Lab Sample Matrix: Wate	89.6 4.0 - Ra ID: MB 1 er tch: 6629 ID: LCS	60-6620 59 MB Result -0.02553 MB %Yield 94.3 81.9	228 (GFPC 16/1-A MB Qualifier U MB Qualifier	Count Uncert. (2σ+/-) 0.303 Limits 30 - 110	Uncert. (2σ+/-)	1.00		pCi/L	Pr 05/10 05/10 05/10	repared 6/24 09:27 repared 6/24 09:27 6/24 09:27 6/24 09:27 nple ID:	Prep Type: T Prep Batch: 05/22/24 16:21 <i>Analyzed</i> 05/22/24 16:21 05/22/24 16:21 05/22/24 16:21 Lab Control S	otal/N/ 662010 Dil Fa Dil Fa Sample otal/N/
Ba Carrier lethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte Radium-228 Carrier Ba Carrier Y Carrier Lab Sample Matrix: Wate	89.6 4.0 - Ra ID: MB 1 er tch: 6629 ID: LCS	60-6620 59 MB Result -0.02553 MB %Yield 94.3 81.9	228 (GFPC 16/1-A MB Qualifier U MB Qualifier	Count Uncert. (2σ+/-) 0.303 Limits 30 - 110 30 - 110	Uncert. (2σ+/-) 0.303	1.00		pCi/L	Pr 05/10 05/10 05/10	repared 6/24 09:27 repared 6/24 09:27 6/24 09:27 6/24 09:27 nple ID:	Analyzed           05/22/24 16:21           Analyzed           05/22/24 16:21           05/22/24 16:21           05/22/24 16:21           Prep Type: T           Prep Batch:	otal/NA 662010 Dil Fa Dil Fa Sample otal/NA
Ba Carrier Iethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte Radium-228 Carrier Ba Carrier Y Carrier Lab Sample Matrix: Wate Analysis Ba	89.6 4.0 - Ra ID: MB 1 er tch: 6629 ID: LCS	60-6620 59 MB Result -0.02553 MB %Yield 94.3 81.9	228 (GFPC 16/1-A MB Qualifier U MB Qualifier 016/2-A Spike	Count Uncert. (2σ+/-) 0.303 Limits 30 - 110 30 - 110	Uncert. (2σ+/-) 0.303	Total Uncert.	0.568	pCi/L Clie	— Pr 05/10 Pr 05/10 05/10 05/10	repared 6/24 09:27 repared 6/24 09:27 6/24 09:27 nple ID:	Prep Type: T Prep Batch: <u>Analyzed</u> 05/22/24 16:21 <u>Analyzed</u> 05/22/24 16:21 05/22/24 16:21 US/22/24 16:21 US/24 16:21 US/24 16:21 US	otal/NA 662010 Dil Fa Dil Fa Sample otal/NA
Ba Carrier lethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte Radium-228 Carrier Ba Carrier Y Carrier Lab Sample Matrix: Wate Analysis Ba Analysis Ba	89.6 4.0 - Ra ID: MB 1 er tch: 6629 ID: LCS	60-6620 59 MB Result -0.02553 MB %Yield 94.3 81.9	228 (GFPC 16/1-A MB Qualifier U MB Qualifier	Count Uncert. (2σ+/-) 0.303 Limits 30 - 110 30 - 110	Uncert. (2σ+/-) 0.303	1.00		pCi/L	— <u>Pr</u> 05/10 <u>Pr</u> 05/10 05/10 05/10 <b>ent San</b>	repared 6/24 09:27 repared 6/24 09:27 6/24 09:27 6/24 09:27 nple ID:	Analyzed           05/22/24 16:21           Analyzed           05/22/24 16:21           05/22/24 16:21           05/22/24 16:21           Prep Type: T           Prep Batch:	otal/NA 662010 Dil Fa Dil Fa Sample otal/NA
Ba Carrier Iethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte Radium-228 Carrier Ba Carrier Y Carrier Lab Sample Matrix: Wate Analysis Ba Analysis Ba	89.6 4.0 - Ra ID: MB 1 er tch: 6629 ID: LCS er tch: 6629	60-6620 59 MB Result -0.02553 MB %Yield 94.3 81.9 160-662 59	228 (GFPC 16/1-A MB Qualifier U MB Qualifier 016/2-A Spike Added	Count Uncert. (2σ+/-) 0.303 <i>Limits</i> 30 - 110 30 - 110 30 - 110 LCS Result	Uncert. (2σ+/-) 0.303	1.00 Total Uncert. (2σ+/-)	0.568 RL	pCi/L Clie	— <u>Pr</u> 05/10 <u>Pr</u> 05/10 05/10 05/10 <b>ent San</b>	repared 6/24 09:27 repared 6/24 09:27 6/24 09:27 nple ID:	Prep Type: T Prep Batch: <u>Analyzed</u> 05/22/24 16:21 <u>Analyzed</u> 05/22/24 16:21 05/22/24 16:21 US/22/24 16:21 US/24 16:21 US/24 16:21 US/24 16:21 US/24 16:21 US/24 16	otal/NA 662010 Dil Fa Dil Fa Dil Fa
Ba Carrier Iethod: 90 Lab Sample Matrix: Wate Analysis Ba Analyte Radium-228 Carrier Ba Carrier Y Carrier Lab Sample Matrix: Wate Analysis Ba Analysis Ba Analysis Ba	89.6 4.0 - Ra ID: MB 1 er tch: 6629 ID: LCS er tch: 6629 LCS	60-6620 59 MB Result -0.02553 MB %Yield 94.3 81.9 160-662 59	228 (GFPC 16/1-A MB Qualifier U MB Qualifier 016/2-A Spike Added 8.92	Count Uncert. (2σ+/-) 0.303 <i>Limits</i> 30 - 110 30 - 110 30 - 110 LCS Result	Uncert. (2σ+/-) 0.303	1.00 Total Uncert. (2σ+/-)	0.568 RL	pCi/L Clie	— <u>Pr</u> 05/10 <u>Pr</u> 05/10 05/10 05/10 <b>ent San</b>	repared 6/24 09:27 repared 6/24 09:27 6/24 09:27 nple ID:	Prep Type: T Prep Batch: <u>Analyzed</u> 05/22/24 16:21 <u>Analyzed</u> 05/22/24 16:21 05/22/24 16:21 US/22/24 16:21 US/24 16:21 US/24 16:21 US/24 16:21 US/24 16:21 US/24 16	otal/N/ 662016 Dil Fac Dil Fac Dil Fac
Ba Carrier Active: 90 Lab Sample Matrix: Wate Analysis Ba Analyte Radium-228 Carrier Ba Carrier Y Carrier Lab Sample Matrix: Wate Analysis Ba Analysis Ba Analyte Radium-228 Carrier Ba Carrier Ba Carrier Ba Carrier Ba Carrier	89.6 4.0 - Ra ID: MB 1 er tch: 6629 ID: LCS er tch: 6629 LCS	60-6620 59 MB Result -0.02553 MB %Yield 94.3 81.9 160-662 59	228 (GFPC 16/1-A MB Qualifier U MB Qualifier 016/2-A Spike Added 8.92	Count Uncert. (2σ+/-) 0.303 <i>Limits</i> 30 - 110 30 - 110 30 - 110 30 - 110	Uncert. (2σ+/-) 0.303	1.00 Total Uncert. (2σ+/-)	0.568 RL	pCi/L Clie	— <u>Pr</u> 05/10 <u>Pr</u> 05/10 05/10 05/10 <b>ent San</b>	repared 6/24 09:27 repared 6/24 09:27 6/24 09:27 nple ID:	Prep Type: T Prep Batch: <u>Analyzed</u> 05/22/24 16:21 <u>Analyzed</u> 05/22/24 16:21 05/22/24 16:21 US/22/24 16:21 US/24 16:21 US/24 16:21 US/24 16:21 US/24 16:21 US/24 16	otal/NA 662016 Dil Fac Dil Fac Dil Fac

### **QC Association Summary**

Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR Background Well Job ID: 240-204358-1

### Rad Prep Batch: 662015

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
40-204358-1	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	
_CS 160-662015/2-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-204358-1	MW-15002	Total/NA	Water	PrecSep 0	Prep Batch
40-204358-2	MW-15008	Total/NA	Water	PrecSep_0	
240-204358-3	MW-15016	Total/NA	Water	PrecSep 0	
		IOtal/INA	Trator	110000p_0	
	MW-15019	Total/NA	Water	PrecSep_0	
240-204358-4				<del>. <del>.</del></del>	
240-204358-4 240-204358-5	MW-15019	Total/NA	Water	PrecSep_0	
240-204358-4 240-204358-5 240-204358-6 MB 160-662016/1-A	MW-15019 DUP-BACKGROUND	Total/NA Total/NA	Water Water	PrecSep_0 PrecSep_0	

Dilution

Factor

1

1

1

Run

Batch

Number Analyst

662015 MLT

665824 SWS

662016 MLT

662959 SCB

666196 FLC

EET SL

EET SL

EET SL

Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR Background Well

Batch

903.0

904.0

Method

PrecSep STD

PrecSep 0

Ra226 Ra228

Client Sample ID: MW-15002

Batch

Туре

Prep

Prep

Analysis

Analysis

Analysis

Client Sample ID: MW-15008

Date Collected: 05/08/24 13:15

Date Collected: 05/08/24 14:51

Date Received: 05/11/24 08:00

Prep Type

Total/NA

Total/NA

Total/NA

Total/NA

Total/NA

**Matrix: Water** 

# 5

### or Analyzed Lab EET SL 05/16/24 09:22 06/12/24 10:00 EET SL

Lab Sample ID: 240-204358-1

Prepared

05/16/24 09:27

05/22/24 16:22

06/13/24 11:50

### Lab Sample ID: 240-204358-2

### Matrix: Water

Lab Sample ID: 240-204358-3

Lab Sample ID: 240-204358-4

Matrix: Water

Matrix: Water

Date Received:	05/11/24 0	8:00	
Γ	Batch	Batch	

	Batch	Batch		Dilution	Batch			Prepared	
Prep Type	Туре	Method	Run	Factor	Number	Analyst	Lab	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 Date Collected: 05/08/24 14:57 Date Received: 05/11/24 08:00

_	Batch	Batch		Dilution	Batch			Prepared
Prep Type	Туре	Method	Run	Factor	Number	Analyst	Lab	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 Date Collected: 05/08/24 14:13 Date Received: 05/11/24 08:00

-	Batch	Batch		Dilution	Batch			Prepared
Prep Type	Туре	Method	Run	Factor	Number	Analyst	Lab	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

Dilution

Factor

1

1

1

Run

Batch

Number Analyst

662015 MLT

665832 SWS

662016 MLT

662961 SCB

666196 FLC

Lab

EET SL

EET SL

EET SL

EET SL

EET SL

### Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR Background Well

### Client Sample ID: DUP-BACKGROUND Date Collected: 05/08/24 00:00 Date Received: 05/11/24 08:00

Batch

903.0

904.0

Method

PrecSep STD

PrecSep\_0

Ra226\_Ra228

Batch

Туре

Prep

Prep

Analysis

Analysis

Analysis

### Lab Sample ID: 240-204358-5 Matrix: Water

Prepared

or Analyzed

05/16/24 09:22

06/12/24 10:06

05/16/24 09:27

05/22/24 16:39

06/13/24 11:50

### Lab Sample ID: 240-204358-6

Matrix: Water

Client Sample ID: EQ-BACKGROUND
Date Collected: 05/08/24 16:05
Date Received: 05/11/24 08:00

	Batch	Batch		Dilution	Batch			Prepared	
Prep Type	Туре	Method	Run	Factor	Number	Analyst	Lab	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:

Ргер Туре

Total/NA

Total/NA

Total/NA

Total/NA

Total/NA

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

### Accreditation/Certification Summary

Client: TRC Environmental Corporation. Project/Site: Karn/Weadock CCR Background Well

**12** 13

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
Naska (UST)	State	20-001	05-06-25
NAB	Dept. of Defense ELAP	L2305	04-06-25
NAB	Dept. of Energy	L2305.01	04-08-25
NAB	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
Iorida	NELAP	E87689	06-30-24
II - RadChem Recognition	State	n/a	06-30-24
linois	NELAP	200023	11-30-24
owa	State	373	12-01-24
ansas	NELAP	E-10236	10-31-24
Kentucky (DW)	State	KY90125	12-31-24
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-24
ouisiana	NELAP	04080	06-30-22 *
ouisiana (All)	NELAP	04080	06-30-24
ouisiana (DW)	State	LA011	12-31-24
<i>l</i> aryland	State	310	09-30-24
/lassachusetts	State	M-MO054	06-30-24
/II - RadChem Recognition	State	9005	06-30-24
lissouri	State	780	06-30-25
levada	State	MO00054	07-31-24
lew Jersey	NELAP	MO002	06-30-24
lew Mexico	State	MO00054	06-30-24
lew York	NELAP	11616	03-31-25
lorth Carolina (DW)	State	29700	07-31-24
lorth Dakota	State	R-207	06-30-24
Dklahoma	NELAP	9997	08-31-24
Dregon	NELAP	4157	09-01-24
Pennsylvania	NELAP	68-00540	02-28-25
South Carolina	State	85002001	06-30-24
exas	NELAP	T104704193	07-31-24
JS Fish & Wildlife	US Federal Programs	058448	07-31-24
JSDA	US Federal Programs	P330-17-00028	05-18-26
Jtah	NELAP	MO00054	07-31-24
/irginia	NELAP	10310	06-15-25
Vashington	State	C592	08-30-24
Vest 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

**Chain of Custody Record** 



eurofins Environment Testing

Phone: 330-497-9396 Fax: 330-497-0772										170				
Client Information	Sampler:	5-7	ASSe	Lab Bro	PM: ooks, K	iris M				Carrier Trac	king No(s):		COC No: 240-120140-33282	.1
Client Contact: Jacob Krenz	Phone:	904	33	E-M		ks@e	t.eurofir	isus.com		State of Orig	in:		Page: Page 1 of 1	
Company: TRC Environmental Corporation.			PWSID:					Anal	ysis Re	quested			Job #:	
Address: 1540 Eisenhower Place	Due Date Requeste	ed:											Preservation Codes D = HNO3	
City: Ann Arbor	TAT Requested (da	iys):				8								
State, Zip: MI, 48108-7080	Compliance Projec	t: <u>A</u> Yes	A No		-							1		
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD													
Email: JKrenz@trccompanies.com	WO #:				or No							5		14
Project Name: Karn/Weadock CCR Background Weil	Project #: 24024154				8 (Yes	bC .	1 List					containers		
Site:	SSOW#:				Sample (Yes or SD (Yes or No)	28_GF	Targe					of con	Other:	
Sample Identification	Sample Date	Sample Time		Matrix (W-wster, 3-solid, 0-waste/oil, BT-Tissue, A-Ak ation Code:	eld Filtered : arform MS/M	226Ra	O 904.0 - Standard Target List					Total Number (	Special Instr	uctions/Note:
MW-15002	5/8/24	1451	6	Water	M.	14	i	24				3		
MW-15008	5/8/24	1315	6	Water	NV	1	1	240-204358				2		
MW-15016	5/8/24	1457	G	Water	NU	NT.	-	1358						
MW-15019	518124	1413	6	Water	N.	14	+	Chain				Э		
DUP-Background	5/0/24	-	6	Water	4	1	4	19				2		
EQ-Backgroud	sle 124	1405	6	Water	w	٦,	+		Custody			ð		
				Water					dy					
					11									
					11			++	1					
Possible Hazard Identification					Ц									
Non-Hazard Flammable Skin Irritant Pois			Radiological	,	3			o Client		issessed if Disposal By	Lab		ed longer than 1 mo ive For	Months
Deliverable Requested: I, II, III, IV, Other (specify)					Sp			ions/QC R	equireme	nts:				
Empty Kit Relinquished by:		Date:			Time	:		1. 1.1		Method	of Shipment:			
Relinquished by	Date/Time:	- 0	718	Company		Rece	eived by:	1.D	Me	n	Date/Time/	olsu	Cc	EEXA
Relinguistied by: //////////	Date/Time:	40		Company	4	Rece	JES	SE MO	ROSK	0	Date/Time:		4 080 C	ompany Derce
Relinquished by:	Date/Time:			Company			eived by:				Date/Time:	76		ompany
Custody Seals Intact: Custody Seal No.: △ Yes △ No						Cool	er Tempe	rature(s) °C a	ind Other Re	emarks:		under:		

Ver: 06/08/2021 6/14/2024

HI-NC-099 Cooler Receipt Form Page 2 - Multiple Coolers

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X-002147

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Check         Box         Other         Result at the state of the stat	Wet Ice Blue Ice Dry Ice Water None			IR GUN #:		Client	ĒĈ
Cherrich	Wet Ice Blue Ice Dry Ice Water None			IR GUN #:		Client	EC
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Victorial         Incomposition         Incomposition         Temp occur         T	0			IR GUN #:		Client	EC
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(Circle) Temp °C Temp °C	Wet ibe Blue Ice Dry Ice	77	1.7	IR GUN #:			È
IB Gun # Observed Corrected	Coolant (Circle)	Corrected Temp °C	Observed Temp °C	IR Gun # (Circle)	scription le)	oler Des (Circ	) လို

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Login #

5

# 13

# Login Container Summary Report

6/14/2024

## Temperature readings

5/11/2024

EQ-BACKGROUND 240-204358-B-6 Plastic 1 liter - Nitric Acid <2	EQ-BACKGROUND 240-204358-A-6 Plastic 1 liter - Nitric Acid <2	DUP-BACKGROUND 240-204358-B-5 Plastic 1 liter - Nitric Acid <2	DUP-BACKGROUND 240-204358-A-5 Plastic 1 liter - Nitric Acid <2	MW-15019 240-204358-B-4 Plastic 1 liter - Nitric Acid <2	MW 15019 240 204358-A-4 Plastic 1 liter - Nitric Acid <2	MW-15016 240-204358-B-3 Plastic 1 liter - Nitric Acid <2	MW-15016 240-204358 A-3 Plastic 1 liter - Nitric Acid <2	MW-15008 240-204358-B-2 Plastic 1 liter - Nitric Acid <2	MW-15008 240-204358-A-2 Plastic 1 liter - Nitric Acid <2	MW-15002 240-204358-B-1 Plastic I liter - Nitric Acid <2	MW 15002 240-204358 A-1 Plastic 1 liter - Nitric Acid <2	Client Sample ID     Lab ID     Container Type     PH     Temp
			nc Acid <2		ıc Acid <2				ic Acıd <2			<u>Container</u> Preservation Preservation pH Temp Added Lot Number

Eurofins Cleveland								30.H. 21			
iou S. vari Buren Avenue Barberton, OH 44203 Phone: 330-497-9396 Fax: 330-497-0772	ч	lain of	Chain of Custody Record	Reco	p					🔅 eurofins  🗉	Environment Testing
Client Information (Sub Contract Lab)	Sampler:			Lab PM: Brooks, Kris M	Σ			Carrier Tracking No(s)	No(s):	COC No: 240-184582.1	
Client Contact. Shipping/Receiving	Phone:			E-Mail: Kris.Brooks@et.eurofinsus.com	@et.eui	ofinsus.co	ε	State of Origin: Michigan		Page Page 1 of 1	
Company TestAmerica Laboratories, Inc.				Accredita	tions Re	Accreditations Required (See note)	ote):	,		Job # 240-204358-1	
Address: 13715 Rider Trail North,	Due Date Requested: 6/12/2024						Analvsis Requested	ouested		Preservation Codes:	
City. Earth City	TAT Requested (days):				-						
State, Zp: MO, 63045											
Phone 314-298-8566(Tel) 314-298-8757(Fax)	# 0d			(1							
Email:	:# OM										
Project Name Karn/Weadock CCR Background Well	Project #: 24024154			and the second second						enenia	
Site	SSOW#:									ot cont	
Sample Identification - Client ID (Lab ID)	Sample Date	Sample (C= T Time (C=	Sample Matrix Type Seedid. (C=comp, Ownease, Astrict G=grab) STTT (Carcon)	Field Filtered S Perform MS/M	2_q923919\0.509  0_q923919\0.209_0	Ra226Ra228_GF				o 19dmuV Isto	
	1		1 103	X						P opecial instructions/Note:	tions/Note:
MW-15002 (240-204358-1)	5/8/24 F		Water		×	×				2 TVA protocol - Ra-226+228 action limit at	228 action limit at
MW-15008 (240-204358-2)	5/8/24	13:15 Eastern	Water		×	×					228 action limit at
MW-15016 (240-204358-3)	5/8/24	14:57 Eastern	Water		×	×					228 action limit at
MW-15019 (240-204358-4)	5/8/24	14:13 Eastern	Water		×	×				2 TVA protocol - Ra-226+228 action limit at	228 action limit at
DUP-BACKGROUND (240-204358-5)	5/8/24 E	Eastern	Water		×	×				2 TVA protocol - Ra-226+228 action limit at	228 action limit at
EQ-BACKGROUND (240-204358-6)	5/8/24	16:05 Eastern	Water		× ×	×				1 TVA protocol - Ra-226+228 action limit at	228 action limit at
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/flests/maritix being analyzed, the samples may to the Eurofins Environment Testing North Central. LLC alaces the ownership of method, analyte & accreditation compliance upon our subcontract laboratory are of the instructions will be provided under chain-of-custody. If the 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 Clostody attention to said compliance to Eurofins Environment Testing North Central. LLC attention North Central. LLC attention North Central. LLC attention North Central. LLC attention to said compliance to Eurofins Environment Testing North Central. LLC attention North Central. LLC attention North Central. LLC attention to said compliance to Eurofins Environment Testing North Central. LLC attention North Central. LLC attention to said compliance to Eurofins Environment Testing North Central. LLC attention North Central. LLC attention North Central. LLC attention to the instructions will be provided attention to the central to said compliance to Eurofins Environment Testing North Central. LLC attention North Central. LLC attention to the central to the cen	ment Testing North Central, LL d above for analysis/tests/matr Central, LLC attention immedi	C places the ow ix being analyze ately. If ail requ	mership of method, id, the samples mus ested accreditations	analyte & accre t be shipped bi are current to	editation ack to the date, ret	compliance u Eurofins Environte signed	pon our subcor vironment Testi 1 Chain of Cust	tract laboratories. 7 Ng North Central, LL	This sample shipu C laboratory or o c compliance to E	ent is forwarded under chain-of- ber instructions will be provided. Irofins Environment Testino Norti	custody. If the Any changes to
Possible Hazard Identification				Sam	ple Dis	sposal ( A	fee may be	assessed if sa	mples are ret	Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)	(4)
Deliverable Requested: I, II, IV, Other (specify)	Primary Deliverable Rank:	Rank: 2		Spec	Retur	Return To Client al Instructions/QC	Return To Client Dist Special Instructions/QC Requirements:	<i>Disposal By Lab</i> ents:	]	Archive For M	Months
Empty Kit Relinquished by:	Dat	te:		Time:				Method of Shipment	shipment:		
Relinquished by MÅLISSÅ LOAR	Date/Time:		Company		Received by	py:			Date/Time:	Company	Jany
Relinquished by:	Date/Time:		Company	<u>~</u>	Rec			4	1 MAN	4 707 Company	any
	Date/Time:		Company		Received by	PA:		g	Date/Time:	Company	any
Custody Seals Intact: Custody Seal No.: △ Yes △ No				0	ooler Te	mperature(s)	Cooler Temperature(s) °C and Other Remarks	emarks:			
					11	12 13	11	9 10	7 8	4 5 6	Ver: 06/08/2021

### Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

### Login Number: 204358 List Number: 2 Creator: Thornley, Richard W

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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	

Job Number: 240-204358-1

List Source: Eurofins St. Louis

List Creation: 05/14/24 05:18 PM

14

## Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

#### Login Number: 204358 List Number: 3 Creator: Thornley, Richard W

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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	

List Source: Eurofins St. Louis

List Creation: 05/15/24 08:08 AM



Enclosure 2

First Semiannual 2024 Nature and Extent Data Summary, DE Karn, Consumers Energy, Essexville, Michigan. (TRC, July 30, 2024).



Date:	July 30, 2024
То:	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)<sup>1</sup>.

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.

<sup>&</sup>lt;sup>1</sup> 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<sup>2</sup>
- Orange Statistically Significant GWPS Exceedances<sup>3</sup>

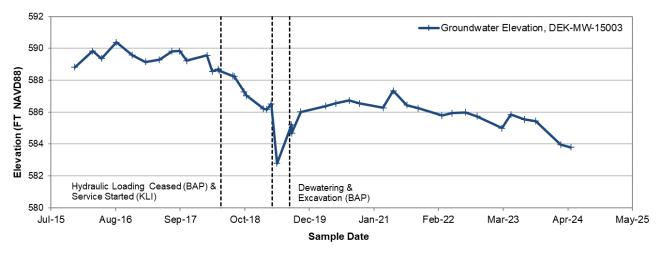
The highest concentrations of arsenic observed in the vicinity of the Karn Bottom Ash Pond have

<sup>&</sup>lt;sup>2</sup> 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).

<sup>&</sup>lt;sup>3</sup> 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.<sup>4</sup> 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<sup>™</sup> 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

<sup>&</sup>lt;sup>4</sup> Discharge to this ditch was completed under authorization of the National Pollutant Discharge Elimination System (NPDES) permit.

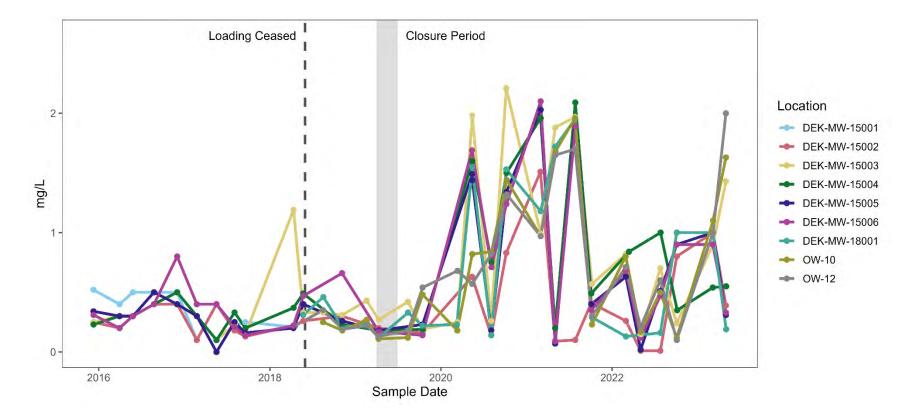
present), as shown by the time-series charts and Welch's t-test results (Attachment A).

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.

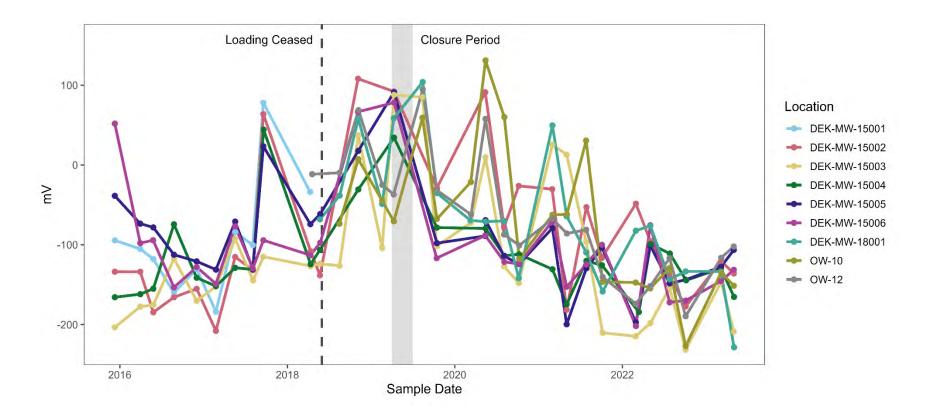
In addition to the groundwater flow direction changes mentioned above, redox conditions which also affect contaminant transport, are still stabilizing in the Bottom Ash Pond Area following removal activities and will continue to be evaluated further. As shown on the charts below, the dissolved oxygen 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 - 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 2Summary of Groundwater Sampling Results (Analytical): DE Karn Nature and Extent<br/>GSI Monitoring Locations

- Figure 1 Figure 2
- Nature and Extent Summary: GWPS Exceedances Nature and Extent Summary: GSI Pathway Compliance

Attachment A Statistical Evaluation

## Tables

								Sa	mple Location:		DEK-MV	N-15003			DFK-M	W-15004			MW	-01	
								<u> </u>	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^^	1120/2020	10/ 1/2020	0/0/2021	0/0/2021	1120/2020	10/0/2020	0/11/2021	0/0/2021	112 112020	10/2/2020	0, 1/2021	0,172021
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 <sup>EE</sup>	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 <sup>E</sup>	250E	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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	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 <sup>E</sup>	500 <sup>E</sup>	500	NC	NC	NC	NC	261	284	322	312	722	666	612	610			520	
pH, Field	su	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	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 <sup>1</sup>	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 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	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 <sup>E</sup>	1,000 <sup>E</sup>	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 <sup>E</sup>	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.

 $^{\mathsf{E}}$  - Criterion is the aesthetic drinking water value per footnote {E}.

 $^{\mbox{\scriptsize EE}}$  - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

BOLD font denotes concentrations detected above the GWPS.

Indicates an	exceedance	of applicable	GSI criteria.
	Indicates an	Indicates an exceedance	Indicates an exceedance of applicable

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.

<sup>1</sup> - Constituent triggered an Assessment of Corrective Measures for the Karn Bottom Ash Pond as described in TRC's letter report dated Janurary 14, 2019.

								Sa	mple Location:		MW	-03			MM	/-06		1	MM	-08	
								04	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^^	1/24/2023	10/2/2023	3/4/2024	3/172024	1/24/2023	10/2/2023	5/4/2024	3/0/2024	1/24/2023	10/2/2023	3/4/2024	5/0/2024
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	500EE	NC	ŃC	ŃC	NC	137	138	139	138	94.7	102	151	260	159	165	151	157
Chloride	mg/L	NA	250 <sup>E</sup>	250 <sup>E</sup>	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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	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 <sup>E</sup>	500 <sup>E</sup>	500	NC	NC	NC	NC			700				758				876	
pH, Field	su	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	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 <sup>1</sup>	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 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	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 <sup>E</sup>	1,000 <sup>E</sup>	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 <sup>E</sup>	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.

<sup>E</sup> - Criterion is the aesthetic drinking water value per footnote {E}.

 $^{\mathsf{EE}}$  - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

**BOLD** font denotes concentrations detected above the GWPS.

es an exceedance	of applicable GSI criteria.
	s an exceedance

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.

<sup>1</sup> - Constituent triggered an Assessment of Corrective Measures for the Karn Bottom Ash Pond as described in TRC's letter report dated Janurary 14, 2019.

								Sa	mple Location:		MW	-10			MM	1-12			MW	-14	p
								04	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^^	1124/2020	10/2/2023	5/4/2024	3/0/2024	1/24/2020	10/2/2023	5/4/2024	3/0/2024	1/24/2020	10/2/2023	5/4/2024	0/0/2024
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	500EE	NC	ŃC	ŃC	NC	259	272	302	264	190	184	200	186	301	188	181	179
Chloride	mg/L	NA	250 <sup>E</sup>	250 <sup>E</sup>	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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	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 <sup>E</sup>	500 <sup>E</sup>	500	NC	NC	NC	NC			1,410				970				952	
pH, Field	su	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	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 <sup>1</sup>	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	300E	300 <sup>E</sup>	500,000 <sup>EE</sup>	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 <sup>E</sup>	1,000 <sup>E</sup>	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 <sup>E</sup>	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.

<sup>E</sup> - Criterion is the aesthetic drinking water value per footnote {E}.

 $^{\mathsf{EE}}$  - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

**BOLD** font denotes concentrations detected above the GWPS.

Bosult	ndicates an exceeda	ance of applicable GSI criteria	ι.
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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.

<sup>1</sup> - Constituent triggered an Assessment of Corrective Measures for the Karn Bottom Ash Pond as described in TRC's letter report dated January 14, 2019.

								Sa	mple Location:		MW	/-16		<u> </u>	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 <sup>EE</sup>	NC	NC	NC	NC	372	345	331	301	113	105	128	141
Chloride	mg/L	NA	250 <sup>E</sup>	250E	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 <sup>E</sup>	250E	500 <sup>EE</sup>	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 <sup>E</sup>	500 <sup>E</sup>	500	NC	NC	NC	NC			1,910		560	580	682	832
pH, Field	su	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	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 <sup>1</sup>	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	300E	300E	500,000 <sup>EE</sup>	NC	NC	NC	NC	194	358	2,300	141	2,170	1,640	3,130	3,380
Copper	ug/L	NA	1,000E	1,000E	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 <sup>E</sup>	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.
- M 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.
- <sup>E</sup> 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.

Indicates an exceedance of acute-based GSI criteria.

All metals were analyzed as total unless otherwise specified.

Result

<sup>1</sup> - Constituent triggered an Assessment of Corrective Measures for the Karn Bottom Ash Pond as described in TRC's letter report dated Janurary 14, 2019.

								Sa	ample Location:		OW	/-11		<u> </u>	ON	/-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 <sup>^^</sup>								
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 <sup>EE</sup>	NC	NC	NC	NC	5.8	7.8	10.7	10.3	66.5	89	165	179
Chloride	mg/L	NA	250 <sup>E</sup>	250 <sup>E</sup>	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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	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 <sup>⊑</sup>	500 <sup>E</sup>	500	NC	NC	NC	NC	216	208	224	312	510	646	1,010	1,290
pH, Field	su	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	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 <sup>1</sup>	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 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	NC	NC	NC	NC	42	52	140	21	5,690	7,750	6,250	5,200
Copper	ug/L	NA	1,000 <sup>E</sup>	1,000 <sup>E</sup>	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 <sup>E</sup>	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.
- M 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.

Indicates an exceedance of acute-based GSI criteria.

All metals were analyzed as total unless otherwise specified.

Result

<sup>1</sup> - Constituent triggered an Assessment of Corrective Measures for the Karn Bottom Ash Pond as described in TRC's letter report dated Janurary 14, 2019.

								Sa	ample Location:		T1-3	GSI			T2-3	BGSI			Т3-3	GSI	l
		_							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 <sup>EE</sup>	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 <sup>E</sup>	250 <sup>E</sup>	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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	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 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	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 <sup>1</sup>	10	10	10	340	680	100 <sup>2</sup>	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 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	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.

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 $^{\mathsf{E}}$  - 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.

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.

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.

<sup>1</sup> - Constituent triggered an Assessment of Corrective Measures for the Karn Bottom Ash Pond as described in TRC's letter report dated January 14, 2019.

<sup>2</sup> - Compliance demonstrated on a mass flux basis.

Result

Result

								Sa	ample Location:		T4-3	GSI			T5-3	GSI			T6-3	GSI	
									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 <sup>EE</sup>	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 <sup>E</sup>	250 <sup>E</sup>	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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	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 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	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 <sup>1</sup>	10	10	10	340	680	100 <sup>2</sup>	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 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	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.

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\* - 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.

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SW-02 [Saginaw River] collected in April 2018). Chromium AMV & FAV criteria are based on hexavalent chromium.

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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.

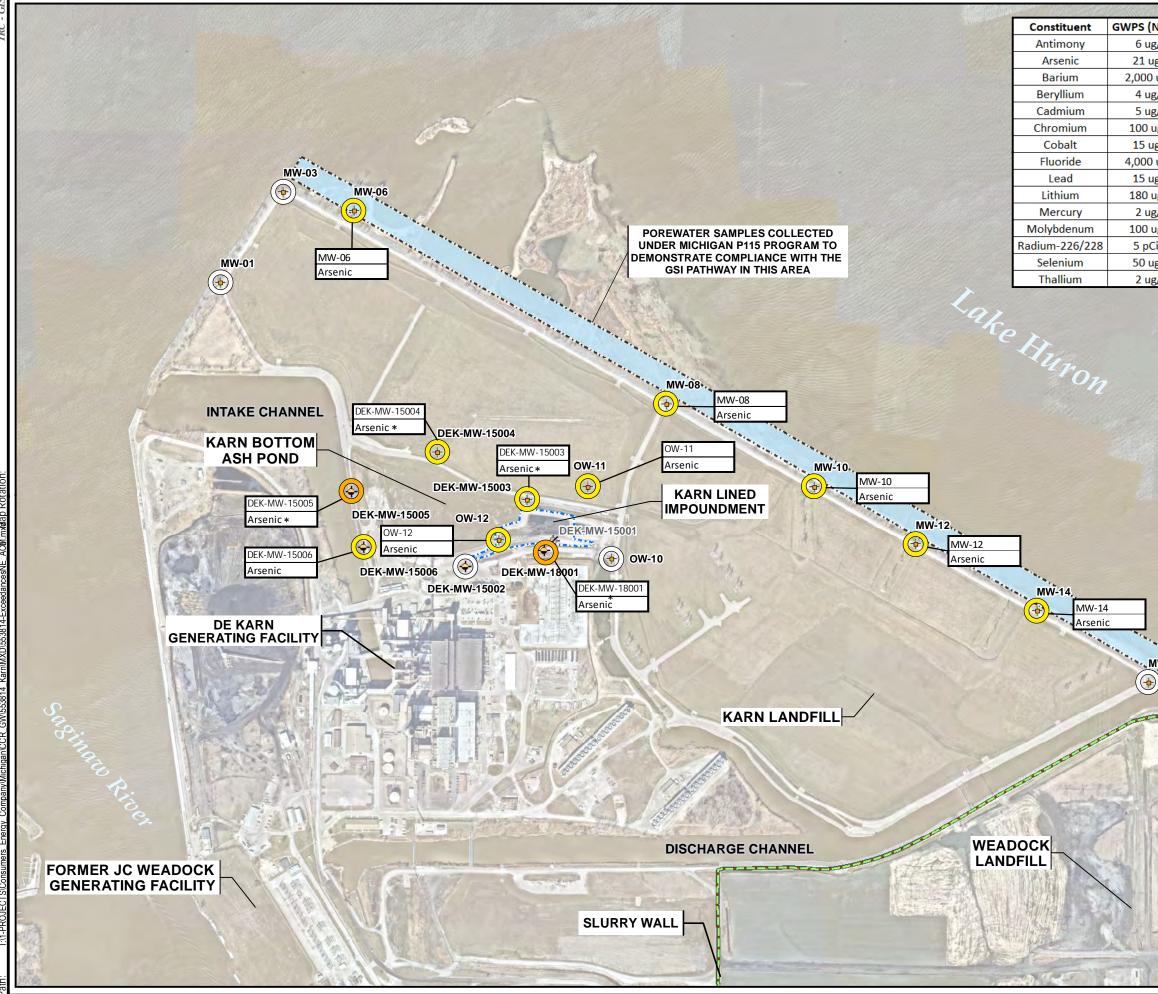
<sup>1</sup> - Constituent triggered an Assessment of Corrective Measures for the Karn Bottom Ash Pond as described in TRC's letter report dated January 14, 2019.

<sup>2</sup> - Compliance demonstrated on a mass flux basis.

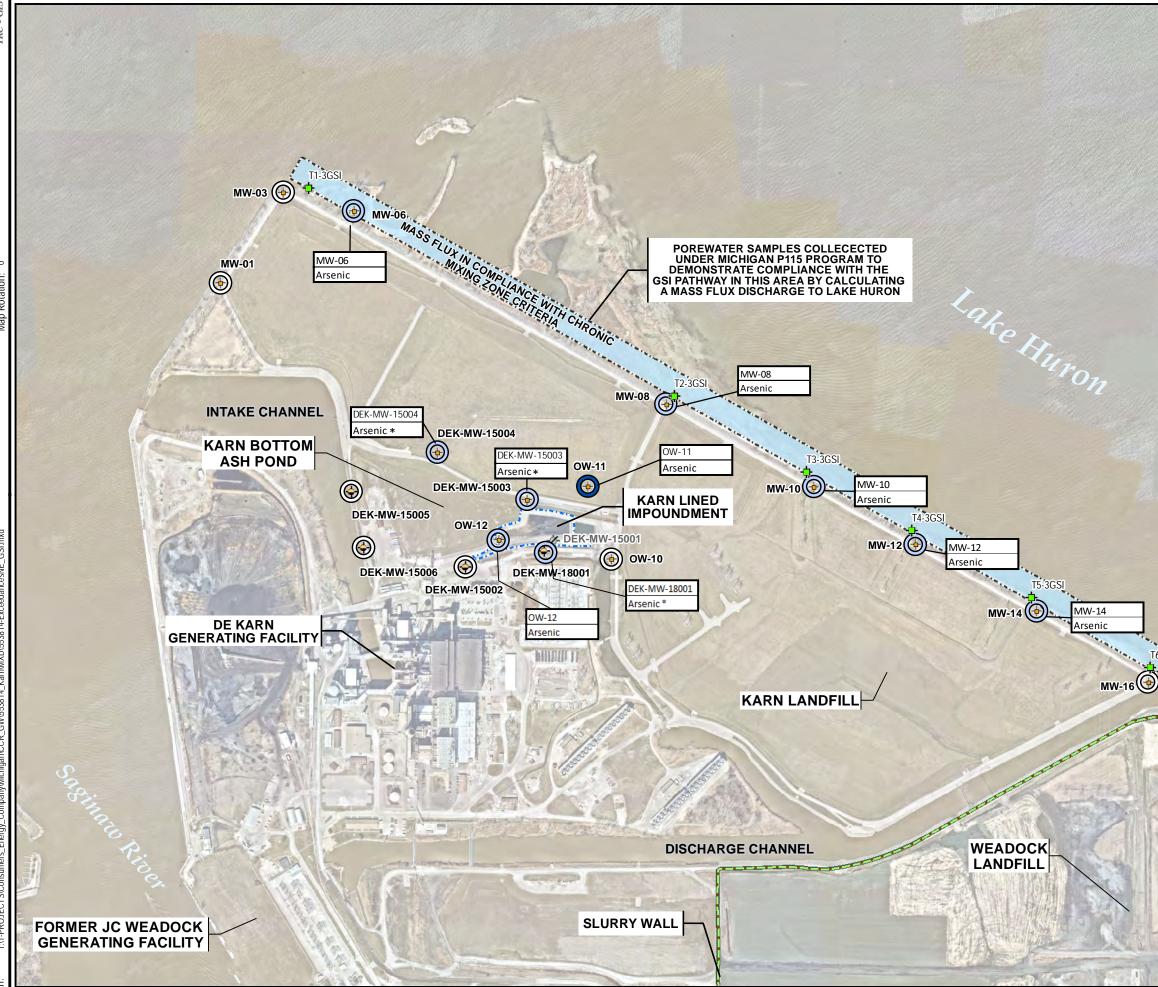
Result

Result

## **Figures**



Note 3)	LEGEN	ID		
g/L	÷	DEK BOTTOM ASH P	OND MONITORING WI	ELL
ig/L	4	DECOMMISSIONED	MONITORING WELL	
ug/L g/L	-	NATURE AND EXTEN	IT WELL	
g/L	$\bigcirc$	NO EXCEEDANCES		
ug/L		TWO OR MORE EXC	EEDANCES (NOTES 4	+ 5)
ug/L			VIFICANT GWPS EXCE	,
ig/L	$\bigcirc$	(NOTE 6)		LDANCE
ug/L g/L		SLURRY WALL (APP	ROXIMATE)	
ug/L	03	LINED IMPOUNDMEN (COVENANT BOUND		
Ci/L	03	POREWATER SAMPL	INGAREA	
g/L g/L	*		TRIGGERED ASSESSI RES PURSUANT TO §2	
and the	WELL ID			
	<u>NOTES</u>			
	1. BASI	E MAP IMAGERY FROM	/I NEARMAP, (10/3/202	2).
line server	-	IITORING WELL AND S EC; SG21733SHT2 RE		
	3. GWF HIGF (MCL	PS (GROUNDWATER PI IER OF THE MAXIMUM )/REGIONAL SCREEN	ROTECTION STANDAR I CONTAMINANT LEVE ING LEVEL FROM 83 F	RD) IS THE L R 36435 (RSL)
	TECI	UPPER TOLERANCE L HNICAL MEMORANDUI	M DATED OCTOBER 1	5, 2018.
	SCR ONL ABO	UNDWATER DATA FR( EENED AGAINST THE Y. AN EXCEEDANCE IS VE THE GWPS, HOWE D TO DETERMINE CON	GWPS FOR EVALUATI DEFINED AS A SINGL VER, CONFIDENCE IN	ON PURPOSES .E DETECTION TERVALS WILL BE
	UNA DRIN PRO MON	EXCEEDANCE OF THE CCEPTABLE RISK FRC IKING WATER PATHW, PERTY. GROUNDWAT IITORED TO INFORM T ECTION.	OM GROUNDWATER EX AY IS NOT COMPLETE ER CONDITIONS CON	KPOSURE; THE ON THE TINUE TO BE
NW-16	REC	ER CONFIDENCE LIMI ENT ASSESSMENT MC IG THE MOST RECENT	NITORING STATISTIC	AL EVALUATION
				N
· Restin	0	600	1,200	
in an	1 " = 600 ' 1:7,200		Feet	
14	PROJECT:	DE KARN	SENERGY COMPA	NY
a frage	TITLE:	ESSEAV	ILLE, MICHIGAN	
		NATURE AND GWPS EX	EXTENT SUMN	IARY
1 and	DRAWN BY: CHECKED BY:	A. FOJTIK K. LOWERY	PROJ NO.:	553814.0001
	APPROVED BY:	D. LITZ	FIGU	RE 1
		TRC	l Ar	1540 Eisenhower Place in Arbor, MI 48108-3284 Phone: 734.971.7080
A Carl	FILE NO.:		55381/1	www.trccompanies.com ExceedancesNE_ACM.mxd
	1		000014-1	_ACTIVITING



## LEGEND

- ✦ DEK BOTTOM ASH POND MONITORING WELL
- -
- + NATURE AND EXTENT WELL
- ✿ GSI TRANSECT LOCATION/POREWATER SAMPLE

TWO OR MORE DATA POINTS EXCEED CHRONIC

NO EXCEEDANCES

(NOTES 3 + 4)

 $\bigcirc$ 

 $\bigcirc$ 

0

TWO OR MORE DATA POINTS EXCEED ACUTE MIXING ZONE GSI CRITERION (FAV, 680 UG/L) (NOTES 3 + 4)

MIXING ZONE GSI CRITERION (100 UG/L)

SLURRY WALL (APPROXIMATE)



LINED IMPOUNDMENT (COVENANT BOUNDARY)

POREWATER SAMPLING AREA



\* GROUNDWATER PROTECTION STANDARD (GWPS) EXCEEDANCE TRIGGERED ASSESSMENT OF CORRECTIVE MEASURES PURSUANT TO §257.96

### NOTES

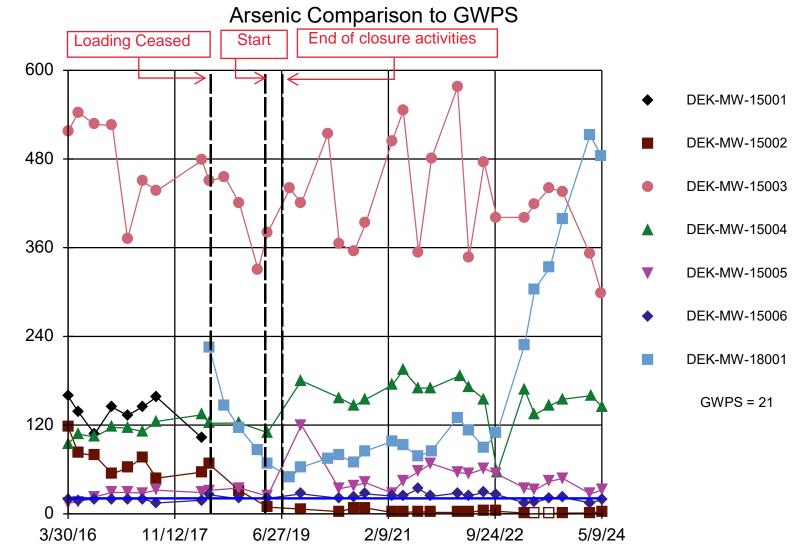
T6-3GSI

- 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 1 " = 600 ' 1:7,200	600	1,20	0 Feet					
2	PROJECT: CONSUMERS ENERGY COMPANY DE KARN POWER PLANT ESSEXVILLE, MICHIGAN								
	ARSENIC NATURE AND EXTENT SUMMARY GSI PATHWAY COMPLIANCE								
1000	DRAWN BY:	A. FOJTIK	PROJ NO.:	553814.000					
1000	CHECKED BY:	K. LOWERY							
100	APPROVED BY:	D. LITZ	F	IGURE 2					
- West	DATE:	JULY 2024							
	<b>∂</b> T	RC		1540 Eisenhower Place Ann Arbor, MI 48108-3284 Phone: 734.971.7080 www.trccompanies.com					
Pro Carlos	FILE NO.:								

## Attachment A Statistical Evaluation

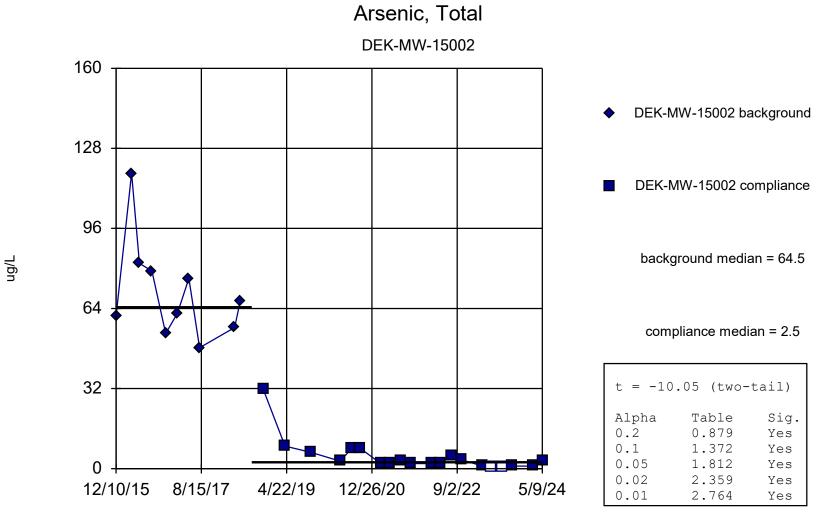
Sanitas<sup>™</sup> v.10.0.16 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.



Time Series Analysis Run 6/20/2024 1:24 PM Client: Consumers Energy Data: DEK\_HMPCCR\_Sanitas\_24Q2\_NE\_rev

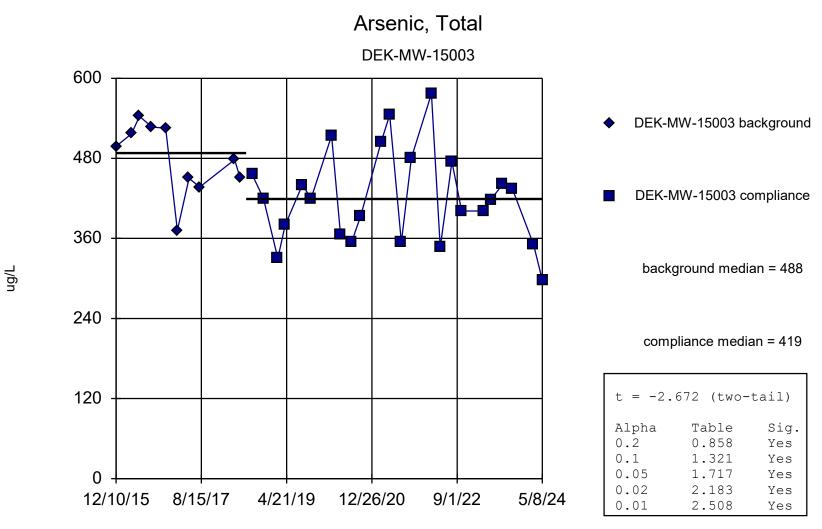
ng/L

Sanitas<sup>™</sup> v.10.0.16 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.

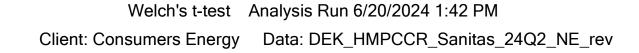


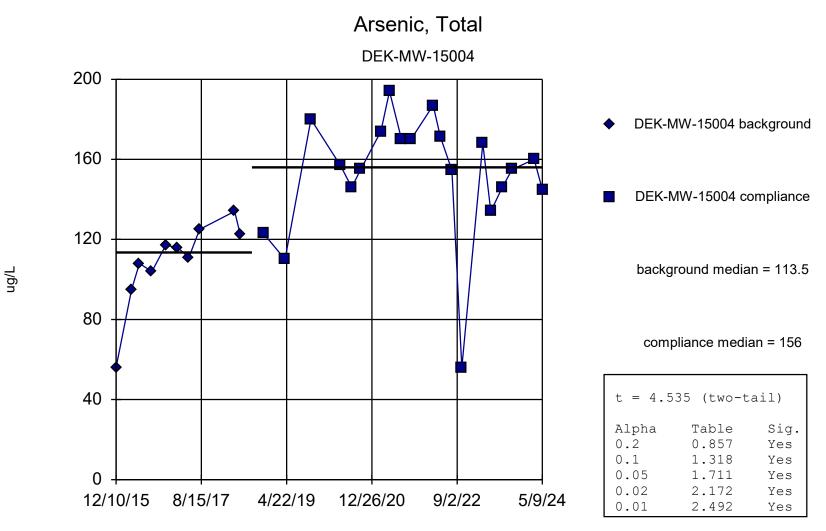
Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8668, critical = 0.842.

Welch's t-test Analysis Run 6/20/2024 1:40 PM Client: Consumers Energy Data: DEK\_HMPCCR\_Sanitas\_24Q2\_NE\_rev

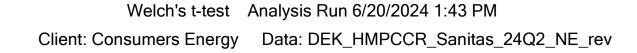


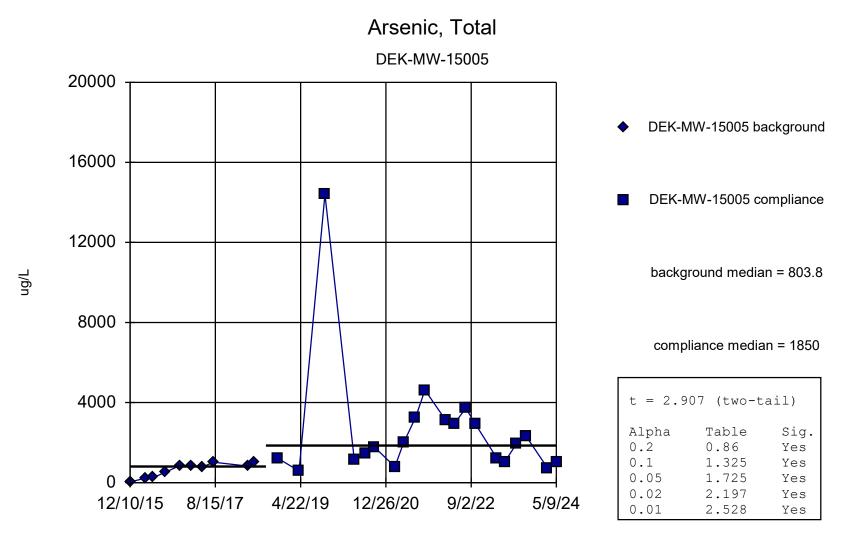
Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9262, critical = 0.842.





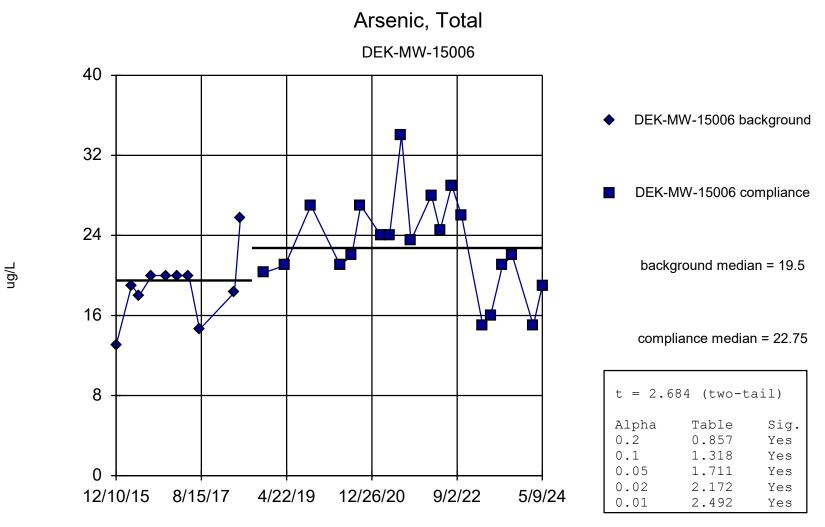
Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.852, critical = 0.842.



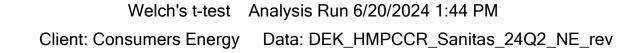


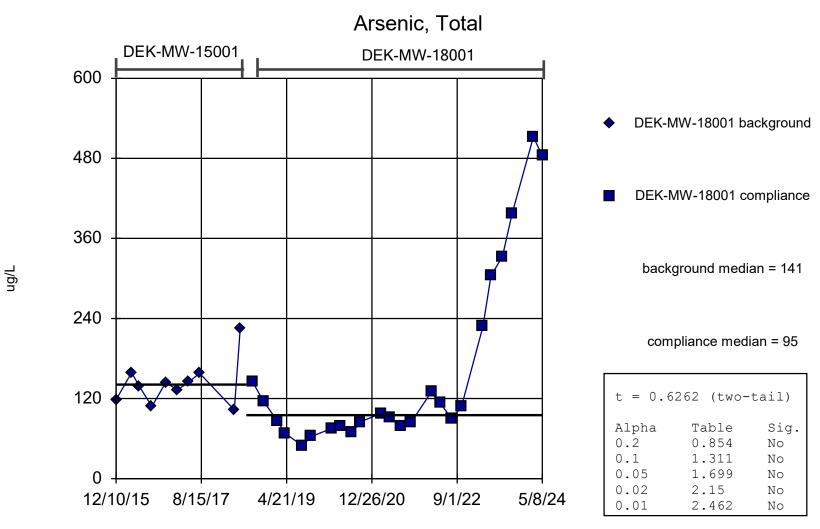
Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8767 after square transformation, critical = 0.842.

Welch's t-test Analysis Run 6/20/2024 1:44 PM Client: Consumers Energy Data: DEK\_HMPCCR\_Sanitas\_24Q2\_NE\_rev

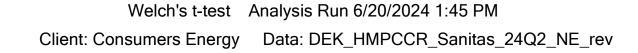


Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8992, critical = 0.842.





Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8737, critical = 0.842.



Constituent: Arsenic, Total (ug/L) Analysis Run 6/20/2024 2:15 PM

			0,	_	 		
	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)					

Constituent: Arsenic, Total (ug/L) Analysis Run 6/20/2024 2:15 PM

	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)

Constituent: Arsenic, Total (ug/L) Analysis Run 6/20/2024 2:15 PM

			0,	-	 	-		
	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						

Constituent: Arsenic, Total (ug/L) Analysis Run 6/20/2024 2:15 PM

		·	 -	 -		
	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				

Constituent: Arsenic, Total (ug/L) Analysis Run 6/20/2024 2:15 PM

	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

Constituent: Arsenic, Total (ug/L) Analysis Run 6/20/2024 2:15 PM

		Client. Consumers Energ	
	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	