January 28, 2022 ***TRANSMITTAL VIA EMAIL 01/28/2022***

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

SUBJECT: 2021 Annual Groundwater Monitoring and Corrective Action Report
DE Karn Lined Impoundment Coal Combustion Residuals (CCR) Unit

Dear Ms. Babcock:

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) (USEPA, April 2015, as amended). Standards for groundwater monitoring and corrective action codified in the CCR Rule (40 CFR 257.90-98), apply to the Consumers Energy Company (Consumers Energy) Lined Impoundment at the DE Karn Power Plant Site. Pursuant to the CCR Rule, the owner or operator of a CCR unit must prepare an annual groundwater monitoring and corrective action report for the CCR unit documenting the status of groundwater monitoring and corrective action for the preceding year in accordance with §257.90(e). On behalf of Consumers Energy, TRC has prepared this Annual Groundwater Monitoring Report for the Karn Lined Impoundment to cover the period of January 1, 2021 to December 31, 2021.

This 2021 Karn Lined Impoundment Annual Report was prepared in accordance with the requirements of §257.90(e) and presents the monitoring results and the statistical evaluation of the detection monitoring constituents (Appendix III to Part 257 of the CCR Rule) for the four quarterly groundwater monitoring events completed in 2021 for the Lined Impoundment. As part of the statistical evaluation, the data collected during detection monitoring events are evaluated to identify statistically significant increases (SSIs) in detection monitoring constituents to determine if concentrations in detection monitoring well samples exceed background levels.

After establishing the groundwater monitoring system and detection monitoring project pursuant to the requirements and schedule of §257.90 - §257.94, the State of Michigan enacted Public Act No. 640 of 2018 (PA 640) December 28, 2018 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. This alignment would ensure compliance with the CCR standards through a state-approved

permitting program that would be deemed to be "equivalent to" or "as protective as" through an administrative application that would be reviewed and authorized by U.S. EPA.

On November 6, 2020 Consumers Energy submitted the Karn Lined Impoundment Hydrogeological Monitoring Plan (November 2020 HMP) to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to comply with the requirements of Part 115, Rule 299.4905, and the CCR Rule. The HMP was approved by the EGLE on November 13, 2020 and the four quarterly events completed in 2021were performed in accordance with the EGLE-approved HMP. This letter and four quarterly reports (Enclosures 2 through 5) collectively comprise the 2021 Annual Groundwater Monitoring and Corrective Action Report and meet the requirements of §257.90(e) as documented in the enclosed checklist (Enclosure 1).

At this time, Consumers Energy is continuing to assert an Alternate Source Demonstration (ASD), for the following SSIs over background limits:

- Sulfate in monitoring well DEK-MW-18001
- Calcium in monitoring well OW-10; and
- Boron and pH in monitoring well OW-11.

As detailed in the Second Quarter 2021 Hydrogeological Monitoring Report (Enclosure 2), a source other than the Karn Lined Impoundment CCR Unit caused the SSIs. As such, Consumers Energy will continue with the detection monitoring program at the Karn Lined Impoundment in conformance with §257.90 - §257.94.

No corrective actions were performed in 2021. Per the November 2020 HMP, quarterly monitoring will be performed at the Karn Lined Impoundment in 2022. The next annual monitoring report will cover monitoring conducted in the 2022 calendar year and will be submitted no later than January 31, 2023.

Sincerely,

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cc: Mr. Phil Roycraft, EGLE Saginaw Bay District Office
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Ms. Darby Litz, TRC
Ms. Kristin Lowery, TRC
Mr. Jacob Krenz, TRC

Enclosures: 1) CCR Annual Groundwater Report Requirements: § 257.90(e). Checklist for the Karn Lined Impoundment CCR Unit.

2) First Quarter 2021 Hydrogeological Monitoring Report, DE Karn Lined Impoundment CCR Unit, Essexville, Michigan. (TRC; April 30, 2021)

3) Second Quarter 2021 Hydrogeological Monitoring Report, DE Karn Lined Impoundment CCR Unit, Essexville, Michigan. (TRC; July 29, 2021)

4) Third Quarter 2021 Hydrogeological Monitoring Report, DE Karn Lined Impoundment CCR Unit, Essexville, Michigan. (TRC; October 28, 2021)

5) Fourth Quarter 2021 Hydrogeological Monitoring Report, DE Karn Lined Impoundment CCR Unit, Essexville, Michigan. (TRC; January 28, 2022)

CCR Annual Groundwater Report Requirements: § 257.90(e)
Checklist for the Karn Lined Impoundment CCR Unit
2021 Annual Report

Requirement	Reference
At a minimum, the annual groundwater monitoring and corrective action report must contain the following information, to the extent available:	
(1) A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit;	Figure 2 [2],[3],[4],[5]
(2) Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken;	Not Applicable - no installation or decomissioning
(3) In addition to all the monitoring data obtained under §§ 257.90 through 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs;	Section 3.2 [2],[3],[4],[5]
(4) A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels); and	Corrective Action Progress Report [1]; Section 1.2 Program Summary [2],[3],[4],[5]
(5) Other information required to be included in the annual report as specified in §§ 257.90 through 257.98.	Certified ASD[3]
(6) A section at the beginning of the annual report that provides an overview of the current status of groundwater monitoring and corrective action programs for the CCR unit. At a minimum, the summary must specify all of the following:	
(i) At the start of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in § 257.94 or the assessment monitoring program in § 257.95;	Section 1.2 Program Summary [2],[3],[4],[5]
(ii) At the end of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in § 257.94 or the assessment monitoring program in § 257.95;	Section 1.2 Program Summary [2],[3],[4],[5]
(iii) If it was determined that there was a statistically significant increase over background for one or more constituents listed in appendix III to this part pursuant to § 257.94(e):	Section 4.3 Alternate Source Demonstration[3],[4],[5]; Certified ASD[3]
(A) Identify those constituents listed in appendix III to this part and the names of the monitoring wells associated with such an increase; and	Certified ASD[3]; remaining in Detection Monitoring
(B) Provide the date when the assessment monitoring program was initiated for the CCR unit.	Not Applicable; Detection Monitoring
(iv) If it was determined that there was a statistically significant level above the groundwater protection standard for one or more constituents listed in appendix IV to this part pursuant to § 257.95(g) include all of the following:	Not Applicable; Detection Monitoring
(A) Identify those constituents listed in appendix IV to this part and the names of the monitoring wells associated with such an increase;	Not Applicable; Detection Monitoring
(B) Provide the date when the assessment of corrective measures was initiated for the CCR unit;	Not Applicable; Detection Monitoring
(C) Provide the date when the public meeting was held for the assessment of corrective measures for the CCR unit; and	Not Applicable; Detection Monitoring
(D) Provide the date when the assessment of corrective measures was completed for the CCR unit.	Not Applicable; Detection Monitoring
(v) Whether a remedy was selected pursuant to § 257.97 during the current annual reporting period, and if so, the date of remedy selection; and	Not Applicable; Detection Monitoring
(vi) Whether remedial activities were initiated or are ongoing pursuant to § 257.98 during the current annual reporting period.	Not Applicable; Detection Monitoring

Notes:

(1) *2021 Annual Groundwater Monitoring and Corrective Action Report Karn Lined Impoundment Coal Combustion Residuals CCR Unit.* Consumers Energy. January 28, 2022.

(2) *First Quarter 2021 Hydrogeological Monitoring Report, DE Karn Lined Impoundment CCR Unit, Essexville, Michigan.* TRC. April 30, 2021.

(3) *Second Quarter 2021 Hydrogeological Monitoring Report, DE Karn Lined Impoundment CCR Unit, Essexville, Michigan.* TRC. July 29, 2021.

(4) *Third Quarter 2021 Hydrogeological Monitoring Report, DE Karn Lined Impoundment CCR Unit, Essexville, Michigan.* TRC. October 28, 2021.

(5) *Fourth Quarter 2021 Hydrogeological Monitoring Report, DE Karn Lined Impoundment CCR Unit, Essexville, Michigan.* TRC. January 28, 2022.

First Quarter 2021 Hydrogeological Monitoring Report

DE Karn Lined Impoundment CCR Unit

Essexville, Michigan

April 2021

Prepared For:

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1.0 Introduction

Pursuant to the Federal CCR Rule[1], Consumers Energy initiated a detection monitoring program for the Karn Lined Impoundment that went into service on June 7, 2018. After establishing the groundwater monitoring system and detection monitoring project pursuant to the requirements and schedule of §257.90 - §257.94, the State of Michigan enacted Public Act No. 640 of 2018 (PA 640) December 28, 2018 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 amendments to the solid waste statute amended state groundwater monitoring requirements for coal ash impoundments; therefore, Consumers Energy submitted the *Karn Lined Impoundment Hydrogeological Monitoring Plan* (HMP) to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to comply with the requirements of Part 115, Rule 299.4905, and the CCR Rule. The HMP was approved by the EGLE on November 13, 2020 and incorporated, by reference, in Solid Waste Disposal Area Operating License No. 9629 issued on December 10, 2020.

1.1 Statement of Adherence to Approved Hydrogeological Monitoring Plan

This First Quarter 2021 Karn Lined Impoundment Hydrogeological Monitoring Report (Report) has been prepared by TRC on behalf of Consumers Energy to satisfy quarterly groundwater monitoring requirements during the active life of the coal ash impoundment. This Report was prepared in accordance with the items listed in Appendix A (Solid Waste Monitoring Submittal Components) of the May 15, 2015 Michigan Department of Environmental Quality (MDEQ) – Office of Waste Management and Radiological Protection, now the EGLE Materials Management Division (MMD), communication prescribing the format for solid waste disposal facility monitoring submittals as published in OWMRP-115-29, *Format for Solid Waste Disposal Facility Monitoring Submittals*, dated July 5, 2013. All references herein to the EGLE are inclusive of the MDEQ. Information contained in this report was prepared in adherence to the facility's approved HMP that was approved by the EGLE on November 13, 2020. This HMP is compliant with the requirements set forth in Public Act No. 640 of 2018 (PA 640) to amend the Natural Resources and Environmental Protection Act (NREPA), also known as Part 115 of PA 451 of 1994, as amended (Part 115) (a.k.a., Michigan Part 115 Solid Waste Management).

1.2 Program Summary

This Report provides results and summarizes the monitoring activities completed in 1st Quarter 2021 at the Karn Lined Impoundment located at 2742 Weadock Highway in Essexville, Michigan (Figure 1). Groundwater in the vicinity of the Karn Lined Impoundment has been documented to be affected by the management of CCR prior to the construction of the unit (January 2019, TRC). Given that the constituents associated with CCR currently managed at the Karn Lined Impoundment are indistinguishable from the constituents already present in groundwater from past operation of the former Karn Bottom Ash Pond, the compliance monitoring program for the Karn Lined Impoundment consists of two parts to evaluate if there are new releases from the unit:

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

1. Monitoring of secondary collection system flow rates to detect leaks in the liner; and
2. Groundwater monitoring to determine if there are potential new releases from the Karn Lined Impoundment.

The Karn Lined Impoundment is currently in detection monitoring. This is the first report submitted utilizing the compliance monitoring approach outlined in the EGLE-approved HMP.

1.3 Site Overview

The Karn Lined Impoundment is located within the DE Karn Power Plant site (Site) located north of the former 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 former Karn Bottom Ash Pond that was closed by removal and the Karn Landfill that was certified closed and now in post-closure care.

1.4 Geology/Hydrogeology

The majority of the Karn Lined Impoundment area is comprised of surficial CCR and sand fill, as described in the HMP. 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 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, was generally encountered at 80-90 ft bgs.

The DE Karn Power Plant site is bound by several surface water features (Figures 1 and 2): 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 and Karn Lined Impoundment, the shallow groundwater flow is generally radial, flowing outward from the pond area toward the surrounding surface water bodies.

2.0 Second Collection System Monitoring

Consumers Energy initiated secondary collection system flow monitoring to comply with the EGLE-approved HMP in December 2020. The SCS serves as a leak detection system and the SCS flow rate data is used to demonstrate compliance with Part 115. Consumers Energy continues to comply with the requirements for unmonitorable units under Rule 437 of the Part 115 Rules.

The Average Daily Flow Rate for the period from December 10, 2020 – January 6, 2021 was calculated as 137.0 gallons per acre per day (GPAD), which exceeded the Response Action Flow Rate of 25 GPAD. Although this calculated flow rate does not constitute the average flow rates for the last three months per the definition of average daily flow rate under Part 115, Consumers provided a proactive notification and a preliminary written assessment of the flow rate exceedances to the EGLE January 15, 2021 and January 22, 2021, respectively. The use of secondary collection system flow rates as a leak detection system was successful. Increased flow rates triggered investigations by Consumers Energy that quickly identified deficiencies in the liner system and prompted actions to address the damaged liner. A written assessment that summarizes investigations and provides an update on remedial actions performed and planned on the leachate collection system is included in Appendix E.

In response to the exceedance of the SCS action flow rate (AFR), a sample was collected from the secondary leachate collection system sump (KLI-SCS) in March 2021 to compare leachate chemistry to groundwater chemistry. The secondary collection system sample was analyzed for the following constituents:

- Primary Indicator Parameters: Section 11511a(3)(c) - Detection Monitoring Constituents
- Alternative Indicator Parameters: Section 11519b(2) - Assessment Monitoring Constituents
- Optional Analyses in support of Piper or Stiff diagrams

Water quality data collected for 1st Quarter 2021 are included in the attached laboratory reports (Appendix A). Groundwater chemistry is discussed in Section 4.1. Groundwater conditions will continue to be monitored. Using the secondary collection system flow rates as a leak detection system was successful. The leak was identified last quarter, actions were promptly taken to address the leak, and the results of the mitigation efforts will continue to be monitored.

Consumers Energy continues to monitor the secondary collection system flow rates, record flow rates and head level on the secondary liner in the operating record and evaluate flowrate trends on a weekly basis. Now that Consumers Energy has completed evaluations and summarized work performed as required by April 30, 2021, written notifications of flow rates in the secondary collection system will be provided monthly and evaluations of the chemical characteristics of liquid in the secondary collection system will be reported quarterly. In addition, Consumers Energy continues to provide quarterly updates on remedial actions performed on the leachate collection system through the quarterly groundwater monitoring report required by the HMP.

3.0 Groundwater Monitoring

3.1 Monitoring Well Network

In accordance with §257.91, Consumers Energy developed a groundwater monitoring system for the Karn Lined Impoundment prior to the initial receipt of waste in the CCR unit (TRC, 2018c). Given the radial groundwater flow direction and constituents associated with CCR currently managed at the Karn Lined Impoundment are indistinguishable from the constituents already present in groundwater from past operation of the Karn Bottom Ash Pond, the groundwater monitoring system design incorporates an *intrawell statistical approach* for detection monitoring as described in the HMP and in accordance with the "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance" (USEPA, 2009): Five monitoring wells that are screened in the uppermost saturated unit will be used for the Karn Lined Impoundment HMP detection monitoring (DEK-MW-15003, DEK-MW-18001, OW-10, OW-11, and OW-12). Monitoring well locations are shown on Figure 2.

3.2 March 2021 Detection Monitoring Event

In accordance with the HMP, TRC conducted the first quarter 2021 monitoring event for the Karn Lined Impoundment on March 1 through 3, 2021. In addition to the routine groundwater samples collected from the monitoring well network, a water sample was collected from a sump in the secondary collection system (KLI-SCS) and a surface water sample was collected from the primary collection system (KLI-PCS), as discussed in Section 2 above, such that leachate chemistry could be compared to groundwater chemistry. A sample of surface water was also collected from a ditch located north of the lined impoundment (SW-Ditch) to further evaluate site geochemistry (Figure 2). The SW-Ditch surface water grab sample represents water quality from the potentiometric high point adjacent to the Karn Lined Impoundment.

Groundwater samples collected during the March 2021 event were submitted to Consumers Energy Laboratory Services in Jackson, Michigan, for analysis of the following metals and inorganic indicator constituents:

Section 11511a(3)(c) – Detection Monitoring Constituents	Section 11519b(2) – Assessment Monitoring Constituents
Boron	Antimony
Calcium	Arsenic
Chloride	Barium
Fluoride	Beryllium
Iron	Cadmium
pH	Chromium, total
Sulfate	Cobalt
Total Dissolved Solids (TDS)	Copper
	Fluoride
	Lead
	Lithium
	Mercury
	Molybdenum
	Nickel
	Selenium
	Silver
	Thallium
	Vanadium
	Zinc

Samples were also analyzed for constituents identified in Section 11519b(2) – Assessment Monitoring Constituents and the additional constituent's magnesium, sodium, potassium, and bicarbonate, carbonate, and total alkalinity to provide additional evaluation of groundwater chemistry. Analytical results from the first quarter 2021 monitoring event are included in the attached laboratory reports (Appendix A).

Static water level measurements were collected at all locations after equilibration to atmospheric pressure and immediately prior to purging. The depth to water was recorded to the nearest 0.01-ft in accordance with the procedures in the HMP. Groundwater purging and sampling were conducted in accordance with low-flow sampling protocol. Static water elevation data are included in the attached field records (Appendix B).

Monitoring wells 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. Field notes are included as Appendix B. The samples were collected in vendor-provided, nitric acid pre-preserved (metals only) and unpreserved sample containers and submitted to the laboratory for analysis. Porewater sample preparation and analyses were performed in accordance with SW-846 "Test Methods for Evaluation Solid Waste – Chemical / Physical Methods," USEPA (latest revision). TRC followed chain of custody procedures to document the sample handling sequence.

TRC also collected quality assurance/quality control (QA/QC) samples during the groundwater sampling event. The QA/QC samples consisted of one field blank, one equipment blank, one field duplicate (OW-10), and field matrix spike/matrix spike duplicate samples collected at DEK-MW-18001.

3.2.1 Data Quality Review

Data were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The data were found to be complete and usable for the purposes of the HMP program. The data quality reviews for the Karn Lined Impoundment network wells are summarized in Appendix C.

3.2.2 Groundwater Flow Rate and Direction

Groundwater elevation data collected during the March 2021 groundwater monitoring events are provided in Table 1. The data were used to construct the groundwater contour map (Figure 3).

Groundwater elevations measured at the site in March 2021 are generally within the range of 581 to 587 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 data or within approximately 6 feet higher, flowing toward the bounding surface water features.

Although the point source discharge of sluiced bottom ash into the former Karn Bottom Ash Pond historically 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 bottom ash pond in March 2021 demonstrate a reduction in groundwater elevation measurements by several feet when compared to measurement taken in June 2018. Groundwater at the facility is locally influenced by incidental infiltration from precipitation over the uncovered acreage. Monitoring Wells OW-11 and DEK-MW-15003 delineate the newly established groundwater elevation high point that was previously centered over the former Karn Bottom Ash Pond with porewater flow generally flowing radially towards the adjacent surface water features from this newly established potentiometric "high", as

illustrated in Figure 3.

The average hydraulic gradient observed on March 1, 2021 in the vicinity of the former Karn Bottom Ash Pond and Karn Lined Impoundment is estimated at 0.0035 ft/ft. The gradients were calculated using the monitoring well pair DEK MW 15004/DEK-MW-15005, as well as the well water elevation difference and distance between DEK-MW-15003 and the discharge channel. The discharge channel surface water elevation was taken from the NOAA gauging station data on the same dates as the water level measurements. 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 calculated to be 0.18 ft/day or 64 ft/year in March 2021 which is reduced relative to previous estimated seepage velocities (e.g., 0.33 ft/day or 120 ft/year August 2018).

Due to the operational changes of the former bottom ash pond and the completion of the landfill capping activities in 2020, the gradient between the area of the Karn Bottom Ash Pond and Karn Lined Impoundment and the surrounding surface water bodies is flattening out as compared to previous quarters and is also attempting to reach a new equilibrium, as expected. The general flow direction is similar to that identified in previous monitoring rounds since the closure of the previous Karn Lined Impoundment and continues to demonstrate that the downgradient wells are appropriately positioned to detect the presence of Appendix III/IV parameters that could potentially migrate from the Karn Lined Impoundment.

4.0 Data Evaluation

Detection monitoring is continuing at the Karn Lined Impoundment in accordance with the HMP. The following section summarizes the statistical approach applied to assess the first quarter 2021 groundwater data in accordance with the detection monitoring program.

Water quality data are included in the attached laboratory reports (Appendix A). Groundwater analytical data for the most recent quarterly monitoring event is summarized in Table 3 along with the associated Part 201 generic drinking water criteria, the generic GSI criteria, and the site-specific mixing-zone GSI criteria. Mixing-zone criteria are provided for the Karn-Weadock complex in the December 23, 2015 mixing zone determination that consists of arsenic, boron, and selenium. As such, arsenic, boron, and selenium are compared to site-specific mixing zone-based GSI criteria, and all other constituents are screened against generic GSI criteria. GSI compliance is evaluated through monitoring performed at the Karn Landfill in accordance with the EGLE-approved Consumers Energy's revised Karn Landfill HMP (Hydrogeological Monitoring Plan, Rev. 3, DE Karn Solid Waste Disposal Area) dated December 19, 2017. Groundwater compliance is evaluated in accordance with the HMP to determine if a release from the Karn Landfill has occurred and drinking water and GSI criteria are provided as screening levels only.

4.1 Statistical Evaluation of Trends

Groundwater in the vicinity of the Karn Lined Impoundment has been affected by CCR management before commencement of operation (January 2019, TRC). Given that the constituents associated with CCR currently managed in the Karn Lined Impoundment are indistinguishable from the constituents already present in groundwater from past operation of the former Karn Bottom Ash Pond, intrawell trend tests, in conjunction with KLI-SCS flow rates, will be utilized to assess whether a release has occurred from operation of the unit. The detection monitoring constituent concentrations will be analyzed using Mann-Kendall and Sen's Slope trend tests to determine if there is an upward trend that may indicate a release from the Karn Lined Impoundment. The data will be analyzed in the context of the Site hydrogeologic characteristics and an assessment made as to whether the source of an upward trend, if identified, is from a possible release from the Karn Lined Impoundment, another on-site release, or on-site migration of nearby impact (i.e., former Karn Bottom Ash Pond).

Time-series plots and statistical trend analyses are used to evaluate groundwater quality each quarter, which are included as Appendix D. Consumers Energy manages and evaluates its analytical data using Sanitas™ Statistical Software (Sanitas™). Consumers Energy conducts intra-well trend analyses to examine data for each monitoring well-constituent pair in the groundwater monitoring system over time to determine if changes in water quality are occurring that may be associated with the Karn Lined Impoundment. Data from April 2019 through March 2021 were analyzed using Mann-Kendall and Sen's Slope at a significance level (α) of 0.025 per tail for each constituent/sampling point dataset to assess trends. Sen's Slope estimator was used to assess the magnitude of the slope and the Mann-Kendall test was used to determine if the slope was statistically significant. The graphical output of the Sen's Slope/Mann-Kendall trend tests and time series are presented in Appendix D. Appendix D also includes a table summarizing these trends and the associated statistical trend charts.

Data trends are generally stable (i.e., no trend) or declining for the majority of the monitoring well/constituent pairs with the following exceptions:

- Preliminary, unconfirmed increasing trends for boron, fluoride, and pH were observed in monitoring well OW-11.
- A preliminary, unconfirmed increasing trend was observed for calcium in monitoring well OW-10.
- A preliminary, unconfirmed increasing trend was observed for sulfate at DEK-MW-18001.

4.2 Detection Monitoring Data Discussion

Although preliminary detection monitoring trends noted in Section 4.1 exist, the groundwater conditions do not conclusively indicate a release from the unit. Groundwater quality is generally consistent with previous monitoring events. The location of one of the two identified liner damage locations is approximately 40-ft upgradient from monitoring well OW-12. Detection monitoring constituent concentrations at OW-12 exhibit no statistically significant trends, indicating that if a release to groundwater occurred due to the apparent leak in the liner system, the effects on local groundwater quality at this point appear to be negligible. The three wells with noted preliminary trends are located much further away from where the release was likely to occur. Additionally, concentrations of several constituents observed at OW-11 are much higher than concentrations observed in the KLI-PCS and KLI-SCS, which support a source other than the Karn Lined Impoundment is affecting chemistry at OW-11. The preliminary trends at OW-10 and DEK-MW-18001 will continue to be evaluated to determine if they could be indication of a release from the unit, or if they could be attributed to another change in conditions, such as groundwater flow regime or redox conditions.

4.3 Alternate Source Demonstration

At this time, Consumers Energy is not asserting an Alternate Source Demonstration (ASD), as there are no confirmed Statistically Significant Increases (SSI) from this reporting period.

5.0 Conclusions and Recommendations

Consumers Energy will continue with the detection monitoring program at the Karn Lined Impoundment unit in conformance with the HMP. No SSIs over background limits were identified at the Karn Lined Impoundment during the March 2021 monitoring event. The use of secondary collection system flow rates as a leak detection system was successful. Increased flow rates observed in Q4 2020 triggered investigations by Consumers Energy that quickly identified deficiencies in the liner system and prompted actions to address the damaged liner. The results of the mitigation efforts will continue to be monitored. The second quarter monitoring event is scheduled for the first week of May 2021.

6.0 References

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

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

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

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

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

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

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

Tables

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

Well Location	TOC Elevation (ft)	Geologic Unit of Screen Interval	Screen Interval Elevation (ft)	March 1, 2021	
				Depth to Water (ft BTOC)	Groundwater Elevation (ft)
Background					
MW-15002[(1)]	587.71	Sand	580.9 to 570.9	5.99	581.72
MW-15008[(1)]	585.36	Sand with clay	578.7 to 568.7	4.00	581.36
MW-15016[(1)]	586.49	Sand	581.2 to 578.2	3.54	582.95
MW-15019[(1)]	586.17	Sand and Sand/Clay	579.5 to 569.5	4.77	581.40
DEK Bottom Ash Pond					
DEK-MW-15002	590.87	Sand	578.3 to 575.3	5.84	585.03
DEK-MW-15004	611.04	Sand	576.6 to 571.6	27.75	583.29
DEK-MW-15005	589.72	Sand	572.3 to 567.3	8.70	581.02
DEK-MW-15006	589.24	Sand	573.0 to 568.0	8.00	581.24
DEK Bottom Ash Pond & Karn Lined Impoundment					
DEK-MW-15003	602.74	Sand	578.8 to 574.8	16.46	586.28
DEK-MW-18001	593.47	Sand	579.2 to 574.2	8.23	585.24
OW-10	591.58	Silty Sand and Silty Clay	576.0 to 571.0	5.96	585.62
OW-11	607.90	Silt/Fly Ash	587.5 to 582.5	21.45	586.45
OW-12	603.07	Silty Sand	584.2 to 579.2	16.98	586.09
DEK Nature and Extent					
MW-01	597.02	Sand	573.0 to 570.0	16.10	580.92
MW-03	597.30	Sand	569.8 to 566.8	16.40	580.90
MW-06	589.44	Sand and Silty Sand	578.5 to 563.5	7.88	581.56
MW-08	598.78	Sand and Silty Clay	580.9 to 570.9	17.00	581.78
MW-10	596.97	Sand	582.5 to 572.5	15.80	581.17
MW-12	598.60	Sand	583.9 to 573.9	17.59	581.01
MW-14	594.37	Sand and Silty Clay	584.7 to 574.7	13.57	580.80
MW-16	595.80	Sand and Sand/Bottom Ash	584.1 to 574.1	14.91	580.89
MW-22	598.99	Ash/Sand	571.4 to 568.4	16.28	582.71
MW-23	595.57	Ash/Sand	576.9 to 571.9	12.68	582.89
DEK Static Water Level					
MW-02	597.34	Sand and Silty Clay	572.5 to 567.5	16.40	580.94
MW-04	598.01	NR	569.5 to 564.5	17.10	580.91
MW-17	597.91	Sand	577.0 to 574.0	12.70	585.21
MW-18	609.22	Silty Sand and Silty Clay	575.8 to 573.8	25.40	583.82
MW-19	597.28	NR	572.1 to 567.1	16.10	581.18
MW-20	632.75	Sand	582.3 to 579.3	51.70	581.05
MW-21	632.91	Sand	587.1 to 584.1	50.60	582.31
OW-01	631.33	NR	572.5 to 567.5	50.50	580.83
OW-02	598.01	Fly Ash	579.4 to 576.4	15.16	582.85
OW-03	597.94	Fly Ash and Sand	573.6 to 568.6	16.50	581.44
OW-04	590.21	Sand and Bottom/Fly Ash	579.1 to 574.1	9.30	580.91
OW-05	593.53	Sand	576.9 to 571.9	12.31	581.22
OW-06	603.95	NR	580.9 to 575.9	21.15	582.80
OW-07	596.41	Ash	583.3 to 580.3	13.96	582.45
OW-08	593.93	NR	581.0 to 576.0	10.41	583.52
OW-09	593.45	NR	585.5 to 580.5	9.88	583.57
OW-13	588.52	NR	579.5 to 574.5	3.35	585.17
OW-15	587.75	NR	572.8 to 567.8	2.55	585.20

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
(1) Water level measurements during the August event were collected on August 10, 2020.

Table 2
Summary of Field Parameter Results: March 2021
Karn Lined Impoundment – RCRA CCR Monitoring Program
Essexville, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (°C)	Turbidity (NTU)
Karn Lined Impoundment							
DEK-MW-15003	3/2/2021	0.99	25.5	7.8	340	14.3	2.0
DEK-MW-18001	3/2/2021	1.18	49.7	7.0	629	8.2	3.8
KLI-SCS	3/3/2021	4.10	169.7	7.8	1,412	8.2	34.5
OW-10	3/2/2021	0.97	-62.4	7.0	712	10.1	21.1
OW-11	3/2/2021	1.15	31.9	9.1	364	10.3	8.9
OW-12	3/2/2021	0.97	-67.5	7.0	675	11.6	9.8
KLI-PCS	3/1/2021	12.42	269.6	8.7	959	14.7	37.9
SW-DITCH	3/1/2021	8.14	313.1	8.3	907	15.1	19.1

Notes:
mg/L - Milligrams per Liter.
mV - Millivolts.
SU - Standard Units.
umhos/cm - Micromhos per centimeter.
°C - Degrees Celcius.
NTU - Nephelmetric Turbidity Unit.

Table 3
Summary of Groundwater Sampling Results (Analytical): March 2021
Karn Lined Impoundment – RCRA CCR Monitoring Program
Essexville, Michigan

Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Chronic-Based Mixing Zone GSI Criteria^	Acute-Based Mixing Zone GSI Criteria^	Sample Location:	DEK-MW-15003	DEK-MW-18001	OW-10	OW-12	OW-11	KLI-SCS	KLI-PCS	SW-DITCH
								Sample Date:	3/2/2021	3/2/2021	3/2/2021	3/2/2021	3/2/2021	3/3/2021	3/1/2021	3/1/2021
									Downgradient					Supplemental		
Appendix III(1)																
Boron	ug/L	NC	**500**	**500**	NA	44,000	69,000		**924**	**1,240**	**1,380**	**906**	**3,050**	**716**	**566**	103
Calcium	mg/L	NC	NC	NC	500EE	NC	NC		29.3	71.0	103	84.9	14.0	63.4	113	71.8
Chloride	mg/L	250**	250E	250E	**50**	NC	NC		**50.2**	**53.8**	**66.0**	50.0	**69.0**	**108**	**108**	**112**
Fluoride	ug/L	**4,000**	NC	NC	NC	NC	NC		< 1,000	1,200	< 1,000	< 1,000	**4,150**	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250E**	**250E**	500EE	NC	NC		27.6	115	2.62	165	25.4	**395**	77.1	41.3
Total Dissolved Solids	mg/L	**500****	**500E**	**500E**	**500**	NC	NC		261	495	**551**	**549**	242	**1,440**	**528**	493
pH, Field	SU	**6.5 - 8.5****	**6.5 - 8.5E**	**6.5 - 8.5E**	**6.5 - 9.0**	NC	NC		7.8	7.0	7.0	7.0	**9.1**	7.9	**8.7**	8.3
Appendix IV(1)																
Antimony	ug/L	6	6	6	2	NC	NC		< 1	< 1	< 1	< 1	1	1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	NA	**100**	**680**		**504**	**98**	3	**121**	**711**	4	5	2
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC		44	143	135	84	42	87	1,090	225
Beryllium	ug/L	4	4	4	33	NC	NC		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5	5	2.5	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**	NC	NC		< 1	< 1	1	< 1	< 1	1	**12**	2
Cobalt	ug/L	NC	40	100	100	NC	NC		< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	**4,000**	NC	NC	NC	NC	NC		< 1,000	1,200	< 1,000	< 1,000	**4,150**	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4	4	14	NC	NC		< 1	< 1	< 1	< 1	< 1	2	2	1
Lithium	ug/L	NC	170	350	440	NC	NC		20	24	29	32	12	< 10	< 10	< 10
Mercury	ug/L	2	2	2	0.20#	NC	NC		< 0.2	< 0.2	< 0.2H	< 0.2H	< 0.2H	< 0.2H	< 0.2H	< 0.2H
Molybdenum	ug/L	NC	**73**	**210**	**120**	NC	NC		28	< 5	< 5	11	**317**	**159**	22	6
Selenium	ug/L	50	50	50	NA	55	120		< 1	< 1	1	< 1	2	5	1	1
Thallium	ug/L	2	2	2	2	NC	NC		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115(2)																
Iron	ug/L	**300****	**300E**	**300E**	500,000EE	NC	NC		101	**687**	**1,480**	**4,440**	35	**1,220**	**3,810**	**570**
Copper	ug/L	1,000**	1,000E	1,000E	20	NC	NC		< 1	< 1	2	1	< 1	6	20	18
Nickel	ug/L	NC	100	100	120	NC	NC		< 2	< 2	2	< 2	2	5	9	4
Silver	ug/L	100**	34	98	0.2	NC	NC		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	**62**	**27**	NC	NC		< 2	< 2	2	< 2	**429**	**11**	**52**	**10**
Zinc	ug/L	5,000**	2,400	5,000E	260	NC	NC		< 10	< 10	< 10	< 10	< 10	< 10	18	15

Notes:

Groundwater compliance is evaluated in accordance with the HMP to determine if a release from the unit has occurred and drinking water and GSI criteria are provided as screening levels only.

ug/L - micrograms per liter; mg/L - milligrams per liter.

SU - standard units (pH is a field parameter); pCi/L - picocuries per liter.

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

NC - no criteria; NA - not applicable.

* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 30, 2013.

** - 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 chloride is 50 mg/L when the discharge is to the Great Lakes or connecting waters per footnote {FF}. Mixing Zone 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}.

H - Sample was analyzed out of hold time.

(1) 40 CFR Part 257 Appendix III Detection Monitoring Constituents and Appendix IV Assessment Monitoring Constituents.

(2) Per Michigan Part 115 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) addtional detection monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

BOLD value indicates an exceedance of one or more of the listed criteria.

RED value indicates an exceedance of the MCL.

All metals were analyzed as total unless otherwise specified.

Table 4
Summary of Statistical Exceedances – March 2021
Karn Lined Impoundment
Essexville, Michigan

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
SUMMARY OF STATISTICAL EXCEEDANCES

Data is in (X) ug/L or ( ) mg/L unless otherwise stated

Facility: Karn Lined Impoundment – WDS# 392503

Well #	Location	Parameter	Part 201 GRCC	Statistical Limit (or 'CC' for Control Charts)	4 Qtr. 2020 (**bold** >201)			

No Exceedances

Figures

BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

N

1 " = 3,000 '
1:36,000

0 3,000 6,000
FEET

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
TRC - GIS

PROJECT:

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

TITLE:

SITE LOCATION MAP

DRAWN BY:	A. ADAIR
CHECKED BY:	J. KRENZ
APPROVED BY:	D. LITZ
DATE:	APRIL 2021
PROJ. NO.:	418425-001-002
FILE:	418425-101-001.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\1_DEKARN\2021_MXDs\2021_001_MARCH\418425-101-001.mxd -- Saved By: AADAIR on 4/19/2021, 22:21:24 PM

LEGEND

- DEK BOTTOM ASH POND & LINED IMPOUNDMENT MONITORING WELL
- DEK BOTTOM ASH POND MONITORING WELL
- DEK LINED IMPOUNDMENT MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- SURFACE WATER GAUGING STATION
- NATURE AND EXTENT WELL
- SECONDARY CONTAINMENT SUMP (KLI-SCS)
- PRIMARY CONTAINMENT SYSTEM SAMPLE (KLI-PCS)
- SURFACE WATER SAMPLE (SW-DITCH)
- SLURRY WALL (APPROXIMATE)
- LINED IMPOUNDMENT (COVENANT BOUNDARY)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. WELL LOCATIONS SURVEYED BY ROWE PROFESSIONAL SERVICES COMPANY ON 11/4/2015.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).
4. A SINGLE WELL SYMBOL IS SHOWN FOR WELL PAIRS MW-01/MW-02, MW-03/MW-04, OW-02/MW-22, AND OW-07/MW-23 AS THE WELLS ARE LOCATED WITHIN 15-FT OF EACH OTHER.

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

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

TITLE:

SITE LAYOUT MAP

DRAWN BY:	A. ADAIR	PROJ NO.:	418425.0001
CHECKED BY:	J. KRENZ		
APPROVED BY:	L. DARBY		**FIGURE 2**
DATE:	APRIL 2021		

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

FILE NO.: 418425-101-002.mxd

Plot Date: 4/26/2021, 14:19:45 PM by AADAIR -- LAYOUT: ANSI B (11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 26976\1 DEKARN\2021 MXDs\2021 001 MARCH\418425-101-002.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

LEGEND

- DEK BOTTOM ASH POND & LINED IMPOUNDMENT MONITORING WELL
- DEK BOTTOM ASH POND MONITORING WELL
- DEK LINED IMPOUNDMENT MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- NATURE AND EXTENT WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- PRIMARY CONTAINMENT SYSTEM SAMPLE (KLI-PCS)
- SURFACE WATER SAMPLE (SW-DITCH)
- SECONDARY CONTAINMENT SUMP
- SLURRY WALL (APPROXIMATE)
- LINED IMPOUNDMENT (COVENANT BOUNDARY)
- GROUNDWATER ELEVATION CONTOUR (1' INTERVAL, DASHED WHERE INFERRED)
- (580.50) GROUNDWATER ELEVATION (FEET)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. WELL LOCATIONS SURVEYED BY ROWE PROFESSIONAL SERVICES COMPANY ON 11/4/2015.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.

N

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

CONSUMERS ENERGY COMPANY
DE KARN POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:

SHALLOW GROUNDWATER CONTOUR MAP MARCH 1, 2021

DRAWN BY:	A. ADAIR	PROJ NO.:	418425.0001
CHECKED BY:	J. KRENZ		
APPROVED BY:	L. DARBY		**FIGURE 3**
DATE:	APRIL 2021		

TRC

1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
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FILE NO.: 418425-101-003a.mxd

Plot Date: 4/26/2021, 15:12:22 PM by AADAIR - LAYOUT: ANSI B (11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 269767\1 DEKARN\2021 MXDs\2021 001 MARCH\418425-101-003a.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

Appendix A
Laboratory Analytical Reports

Consumers Energy
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135 W. Trail St.
Jackson, MI 49201

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

To: CDBatts, Karn/Weadock

From: EBlaj, T-258

Date: March 17, 2021

Subject: RCRA GROUNDWATER MONITORING – KARN BAP & LINED IMP. WELLS – 2021 Q1

CC: BTRunkel, P22-120
HDRegister, P22-521
BLSwanberg, P22-119

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

Chemistry Project: 21-0217

TRC Environmental, Inc. conducted groundwater monitoring at the DEKarn Bottom Ash Pond and Lined Impoundment Wells area on 03/02/2021, for the 1st Quarter monitoring 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 03/04/2021.

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

Reviewed and approved by:

Emil Blaj
Sr. Technical Analyst
Project Lead

ilac-MRA A2LA ACCREDITED Certificate #1097.04

CASE NARRATIVE

I. Sample Receipt

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

II. Methodology

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

III. Results/Quality Control

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

DEFINITIONS / QUALIFIERS

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

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

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

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Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q1-2021 DEK RCRA Bottom Ash Pond & Lined Impoundment
Date Received: 3/4/2021
Chemistry Project: 21-0217

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-0217-01	DEK-MW-15003	Groundwater	03/02/2021 10:25 AM	DEK Bottom Ash Pond & Lined Impoundment
21-0217-02	DEK-MW-18001	Groundwater	03/02/2021 10:25 AM	DEK Bottom Ash Pond & Lined Impoundment
21-0217-03	DEK-MW-18001 MS	Groundwater	03/02/2021 10:25 AM	DEK Bottom Ash Pond & Lined Impoundment
21-0217-04	DEK-MW-18001 MSD	Groundwater	03/02/2021 10:25 AM	DEK Bottom Ash Pond & Lined Impoundment

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Analytical Report

Report Date: 03/17/21

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-15003**
Lab Sample ID: 21-0217-01
Matrix: Groundwater

Laboratory Project: **21-0217**
Collect Date: 03/02/2021
Collect Time: 10:25 AM

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

Aliquot: 21-0217-01-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/10/2021	AB21-0310-08
Arsenic	504		ug/L	1	03/10/2021	AB21-0310-08
Barium	44		ug/L	5	03/10/2021	AB21-0310-08
Beryllium	ND		ug/L	1	03/10/2021	AB21-0310-08
Boron	924		ug/L	20	03/10/2021	AB21-0310-08
Cadmium	ND		ug/L	0.2	03/10/2021	AB21-0310-08
Calcium	29300		ug/L	1000	03/10/2021	AB21-0310-08
Chromium	ND		ug/L	1	03/10/2021	AB21-0310-08
Cobalt	ND		ug/L	6	03/10/2021	AB21-0310-08
Copper	ND		ug/L	1	03/10/2021	AB21-0310-08
Iron	101		ug/L	20	03/10/2021	AB21-0310-08
Lead	ND		ug/L	1	03/10/2021	AB21-0310-08
Lithium	20		ug/L	10	03/10/2021	AB21-0310-08
Magnesium	5060		ug/L	1000	03/10/2021	AB21-0310-08
Molybdenum	28		ug/L	5	03/10/2021	AB21-0310-08
Nickel	ND		ug/L	2	03/10/2021	AB21-0310-08
Potassium	4200		ug/L	100	03/10/2021	AB21-0310-08
Selenium	ND		ug/L	1	03/10/2021	AB21-0310-08
Silver	ND		ug/L	0.2	03/10/2021	AB21-0310-08
Sodium	45300		ug/L	1000	03/10/2021	AB21-0310-08
Thallium	ND		ug/L	2	03/10/2021	AB21-0310-08
Vanadium	ND		ug/L	2	03/10/2021	AB21-0310-08
Zinc	ND		ug/L	10	03/10/2021	AB21-0310-08

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0217-01-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/10/2021	AB21-0310-12

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

Aliquot: 21-0217-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	50200		ug/L	1000	03/10/2021	AB21-0311-01
Fluoride	ND		ug/L	1000	03/10/2021	AB21-0311-01
Sulfate	27600		ug/L	1000	03/10/2021	AB21-0311-01

Total Dissolved Solids by SM 2540C

Aliquot: 21-0217-01-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	261		mg/L	10	03/04/2021	AB21-0305-09

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Analytical Report

Report Date: 03/17/21

Sample Site:	**DEK Bottom Ash Pond & Lined Impoundment**	Laboratory Project:	**21-0217**
Field Sample ID:	**DEK-MW-15003**	Collect Date:	03/02/2021
Lab Sample ID:	21-0217-01	Collect Time:	10:25 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0217-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	95000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity bicarbonate	95000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity carbonate	ND		ug/L	10000	03/09/2021	AB21-0309-16

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001**
Lab Sample ID: 21-0217-02
Matrix: Groundwater

Laboratory Project: **21-0217**
Collect Date: 03/02/2021
Collect Time: 10:25 AM

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

Aliquot: 21-0217-02-C01-A01 Analyst: EB

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/10/2021	AB21-0310-08
Arsenic	98		ug/L	1	03/10/2021	AB21-0310-08
Barium	143		ug/L	5	03/10/2021	AB21-0310-08
Beryllium	ND		ug/L	1	03/10/2021	AB21-0310-08
Boron	1240		ug/L	20	03/10/2021	AB21-0310-08
Cadmium	ND		ug/L	0.2	03/10/2021	AB21-0310-08
Calcium	71000		ug/L	1000	03/10/2021	AB21-0310-08
Chromium	ND		ug/L	1	03/10/2021	AB21-0310-08
Cobalt	ND		ug/L	6	03/10/2021	AB21-0310-08
Copper	ND		ug/L	1	03/10/2021	AB21-0310-08
Iron	687		ug/L	20	03/10/2021	AB21-0310-08
Lead	ND		ug/L	1	03/10/2021	AB21-0310-08
Lithium	24		ug/L	10	03/10/2021	AB21-0310-08
Magnesium	13400		ug/L	1000	03/10/2021	AB21-0310-08
Molybdenum	ND		ug/L	5	03/10/2021	AB21-0310-08
Nickel	ND		ug/L	2	03/10/2021	AB21-0310-08
Potassium	4810		ug/L	100	03/10/2021	AB21-0310-08
Selenium	ND		ug/L	1	03/10/2021	AB21-0310-08
Silver	ND		ug/L	0.2	03/10/2021	AB21-0310-08
Sodium	70900		ug/L	1000	03/10/2021	AB21-0310-08
Thallium	ND		ug/L	2	03/10/2021	AB21-0310-08
Vanadium	ND		ug/L	2	03/10/2021	AB21-0310-08
Zinc	ND		ug/L	10	03/10/2021	AB21-0310-08

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0217-02-C01-A02 Analyst: TMR

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/10/2021	AB21-0310-12

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

Aliquot: 21-0217-02-C02-A01 Analyst: DMW

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	53800		ug/L	1000	03/10/2021	AB21-0311-01
Fluoride	1200		ug/L	1000	03/10/2021	AB21-0311-01
Sulfate	115000		ug/L	1000	03/10/2021	AB21-0311-01

Total Dissolved Solids by SM 2540C

Aliquot: 21-0217-02-C03-A01 Analyst: CET

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	495		mg/L	10	03/04/2021	AB21-0305-09

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Analytical Report

Report Date: 03/17/21

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001**
Lab Sample ID: 21-0217-02
Matrix: Groundwater

Laboratory Project: **21-0217**
Collect Date: 03/02/2021
Collect Time: 10:25 AM

Alkalinity by SM 2320B

Aliquot: 21-0217-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	190000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity bicarbonate	190000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity carbonate	ND		ug/L	10000	03/09/2021	AB21-0309-16

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001 MS**
Lab Sample ID: 21-0217-03
Matrix: Groundwater

Laboratory Project: **21-0217**
Collect Date: 03/02/2021
Collect Time: 10:25 AM

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

Aliquot: 21-0217-03-C01-A01 Analyst: EB

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	108		%	1	03/10/2021	AB21-0310-08
Arsenic	107		%	1	03/10/2021	AB21-0310-08
Barium	106		%	5	03/10/2021	AB21-0310-08
Beryllium	100		%	1	03/10/2021	AB21-0310-08
Boron	112		%	20	03/10/2021	AB21-0310-08
Cadmium	107		%	0.2	03/10/2021	AB21-0310-08
Calcium	113		%	1000	03/10/2021	AB21-0310-08
Chromium	96		%	1	03/10/2021	AB21-0310-08
Cobalt	102		%	6	03/10/2021	AB21-0310-08
Copper	94		%	1	03/10/2021	AB21-0310-08
Iron	89		%	20	03/10/2021	AB21-0310-08
Lead	103		%	1	03/10/2021	AB21-0310-08
Lithium	98		%	10	03/10/2021	AB21-0310-08
Magnesium	110		%	1000	03/10/2021	AB21-0310-08
Molybdenum	107		%	5	03/10/2021	AB21-0310-08
Nickel	95		%	2	03/10/2021	AB21-0310-08
Potassium	104		%	100	03/10/2021	AB21-0310-08
Selenium	107		%	1	03/10/2021	AB21-0310-08
Silver	101		%	0.2	03/10/2021	AB21-0310-08
Sodium	112		%	1000	03/10/2021	AB21-0310-08
Thallium	101		%	2	03/10/2021	AB21-0310-08
Vanadium	105		%	2	03/10/2021	AB21-0310-08
Zinc	96		%	10	03/10/2021	AB21-0310-08

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0217-03-C01-A02 Analyst: TMR

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	99.4		%	0.2	03/10/2021	AB21-0310-12

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

Aliquot: 21-0217-03-C02-A01 Analyst: DMW

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	105		%	1000	03/10/2021	AB21-0311-01
Fluoride	88		%	1000	03/10/2021	AB21-0311-01
Sulfate	101		%	1000	03/10/2021	AB21-0311-01

Alkalinity by SM 2320B

Aliquot: 21-0217-03-C03-A01 Analyst: DLS

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	94		%	10000	03/09/2021	AB21-0309-16

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001 MSD**
Lab Sample ID: 21-0217-04
Matrix: Groundwater

Laboratory Project: **21-0217**
Collect Date: 03/02/2021
Collect Time: 10:25 AM

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

Aliquot: 21-0217-04-C01-A01 Analyst: EB

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	110		%	1	03/10/2021	AB21-0310-08
Arsenic	110		%	1	03/10/2021	AB21-0310-08
Barium	108		%	5	03/10/2021	AB21-0310-08
Beryllium	102		%	1	03/10/2021	AB21-0310-08
Boron	112		%	20	03/10/2021	AB21-0310-08
Cadmium	107		%	0.2	03/10/2021	AB21-0310-08
Calcium	123		%	1000	03/10/2021	AB21-0310-08
Chromium	97		%	1	03/10/2021	AB21-0310-08
Cobalt	101		%	6	03/10/2021	AB21-0310-08
Copper	95		%	1	03/10/2021	AB21-0310-08
Iron	97		%	20	03/10/2021	AB21-0310-08
Lead	102		%	1	03/10/2021	AB21-0310-08
Lithium	100		%	10	03/10/2021	AB21-0310-08
Magnesium	113		%	1000	03/10/2021	AB21-0310-08
Molybdenum	107		%	5	03/10/2021	AB21-0310-08
Nickel	96		%	2	03/10/2021	AB21-0310-08
Potassium	110		%	100	03/10/2021	AB21-0310-08
Selenium	108		%	1	03/10/2021	AB21-0310-08
Silver	102		%	0.2	03/10/2021	AB21-0310-08
Sodium	116		%	1000	03/10/2021	AB21-0310-08
Thallium	99		%	2	03/10/2021	AB21-0310-08
Vanadium	105		%	2	03/10/2021	AB21-0310-08
Zinc	97		%	10	03/10/2021	AB21-0310-08

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0217-04-C01-A02 Analyst: TMR

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	97.4		%	0.2	03/10/2021	AB21-0310-12

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

Aliquot: 21-0217-04-C02-A01 Analyst: DMW

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	106		%	1000	03/10/2021	AB21-0311-01
Fluoride	85		%	1000	03/10/2021	AB21-0311-01
Sulfate	105		%	1000	03/10/2021	AB21-0311-01

Alkalinity by SM 2320B

Aliquot: 21-0217-04-C03-A01 Analyst: DLS

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	94		%	10000	03/09/2021	AB21-0309-16

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Analytical Report

Report Date: 03/17/21

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-0217

Inspection Date: 3/4/2021 **Inspection By:** WH

Sample Origin/Project Name: DEK BAP + LI Q1-2021

Shipment Delivered By: Enter the type of shipment carrier.

Pony ____ FedEx ✓ UPS ____ USPS ____ Airborne ____

Other/Hand Carry (whom) ____

Tracking Number: 784334857157 Shipping Form Attached: Yes ✓ No ____

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

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

Loose/Unpackaged Containers ____ Other ____

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

Damaged Shipment Observed: None ✓ Dented ____ Leaking ____

Other ____

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

Shipping Containers Received: Opened ____ Sealed ✓

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

CoC ✓ Work Request ____ Air Data Sheet ____ Other ____

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

As-Received Temperature Range 3.4-5.2°C Samples Received on Ice: Yes ✓ No ____

M&TE # and Expiration 015402 6.4.21

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

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

 PG. 2 of 2 not needed

CHAIN OF CUSTODY

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SAMPLING SITE: **DEK Bottom Ash Pond & LI – 2021 Q1**

PROJECT NUMBER: **21-0217**

SAMPLING TEAM: TRC – Katy + Javier

DATE SHIPPED: 3/3/2021

SITE SKETCHED ATTACHED? CIRCLE ONE: YES NO

Page 1 of 1

SEND REPORT TO: CDBatts

HD Register, TRC

PHONE:

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	ANALYSIS REQUESTED: Total Metals	Anions	TDS	Alkalinity					REMARKS
21-0217-01	3/2/2021	10:25am	GW	DEK-MW-15003		5	X	X	X	X					
-02	3/2/2021	10:25am	GW	DEK-MW-18001		5	X	X	X	X					
-03	3/2/2021	10:25am	GW	DEK-MW-18001 MS		4	X	X		X					
-04	3/2/2021	10:25am	GW	DEK-MW-18001 MSD		4	X	X		X					

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
Katy Remynga	3/3/2021	FedEx
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)
Fed Ex	3-4-2021 1130	Chris Hansen

COMMENTS: 3.6-5.2°C #015402 ice

ORIGINAL TO LAB COPY TO CUSTOMER

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

To: CDBatts, Karn/Weadock

From: EBlaj, T-258

Date: April 15, 2021

Subject: RCRA GROUNDWATER MONITORING – KARN LINED IMPOUNDMENT – 2021 Q1

CC: BTRunkel, P22-120
HDRegister, P22-521
BLSwanberg, P22-119

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

Chemistry Project: 21-0218R2

TRC Environmental, Inc. conducted groundwater monitoring at the DE Karn Lined Impoundment area on 03/02/2021 and 03/03/2021 for the 1st Quarter monitoring 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 03/04/2021.

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

Reviewed and approved by:

Emil Blaj
Sr. Technical Analyst
Project Lead

ilac-MRA A2LA ACCREDITED Certificate #1097.04

CASE NARRATIVE

I. Sample Receipt

All samples were received within hold time and in good conditions; one anomaly was 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.

NOTE: Metals container 21-0218-07-C01 was received empty. Since the volume was sufficient, a portion from the Anions container 21-0218-C02 was transferred into the metals container during sample receipt.

NOTE: The Karn Influent sample set was received on 03/04/2021 without being listed on a Chain of Custody and it was added to project 21-0218 as sample 21-0218-10 upon clarification & instructions from the sampling team lead.

II. Methodology

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

III. Results/Quality Control

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

NOTE: The original report was revised to include additional metal analytes. A subsequent revision to the report was requested to include Mercury. Since the samples were analyzed past the method recommended hold time, the results have been flagged accordingly.

DEFINITIONS / QUALIFIERS

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

Acronym	Description
RL	Reporting Limit
ND	Result not detected or below Reporting Limit
NT	Non TNI analyte

LCS	Laboratory Control Sample
LRB	Laboratory Reagent Blank (also referred to as Method Blank)
DUP	Duplicate
MS	Matrix Spike
MSD	Matrix Spike Duplicate
RPD	Relative Percent Difference
MDL	Method Detection Limit
PQL	Practical Quantitation Limit
TDL	Target Detection Limit
SM	Standard Methods Compendium

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

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Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q1-2021 DEK RCRA Lined Impoundment Wells
Date Received: 3/4/2021
Chemistry Project: 21-0218

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-0218-01	OW-10	Groundwater	03/02/2021 01:35 PM	DEK Lined Impoundment
21-0218-02	OW-12	Groundwater	03/02/2021 03:45 PM	DEK Lined Impoundment
21-0218-03	OW-11	Groundwater	03/02/2021 05:00 PM	DEK Lined Impoundment
21-0218-04	KLI-SCS	Groundwater	03/03/2021 08:50 AM	DEK Lined Impoundment
21-0218-05	KLI-PCS	Surface Water	03/01/2021 10:30 AM	DEK Lined Impoundment
21-0218-06	SW-DITCH	Surface Water	03/01/2021 10:00 AM	DEK Lined Impoundment
21-0218-07	DUP-KLI	Groundwater	03/02/2021 12:00 AM	DEK Lined Impoundment
21-0218-08	EB-KLI	Water	03/02/2021 01:35 PM	DEK Lined Impoundment
21-0218-09	FE-KLI	Water	03/02/2021 01:40 PM	DEK Lined Impoundment
21-0218-10	Karn Influent	Groundwater	03/03/2021 08:40 AM	DEK Lined Impoundment

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-10**
Lab Sample ID: 21-0218-01
Matrix: Groundwater

Laboratory Project: **21-0218**
Collect Date: 03/02/2021
Collect Time: 01:35 PM

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

Aliquot: 21-0218-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/10/2021	AB21-0319-05
Arsenic	3		ug/L	1	03/10/2021	AB21-0319-05
Barium	135		ug/L	5	03/10/2021	AB21-0319-05
Beryllium	ND		ug/L	1	03/10/2021	AB21-0319-05
Boron	1380		ug/L	20	03/10/2021	AB21-0319-05
Cadmium	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Calcium	103000		ug/L	1000	03/10/2021	AB21-0319-05
Chromium	1		ug/L	1	03/10/2021	AB21-0319-05
Cobalt	ND		ug/L	6	03/10/2021	AB21-0319-05
Copper	2		ug/L	1	03/10/2021	AB21-0319-05
Iron	1480		ug/L	20	03/10/2021	AB21-0319-05
Lead	ND		ug/L	1	03/10/2021	AB21-0319-05
Lithium	29		ug/L	10	03/10/2021	AB21-0319-05
Magnesium	17300		ug/L	1000	03/10/2021	AB21-0319-05
Manganese	301		ug/L	5	03/10/2021	AB21-0319-05
Molybdenum	ND		ug/L	5	03/10/2021	AB21-0319-05
Nickel	2		ug/L	2	03/10/2021	AB21-0319-05
Potassium	4610		ug/L	100	03/10/2021	AB21-0319-05
Selenium	1		ug/L	1	03/10/2021	AB21-0319-05
Silver	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Sodium	62800		ug/L	1000	03/10/2021	AB21-0319-05
Thallium	ND		ug/L	2	03/10/2021	AB21-0319-05
Vanadium	2		ug/L	2	03/10/2021	AB21-0319-05
Zinc	ND		ug/L	10	03/10/2021	AB21-0319-05

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0218-01-C01-A03 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND	H	ug/L	0.2	04/12/2021	AB21-0412-05

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

Aliquot: 21-0218-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	66000		ug/L	1000	03/11/2021	AB21-0311-01
Fluoride	ND		ug/L	1000	03/11/2021	AB21-0311-01
Sulfate	2620		ug/L	1000	03/11/2021	AB21-0311-01

Total Dissolved Solids by SM 2540C

Aliquot: 21-0218-01-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	551		mg/L	10	03/04/2021	AB21-0305-09

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-10**
Lab Sample ID: 21-0218-01
Matrix: Groundwater

Laboratory Project: **21-0218**
Collect Date: 03/02/2021
Collect Time: 01:35 PM

Alkalinity by SM 2320B

Aliquot: 21-0218-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	366000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity Bicarbonate	366000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity Carbonate	ND		ug/L	10000	03/09/2021	AB21-0309-16

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-12**
Lab Sample ID: 21-0218-02
Matrix: Groundwater

Laboratory Project: **21-0218**
Collect Date: 03/02/2021
Collect Time: 03:45 PM

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

Aliquot: 21-0218-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/10/2021	AB21-0319-05
Arsenic	121		ug/L	1	03/10/2021	AB21-0319-05
Barium	84		ug/L	5	03/10/2021	AB21-0319-05
Beryllium	ND		ug/L	1	03/10/2021	AB21-0319-05
Boron	906		ug/L	20	03/10/2021	AB21-0319-05
Cadmium	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Calcium	84900		ug/L	1000	03/10/2021	AB21-0319-05
Chromium	ND		ug/L	1	03/10/2021	AB21-0319-05
Cobalt	ND		ug/L	6	03/10/2021	AB21-0319-05
Copper	1		ug/L	1	03/10/2021	AB21-0319-05
Iron	4440		ug/L	20	03/10/2021	AB21-0319-05
Lead	ND		ug/L	1	03/10/2021	AB21-0319-05
Lithium	32		ug/L	10	03/10/2021	AB21-0319-05
Magnesium	29200		ug/L	1000	03/10/2021	AB21-0319-05
Manganese	130		ug/L	5	03/10/2021	AB21-0319-05
Molybdenum	11		ug/L	5	03/10/2021	AB21-0319-05
Nickel	ND		ug/L	2	03/10/2021	AB21-0319-05
Potassium	6730		ug/L	100	03/10/2021	AB21-0319-05
Selenium	ND		ug/L	1	03/10/2021	AB21-0319-05
Silver	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Sodium	48600		ug/L	1000	03/10/2021	AB21-0319-05
Thallium	ND		ug/L	2	03/10/2021	AB21-0319-05
Vanadium	ND		ug/L	2	03/10/2021	AB21-0319-05
Zinc	ND		ug/L	10	03/10/2021	AB21-0319-05

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0218-02-C01-A03 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND	H	ug/L	0.2	04/12/2021	AB21-0412-05

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

Aliquot: 21-0218-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	50000		ug/L	1000	03/11/2021	AB21-0311-01
Fluoride	ND		ug/L	1000	03/11/2021	AB21-0311-01
Sulfate	165000		ug/L	1000	03/11/2021	AB21-0311-01

Total Dissolved Solids by SM 2540C

Aliquot: 21-0218-02-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	549		mg/L	10	03/04/2021	AB21-0305-09

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-12**
Lab Sample ID: 21-0218-02
Matrix: Groundwater

Laboratory Project: **21-0218**
Collect Date: 03/02/2021
Collect Time: 03:45 PM

Alkalinity by SM 2320B

Aliquot: 21-0218-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	188000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity Bicarbonate	188000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity Carbonate	ND		ug/L	10000	03/09/2021	AB21-0309-16

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-11**
Lab Sample ID: 21-0218-03
Matrix: Groundwater

Laboratory Project: **21-0218**
Collect Date: 03/02/2021
Collect Time: 05:00 PM

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

Aliquot: 21-0218-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	1		ug/L	1	03/10/2021	AB21-0319-05
Arsenic	711		ug/L	1	03/10/2021	AB21-0319-05
Barium	42		ug/L	5	03/10/2021	AB21-0319-05
Beryllium	ND		ug/L	1	03/10/2021	AB21-0319-05
Boron	3050		ug/L	20	03/10/2021	AB21-0319-05
Cadmium	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Calcium	14000		ug/L	1000	03/10/2021	AB21-0319-05
Chromium	ND		ug/L	1	03/10/2021	AB21-0319-05
Cobalt	ND		ug/L	6	03/10/2021	AB21-0319-05
Copper	ND		ug/L	1	03/10/2021	AB21-0319-05
Iron	35		ug/L	20	03/10/2021	AB21-0319-05
Lead	ND		ug/L	1	03/10/2021	AB21-0319-05
Lithium	12		ug/L	10	03/10/2021	AB21-0319-05
Magnesium	2020		ug/L	1000	03/10/2021	AB21-0319-05
Manganese	5		ug/L	5	03/10/2021	AB21-0319-05
Molybdenum	317		ug/L	5	03/10/2021	AB21-0319-05
Nickel	2		ug/L	2	03/10/2021	AB21-0319-05
Potassium	4920		ug/L	100	03/10/2021	AB21-0319-05
Selenium	2		ug/L	1	03/10/2021	AB21-0319-05
Silver	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Sodium	60800		ug/L	1000	03/10/2021	AB21-0319-05
Thallium	ND		ug/L	2	03/10/2021	AB21-0319-05
Vanadium	429		ug/L	2	03/10/2021	AB21-0319-05
Zinc	ND		ug/L	10	03/10/2021	AB21-0319-05

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0218-03-C01-A03 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND	H	ug/L	0.2	04/12/2021	AB21-0412-05

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

Aliquot: 21-0218-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	69000		ug/L	1000	03/11/2021	AB21-0311-01
Fluoride	4150		ug/L	1000	03/11/2021	AB21-0311-01
Sulfate	25400		ug/L	1000	03/11/2021	AB21-0311-01

Total Dissolved Solids by SM 2540C

Aliquot: 21-0218-03-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	242		mg/L	10	03/04/2021	AB21-0305-09

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-11**
Lab Sample ID: 21-0218-03
Matrix: Groundwater

Laboratory Project: **21-0218**
Collect Date: 03/02/2021
Collect Time: 05:00 PM

Alkalinity by SM 2320B

Aliquot: 21-0218-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	65800		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity Bicarbonate	32100		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity Carbonate	33700		ug/L	10000	03/09/2021	AB21-0309-16

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-SCS**
Lab Sample ID: 21-0218-04
Matrix: Groundwater

Laboratory Project: **21-0218**
Collect Date: 03/03/2021
Collect Time: 08:50 AM

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

Aliquot: 21-0218-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	1		ug/L	1	03/10/2021	AB21-0319-05
Arsenic	4		ug/L	1	03/10/2021	AB21-0319-05
Barium	87		ug/L	5	03/10/2021	AB21-0319-05
Beryllium	ND		ug/L	1	03/10/2021	AB21-0319-05
Boron	716		ug/L	20	03/10/2021	AB21-0319-05
Cadmium	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Calcium	63400		ug/L	1000	03/10/2021	AB21-0319-05
Chromium	1		ug/L	1	03/10/2021	AB21-0319-05
Cobalt	ND		ug/L	6	03/10/2021	AB21-0319-05
Copper	6		ug/L	1	03/10/2021	AB21-0319-05
Iron	1220		ug/L	20	03/10/2021	AB21-0319-05
Lead	2		ug/L	1	03/10/2021	AB21-0319-05
Lithium	ND		ug/L	10	03/10/2021	AB21-0319-05
Magnesium	20000		ug/L	1000	03/10/2021	AB21-0319-05
Manganese	20		ug/L	5	03/10/2021	AB21-0319-05
Molybdenum	159		ug/L	5	03/10/2021	AB21-0319-05
Nickel	5		ug/L	2	03/10/2021	AB21-0319-05
Potassium	3840		ug/L	100	03/10/2021	AB21-0319-05
Selenium	5		ug/L	1	03/10/2021	AB21-0319-05
Silver	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Sodium	328000		ug/L	1000	03/10/2021	AB21-0319-05
Thallium	ND		ug/L	2	03/10/2021	AB21-0319-05
Vanadium	11		ug/L	2	03/10/2021	AB21-0319-05
Zinc	ND		ug/L	10	03/10/2021	AB21-0319-05

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0218-04-C01-A03 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND	H	ug/L	0.2	04/12/2021	AB21-0412-05

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

Aliquot: 21-0218-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	108000		ug/L	1000	03/11/2021	AB21-0311-01
Fluoride	ND		ug/L	1000	03/11/2021	AB21-0311-01
Sulfate	395000		ug/L	1000	03/11/2021	AB21-0311-01

Total Dissolved Solids by SM 2540C

Aliquot: 21-0218-04-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1440		mg/L	10	03/04/2021	AB21-0305-09

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-SCS**
Lab Sample ID: 21-0218-04
Matrix: Groundwater

Laboratory Project: **21-0218**
Collect Date: 03/03/2021
Collect Time: 08:50 AM

Alkalinity by SM 2320B

Aliquot: 21-0218-04-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	376000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity Bicarbonate	376000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity Carbonate	ND		ug/L	10000	03/09/2021	AB21-0309-16

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-PCS**
Lab Sample ID: 21-0218-05
Matrix: Surface Water

Laboratory Project: **21-0218**
Collect Date: 03/01/2021
Collect Time: 10:30 AM

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

Aliquot: 21-0218-05-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/10/2021	AB21-0319-05
Arsenic	5		ug/L	1	03/10/2021	AB21-0319-05
Barium	1090		ug/L	5	03/10/2021	AB21-0319-05
Beryllium	ND		ug/L	1	03/10/2021	AB21-0319-05
Boron	566		ug/L	20	03/10/2021	AB21-0319-05
Cadmium	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Calcium	113000		ug/L	1000	03/10/2021	AB21-0319-05
Chromium	12		ug/L	1	03/10/2021	AB21-0319-05
Cobalt	ND		ug/L	6	03/10/2021	AB21-0319-05
Copper	20		ug/L	1	03/10/2021	AB21-0319-05
Iron	3810		ug/L	20	03/10/2021	AB21-0319-05
Lead	2		ug/L	1	03/10/2021	AB21-0319-05
Lithium	ND		ug/L	10	03/10/2021	AB21-0319-05
Magnesium	24400		ug/L	1000	03/10/2021	AB21-0319-05
Manganese	44		ug/L	5	03/10/2021	AB21-0319-05
Molybdenum	22		ug/L	5	03/10/2021	AB21-0319-05
Nickel	9		ug/L	2	03/10/2021	AB21-0319-05
Potassium	3410		ug/L	100	03/10/2021	AB21-0319-05
Selenium	1		ug/L	1	03/10/2021	AB21-0319-05
Silver	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Sodium	70100		ug/L	1000	03/10/2021	AB21-0319-05
Thallium	ND		ug/L	2	03/10/2021	AB21-0319-05
Vanadium	52		ug/L	2	03/10/2021	AB21-0319-05
Zinc	18		ug/L	10	03/10/2021	AB21-0319-05

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0218-05-C01-A03 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND	H	ug/L	0.2	04/12/2021	AB21-0412-05

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

Aliquot: 21-0218-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	108000		ug/L	1000	03/11/2021	AB21-0311-01
Fluoride	ND		ug/L	1000	03/11/2021	AB21-0311-01
Sulfate	77100		ug/L	1000	03/11/2021	AB21-0311-01

Total Dissolved Solids by SM 2540C

Aliquot: 21-0218-05-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	528		mg/L	10	03/04/2021	AB21-0305-09

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-PCS**
Lab Sample ID: 21-0218-05
Matrix: Surface Water

Laboratory Project: **21-0218**
Collect Date: 03/01/2021
Collect Time: 10:30 AM

Alkalinity by SM 2320B

Aliquot: 21-0218-05-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	182000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity Bicarbonate	182000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity Carbonate	ND		ug/L	10000	03/09/2021	AB21-0309-16

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **SW-DITCH**
Lab Sample ID: 21-0218-06
Matrix: Surface Water

Laboratory Project: **21-0218**
Collect Date: 03/01/2021
Collect Time: 10:00 AM

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

Aliquot: 21-0218-06-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/10/2021	AB21-0319-05
Arsenic	2		ug/L	1	03/10/2021	AB21-0319-05
Barium	225		ug/L	5	03/10/2021	AB21-0319-05
Beryllium	ND		ug/L	1	03/10/2021	AB21-0319-05
Boron	103		ug/L	20	03/10/2021	AB21-0319-05
Cadmium	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Calcium	71800		ug/L	1000	03/10/2021	AB21-0319-05
Chromium	2		ug/L	1	03/10/2021	AB21-0319-05
Cobalt	ND		ug/L	6	03/10/2021	AB21-0319-05
Copper	18		ug/L	1	03/10/2021	AB21-0319-05
Iron	570		ug/L	20	03/10/2021	AB21-0319-05
Lead	1		ug/L	1	03/10/2021	AB21-0319-05
Lithium	ND		ug/L	10	03/10/2021	AB21-0319-05
Magnesium	20800		ug/L	1000	03/10/2021	AB21-0319-05
Manganese	37		ug/L	5	03/10/2021	AB21-0319-05
Molybdenum	6		ug/L	5	03/10/2021	AB21-0319-05
Nickel	4		ug/L	2	03/10/2021	AB21-0319-05
Potassium	3080		ug/L	100	03/10/2021	AB21-0319-05
Selenium	1		ug/L	1	03/10/2021	AB21-0319-05
Silver	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Sodium	64900		ug/L	1000	03/10/2021	AB21-0319-05
Thallium	ND		ug/L	2	03/10/2021	AB21-0319-05
Vanadium	10		ug/L	2	03/10/2021	AB21-0319-05
Zinc	15		ug/L	10	03/10/2021	AB21-0319-05

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0218-06-C01-A03 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND	H	ug/L	0.2	04/12/2021	AB21-0412-05

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

Aliquot: 21-0218-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	112000		ug/L	1000	03/11/2021	AB21-0311-01
Fluoride	ND		ug/L	1000	03/11/2021	AB21-0311-01
Sulfate	41300		ug/L	1000	03/11/2021	AB21-0311-01

Total Dissolved Solids by SM 2540C

Aliquot: 21-0218-06-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	493		mg/L	10	03/04/2021	AB21-0305-09

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **SW-DITCH**
Lab Sample ID: 21-0218-06
Matrix: Surface Water

Laboratory Project: **21-0218**
Collect Date: 03/01/2021
Collect Time: 10:00 AM

Alkalinity by SM 2320B

Aliquot: 21-0218-06-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	205000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity Bicarbonate	205000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity Carbonate	ND		ug/L	10000	03/09/2021	AB21-0309-16

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **DUP-KLI**
Lab Sample ID: 21-0218-07
Matrix: Groundwater

Laboratory Project: **21-0218**
Collect Date: 03/02/2021
Collect Time: 12:00 AM

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

Aliquot: 21-0218-07-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/10/2021	AB21-0319-05
Arsenic	2		ug/L	1	03/10/2021	AB21-0319-05
Barium	135		ug/L	5	03/10/2021	AB21-0319-05
Beryllium	ND		ug/L	1	03/10/2021	AB21-0319-05
Boron	1640		ug/L	20	03/10/2021	AB21-0319-05
Cadmium	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Calcium	128000		ug/L	1000	03/10/2021	AB21-0319-05
Chromium	1		ug/L	1	03/10/2021	AB21-0319-05
Cobalt	ND		ug/L	6	03/10/2021	AB21-0319-05
Copper	2		ug/L	1	03/10/2021	AB21-0319-05
Iron	1470		ug/L	20	03/10/2021	AB21-0319-05
Lead	ND		ug/L	1	03/10/2021	AB21-0319-05
Lithium	29		ug/L	10	03/10/2021	AB21-0319-05
Magnesium	20600		ug/L	1000	03/10/2021	AB21-0319-05
Manganese	294		ug/L	5	03/10/2021	AB21-0319-05
Molybdenum	ND		ug/L	5	03/10/2021	AB21-0319-05
Nickel	3		ug/L	2	03/10/2021	AB21-0319-05
Potassium	6730		ug/L	100	03/10/2021	AB21-0319-05
Selenium	1		ug/L	1	03/10/2021	AB21-0319-05
Silver	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Sodium	75400		ug/L	1000	03/10/2021	AB21-0319-05
Thallium	ND		ug/L	2	03/10/2021	AB21-0319-05
Vanadium	3		ug/L	2	03/10/2021	AB21-0319-05
Zinc	ND		ug/L	10	03/10/2021	AB21-0319-05

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0218-07-C01-A03 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND	H	ug/L	0.2	04/12/2021	AB21-0412-05

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

Aliquot: 21-0218-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	66100		ug/L	1000	03/11/2021	AB21-0311-01
Fluoride	ND		ug/L	1000	03/11/2021	AB21-0311-01
Sulfate	2120		ug/L	1000	03/11/2021	AB21-0311-01

Total Dissolved Solids by SM 2540C

Aliquot: 21-0218-07-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	589		mg/L	10	03/04/2021	AB21-0305-09

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **DUP-KLI**
Lab Sample ID: 21-0218-07
Matrix: Groundwater

Laboratory Project: **21-0218**
Collect Date: 03/02/2021
Collect Time: 12:00 AM

Alkalinity by SM 2320B

Aliquot: 21-0218-07-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	370000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity Bicarbonate	370000		ug/L	10000	03/09/2021	AB21-0309-16
Alkalinity Carbonate	ND		ug/L	10000	03/09/2021	AB21-0309-16

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **EB-KLI**
Lab Sample ID: 21-0218-08
Matrix: Water

Laboratory Project: **21-0218**
Collect Date: 03/02/2021
Collect Time: 01:35 PM

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

Aliquot: 21-0218-08-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/10/2021	AB21-0319-05
Arsenic	ND		ug/L	1	03/10/2021	AB21-0319-05
Barium	ND		ug/L	5	03/10/2021	AB21-0319-05
Beryllium	ND		ug/L	1	03/10/2021	AB21-0319-05
Boron	ND		ug/L	20	03/10/2021	AB21-0319-05
Cadmium	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Calcium	ND		ug/L	1000	03/10/2021	AB21-0319-05
Chromium	ND		ug/L	1	03/10/2021	AB21-0319-05
Cobalt	ND		ug/L	6	03/10/2021	AB21-0319-05
Copper	ND		ug/L	1	03/10/2021	AB21-0319-05
Iron	ND		ug/L	20	03/10/2021	AB21-0319-05
Lead	ND		ug/L	1	03/10/2021	AB21-0319-05
Lithium	ND		ug/L	10	03/10/2021	AB21-0319-05
Magnesium	ND		ug/L	1000	03/10/2021	AB21-0319-05
Manganese	ND		ug/L	5	03/10/2021	AB21-0319-05
Molybdenum	ND		ug/L	5	03/10/2021	AB21-0319-05
Nickel	ND		ug/L	2	03/10/2021	AB21-0319-05
Potassium	ND		ug/L	100	03/10/2021	AB21-0319-05
Selenium	ND		ug/L	1	03/10/2021	AB21-0319-05
Silver	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Sodium	ND		ug/L	1000	03/10/2021	AB21-0319-05
Thallium	ND		ug/L	2	03/10/2021	AB21-0319-05
Vanadium	ND		ug/L	2	03/10/2021	AB21-0319-05
Zinc	ND		ug/L	10	03/10/2021	AB21-0319-05

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0218-08-C01-A03 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND	H	ug/L	0.2	04/12/2021	AB21-0412-05

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **FB-KLI**
Lab Sample ID: 21-0218-09
Matrix: Water

Laboratory Project: **21-0218**
Collect Date: 03/02/2021
Collect Time: 01:40 PM

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

Aliquot: 21-0218-09-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/10/2021	AB21-0319-05
Arsenic	ND		ug/L	1	03/10/2021	AB21-0319-05
Barium	ND		ug/L	5	03/10/2021	AB21-0319-05
Beryllium	ND		ug/L	1	03/10/2021	AB21-0319-05
Boron	ND		ug/L	20	03/10/2021	AB21-0319-05
Cadmium	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Calcium	ND		ug/L	1000	03/10/2021	AB21-0319-05
Chromium	ND		ug/L	1	03/10/2021	AB21-0319-05
Cobalt	ND		ug/L	6	03/10/2021	AB21-0319-05
Copper	ND		ug/L	1	03/10/2021	AB21-0319-05
Iron	ND		ug/L	20	03/10/2021	AB21-0319-05
Lead	ND		ug/L	1	03/10/2021	AB21-0319-05
Lithium	ND		ug/L	10	03/10/2021	AB21-0319-05
Magnesium	ND		ug/L	1000	03/10/2021	AB21-0319-05
Manganese	ND		ug/L	5	03/10/2021	AB21-0319-05
Molybdenum	ND		ug/L	5	03/10/2021	AB21-0319-05
Nickel	ND		ug/L	2	03/10/2021	AB21-0319-05
Potassium	ND		ug/L	100	03/10/2021	AB21-0319-05
Selenium	ND		ug/L	1	03/10/2021	AB21-0319-05
Silver	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Sodium	ND		ug/L	1000	03/10/2021	AB21-0319-05
Thallium	ND		ug/L	2	03/10/2021	AB21-0319-05
Vanadium	ND		ug/L	2	03/10/2021	AB21-0319-05
Zinc	ND		ug/L	10	03/10/2021	AB21-0319-05

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0218-09-C01-A03 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND	H	ug/L	0.2	04/12/2021	AB21-0412-05

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **Karn Influent**
Lab Sample ID: 21-0218-10
Matrix: Groundwater

Laboratory Project: **21-0218**
Collect Date: 03/03/2021
Collect Time: 08:40 AM

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

Aliquot: 21-0218-10-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/10/2021	AB21-0319-05
Arsenic	234		ug/L	1	03/10/2021	AB21-0319-05
Barium	178		ug/L	5	03/10/2021	AB21-0319-05
Beryllium	ND		ug/L	1	03/10/2021	AB21-0319-05
Boron	2160		ug/L	20	03/10/2021	AB21-0319-05
Cadmium	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Calcium	154000		ug/L	1000	03/10/2021	AB21-0319-05
Chromium	ND		ug/L	1	03/10/2021	AB21-0319-05
Cobalt	ND		ug/L	6	03/10/2021	AB21-0319-05
Copper	10		ug/L	1	03/10/2021	AB21-0319-05
Iron	1580		ug/L	20	03/10/2021	AB21-0319-05
Lead	2		ug/L	1	03/10/2021	AB21-0319-05
Lithium	63		ug/L	10	03/10/2021	AB21-0319-05
Magnesium	46800		ug/L	1000	03/10/2021	AB21-0319-05
Manganese	425		ug/L	5	03/10/2021	AB21-0319-05
Molybdenum	14		ug/L	5	03/10/2021	AB21-0319-05
Nickel	3		ug/L	2	03/10/2021	AB21-0319-05
Potassium	8750		ug/L	100	03/10/2021	AB21-0319-05
Selenium	1		ug/L	1	03/10/2021	AB21-0319-05
Silver	ND		ug/L	0.2	03/10/2021	AB21-0319-05
Sodium	37500		ug/L	1000	03/10/2021	AB21-0319-05
Thallium	ND		ug/L	2	03/10/2021	AB21-0319-05
Vanadium	ND		ug/L	2	03/10/2021	AB21-0319-05
Zinc	31		ug/L	10	03/10/2021	AB21-0319-05

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0218-10-C01-A03 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND	H	ug/L	0.2	04/12/2021	AB21-0412-05

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

Aliquot: 21-0218-10-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	47200		ug/L	1000	03/11/2021	AB21-0311-01
Fluoride	ND		ug/L	1000	03/11/2021	AB21-0311-01
Sulfate	218000		ug/L	1000	03/11/2021	AB21-0311-01

Alkalinity by SM 2320B

Aliquot: 21-0218-10-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	371000		ug/L	10000	03/11/2021	AB21-0311-07

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Analytical Report

Report Date: 04/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **Karn Influent**
Lab Sample ID: 21-0218-10
Matrix: Groundwater

Laboratory Project: **21-0218**
Collect Date: 03/03/2021
Collect Time: 08:40 AM

Alkalinity by SM 2320B

Aliquot: 21-0218-10-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Bicarbonate	371000		ug/L	10000	03/11/2021	AB21-0311-07
Alkalinity Carbonate	ND		ug/L	10000	03/11/2021	AB21-0311-07

Data Qualifiers		Exception Summary
H	Maximum recommended holding time exceeded	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-0218

Inspection Date: 03/04/2021 **Inspection By:** CLH

Sample Origin/Project Name: DEK LI – Q1-2021

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx ✓ UPS _____ USPS _____ Airborne _____

Other/Hand Carry (whom) _____

Tracking Number: 794334857157 Shipping Form Attached: Yes _____ No ____

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

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

Loose/Unpackaged Containers _____ Other _____

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

Damaged Shipment Observed: None ✓ Dented _____ Leaking _____

Other _____

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

Shipping Containers Received: Opened _____ Sealed ✓

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

CoC ✓ Work Request _____ Air Data Sheet _____ Other _____

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

As-Received Temperature Range 3.6-5.2°C Samples Received on Ice: Yes ✓ No ____

M&TE # and Expiration 015402 6.4.21

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

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL)	14				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	16				
24 mL vial (glass)					
250/500 mL (plastic)	7				
Other					

PG. 192

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Container Damage List or Exception Report (required if leaking, damaged or exception containers are found)

Project Log-In Number: 21-0218

Inspection Date: 03/04/21 **Inspection By:** LVH

Sample Container Damage Listing: List all sample containers that were found to be broken, leaking, missing sample labels or are not accounted for on the CoC.

Sample/Container ID	Damage/Exception Report
21-0218-07-(02)	Metals sample bottle contains no sample.

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251 • FAX (517) 788-2533

SAMPLING SITE: **DEK Lined Impoundment – 2021 Q1**

PROJECT NUMBER: **21-0218**

SAMPLING TEAM: TRC - Katy + Javier

DATE SHIPPED: 3/3/2021

SITE SKETCHED ATTACHED? CIRCLE ONE: YES (NO)

Page 1 of 1

SEND REPORT TO: CDBatts

HD Register, TRC

PHONE

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity					REMARKS
							ANALYSIS REQUESTED								
21-0218-01	3/2/2021	1:35 pm	GW	OW-10		5	x	x	x	x					
-02	3/2/2021	3:45 pm	GW	OW-11 12 3 WH		5	x	x	x	x					
-03	3/2/2021	5:00 pm	GW	OW-12 1 3 1 3-4-2021		5	x	x	x	x					
-04	3/3/2021	8:50 am	GW	KLI-SCS		5	x	x	x	x					
-05	3/1/21	10:30am	GW	KLI-PCS		5	x	x	x	x					
-06	3/1/21	10:00am	GW	SW-DITCH		5	x	x	x	x					
-07	3/2/2021	--	GW	DUP-KLI		5	x	x	x	x					
-08	3/2/2021	1:35 pm	W	EB-KLI		1	x								
-09	3/2/2021	1:40 pm	W	FB-KLI		1	x								
-10	3/3/2021	0840	W	Karn_Influent		5	x	x		x					

Karn_Influent should be analyzed for the GSI metals list plus piper diagrams as wells as Sulfate, Chloride, Total Carbonate, Bicarbonate, and Carbonate Alkalinity

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
Katy Kemingo	3/3/2021	Fedex
FedEx	3/4/2021 1130	Joseph Hansen

COMMENTS: 3.6-5.2°C ice #015402

ORIGINAL TO LAB COPY TO CUSTOMER

Appendix B
Field Notes

TRC

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Compliance
PROJECT NUMBER:	418425.0001.0000
PROJECT MANAGER:	Darby Litz
SITE LOCATION:	2742 Weadock Hwy Essexville, MI 48732
DATES OF FIELDWORK:	3/1/21 TO 3/3/21
PURPOSE OF FIELDWORK:	First Quarter Supplementary CCR Sampling
WORK PERFORMED BY:	Katy Reminga, Javier Jasso

Katy Reminga 3/4/2021
SIGNED DATE

3/8/21
CHECKED BY DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Comp	DATE: 3/1/2021	TIME ARRIVED: 7:15am
PROJECT NUMBER:	418425.0001.0000	AUTHOR: Katy Reminga, Javier Jass	TIME LEFT: 6:00pm

WEATHER

TEMPERATURE: 30 °F WIND: windy MPH VISIBILITY: cloudy

WORK / SAMPLING PERFORMED

- Recorded water levels for the Karn Landfill and Karn lined impoundment.
- Collected a sample @ DEK-MW-15002

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
N/A	N/A

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Butts	CEC	check in/out; safety training

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
N/A	N/A	N/A

Katy Reminga 3/18/2021
SIGNED DATE

CHECKED BY 3/8/21
DATE

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME:	CEC Karn LF: 2021 GW Complian	DATE: 3/1/2021	TIME ARRIVED: 0715
PROJECT NUMBER:	418425.0000.0000	AUTHOR: S. Kranz	TIME LEFT: 1600

WEATHER

TEMPERATURE: 32 °F WIND: 15-20 MPH VISIBILITY: cloudy

WORK / SAMPLING PERFORMED

0715- Arrive to site and check in w/ security. received annual Safety orientation from C. Batts.
0800- Begin assessment of transect conditions and took pictures, report to PM
0900- Sort out Bottleware for samples and prep for sampling
1106- finished sampling Surface water (KLI - PCS) and Ditch North of KLI
1115- Begin sampling MW-18 and MW-19
1345- finished sampling MW-18 and MW-19
~~1600 finished water~~ to 1500- finish water levels and organize team for event, offsite

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Batts	CEC	check in/out ; Safety training

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
Purge water	N/A	purged to ground

3/8/21
SIGNED DATE

Katy Reminga 3/17/2021
CHECKED BY DATE

TRC

GENERAL NOTES

PROJECT NAME: CEC Karn BAP/LI: 2021 GW Comp	DATE: 2/23/21	TIME ARRIVED: 1400
PROJECT NUMBER: 418425.0001.0000	AUTHOR: Katy Reminga, Javier Jass	TIME LEFT: 1651

WEATHER		
TEMPERATURE: 34 °F	WIND: 25 MPH	VISIBILITY: Cloudy

WORK / SAMPLING PERFORMED

DEK-MW-15006, 15005, Dup #02, 15004, FB #02

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS

3/5/21
SIGNED DATE

3/8/21
CHECKED BY DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Comp	DATE: 3/2/2021	TIME ARRIVED: 8:15am
PROJECT NUMBER:	418425.0001.0000	AUTHOR: Katy Reminga, Javier Jass	TIME LEFT: 6:00pm

WEATHER		
TEMPERATURE: 16 °F	WIND: 4 MPH	VISIBILITY: clear

WORK / SAMPLING PERFORMED

- collected sample @ KL1 mon wells (DEK-1800i, DEK-1503)
- collected sample @ OW-10, OW-11, OW-12, EB, DUP, FB

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS

Katy Reminga 3/02/2021
SIGNED DATE

Javier Jass 3/8/21
CHECKED BY DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC Karn LF: 2021 GW Complian	DATE: 3/3/2021	TIME ARRIVED: 8:00am
PROJECT NUMBER:	418425.0000.0000	AUTHOR: KR	TIME LEFT: 4:30pm

WEATHER

TEMPERATURE: 34 °F WIND: 6e MPH VISIBILITY: clear

WORK / SAMPLING PERFORMED

- collected sample @ KII - SCS
- collected sample @ KII - influent
- collected sample @ GW-02
- collected sample @ MW-22
- Shipped samples @ Fedex

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS

Katy Reminga 3/3/2021
SIGNED DATE

CHECKED BY 3/8/21
DATE

TRC

EQUIPMENT SUMMARY

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW	SAMPLER NAME:	Katy Reminga, Javier Jasso
PROJECT NO.:	418425.0001.0000		

WATER LEVEL MEASUREMENTS COLLECTED WITH:

NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)
HERON DIPPER-T	TRC A2

PRODUCT LEVEL MEASUREMENTS COLLECTED WITH:

NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)
NA	NA

DEPTH TO BOTTOM OF WELL MEASUREMENTS COLLECTED WITH:

NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)
HERON DIPPER-T	TRC A2

PURGING METHOD

NAME AND MODEL OF PUMP OR TYPE OF BAILER	SERIAL NUMBER (IF APPLICABLE)
PERISTALTIC PUMP	TRC A2

SAMPLING METHOD

NAME AND MODEL OF PUMP OR TYPE OF BAILER	SERIAL NUMBER (IF APPLICABLE)
PERISTALTIC PUMP	TRC A2
GEOTECH DISPOSABLE FILTER	0.45 MICRON
NAME AND MODEL OF FILTERATION DEVICE	FILTER TYPE AND SIZE
DEDICATED POLY TUBING	☑ LOW-FLOW SAMPLING EVENT
TUBING TYPE	

PURGE WATER DISPOSAL METHOD

☑ GROUND ☐ DRUM ☐ POTW ☐ POLYTANK ☐ OTHER _____

DECONTAMINATION AND FIELD BLANK WATER SOURCE

POTABLE WATER SOURCE	DI WATER SOURCE
STORE BOUGHT	LABORATORY PROVIDED
SIGNED 3/5/21 DATE	CHECKED BY 3/8/21 DATE

REVISED 04/2019

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Compliance / BAP/LI	MODEL: VSI PRO plus	SAMPLER: KR, JJ (JK)
PROJECT NO.:	418425.0000.0000 / 418425.0001	SERIAL #: Rental	DATE: 3/1/2021

PH CALIBRATION CHECK

pH 7 (LOT #): 06I 113 (EXP. DATE): Sep/22 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 062001 (EXP. DATE): Sep/22 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
7.00 / 7.00	4.00 / 4.00	☒ WITHIN RANGE	0930
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 0011175 (EXP. DATE): 9/21 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1413	18.0	☒ WITHIN RANGE	0928
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
232 / 232	19.1	☒ WITHIN RANGE	0933
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
8.41 / 8.41	18.6	☐ WITHIN RANGE	0937
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A9317 (EXP. DATE): 11/21 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
10.1 / 10.0	/	☒ WITHIN RANGE	0941
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

☐ AUTOCAL SOLUTION (LOT #): (EXP. DATE):	☑ STANDARD SOLUTION (S) LIST LOT NUMBERS AND EXPIRATION DATES UNDER CALIBRATION CHECK
CALIBRATED PARAMETERS	CALIBRATION RANGES (1)
☐ pH	pH: +/- 0.2 S.U.
☐ COND	COND: +/- 1% OF CAL. STANDARD
☐ ORP	ORP: +/- 25 mV
☐ D.O.	D.O.: VARIES
☐ TURB	TURB: +/- 5% OF CAL. STANDARD
☐ _____	(1) CALIBRATION RANGES ARE SPECIFIC TO THE MODEL OF THE WATER QUALITY METER
☐ _____	

NOTES

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

SIGNED 3/8/21 DATE

CHECKED BY Katy Reminga 3/17/2021 DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Compliance	MODEL: PROSS	SAMPLER: KR, JJ
PROJECT NO.:	418425.0001.0000	SERIAL #: TRC A2	DATE: 3/5/21

PH CALIBRATION CHECK

pH 7 (LOT #): 66K4467 (EXP. DATE): 11/21 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 061601 (EXP. DATE): 9/21 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
7.00 / 7.00	4.02 / 4.02	☑ WITHIN RANGE	1440
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 061117 (EXP. DATE): 9/21 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1413	10 A	☑ WITHIN RANGE	1410
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 19K1000IC (EXP. DATE): 4/24 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
220 / 220	22.C	☐ WITHIN RANGE	1410
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
8.61 / 8.61	22.	☐ WITHIN RANGE	1410
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A9317 (EXP. DATE): 11/21 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0 / 0	/	☑ WITHIN RANGE	1410
200 / 200	/	☑ WITHIN RANGE	1410
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

☐ AUTOCAL SOLUTION
(LOT #):
(EXP. DATE):

☑ STANDARD SOLUTION (S)
LIST LOT NUMBERS AND EXPIRATION DATES UNDER CALIBRATION CHECK

CALIBRATED PARAMETERS		CALIBRATION RANGES [1]	
☐	pH	pH:	+/- 0.2 S.U.
☐	COND	COND:	+/- 1% OF CAL. STANDARD
☐	ORP	ORP:	+/- 25 mV
☐	D.O.	D.O.:	VARIES
☐	TURB	TURB:	+/- 5% OF CAL. STANDARD
☐	_____	[1] CALIBRATION RANGES ARE SPECIFIC TO THE MODEL OF THE WATER QUALITY METER	
☐	_____		

NOTES

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

SIGNED 3/5/21 DATE

CHECKED BY 3/8/21 DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Compliance	MODEL:	PIODSS	SAMPLER:	KR, JJ
PROJECT NO.:	418425.0001.0000	SERIAL #:	TRC A2	DATE:	3/02/2021

PH CALIBRATION CHECK

pH 7 (LOT #): OGA311 (EXP. DATE): Jan 22 — POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): OG1001 (EXP. DATE): Sept / 22 — POST-CAL. READING / STANDARD	CAL. RANGE	TIME
7.00 / 7.00	4.00 / 4.01	☑ WITHIN RANGE	9:05am
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): OGJ972 (EXP. DATE): Oct / 21 — POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1413	15.3°	☑ WITHIN RANGE	8:56am
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 19H1607560 (EXP. DATE): 9/23/23 — POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
264.0 / 264.1	~20.5°	☑ WITHIN RANGE	9:12am
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING — POST-CAL. READING / SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
8.00 / 8.50	0.1°	☑ WITHIN RANGE	9:25am
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): (EXP. DATE): — POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): — POST-CAL. READING / STANDARD	CAL. RANGE	TIME
9.21 / 10.0	/	☑ WITHIN RANGE	9:05am
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

☐ AUTOCAL SOLUTION (LOT #): (EXP. DATE):

☑ STANDARD SOLUTION (S) — LIST LOT NUMBERS AND EXPIRATION DATES UNDER CALIBRATION CHECK

CALIBRATED PARAMETERS	CALIBRATION RANGES [1]	
☐ pH	pH:	+/- 0.2 S.U.
☐ COND	COND:	+/- 1% OF CAL. STANDARD
☐ ORP	ORP:	+/- 25 mV
☐ D.O.	D.O.:	VARIES
☐ TURB	TURB:	+/- 5% OF CAL. STANDARD
☐ _____	[1] CALIBRATION RANGES ARE SPECIFIC TO THE MODEL OF THE WATER QUALITY METER	
☐ _____		

NOTES

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

Katy Remunga 3/02/2021
SIGNED DATE

CHECKED BY 3/8/21
DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Compliance	MODEL:	YSI Pro DSS	SAMPLER:	KR, JJ
PROJECT NO.:	418425.0001.0000	SERIAL #:	TRC A2	DATE:	3/3/2021

PH CALIBRATION CHECK

pH 7 (LOT #): OGA811 (EXP. DATE): Jan-22 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): OG1001 (EXP. DATE): Sept-22 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
7.00 / 7.00	4.00 / 4.00	☒ WITHIN RANGE	7:30am
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): OGJ972 (EXP. DATE): Oct/21 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1413	18°C	☒ WITHIN RANGE	7:40 am
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 18H1007560 (EXP. DATE): 8/23/23 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
389.0 / 389.0	18°C	☒ WITHIN RANGE	7:45am
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
4.0 / 4.0	18°C	☒ WITHIN RANGE	7:55am
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A7107 (EXP. DATE): July-18 POST-CAL. READING / STANDARD	(LOT #): A7107 (EXP. DATE): July-18 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
failed 9.30 / 10.0	10.5 / 10.0	☒ WITHIN RANGE	8:05am
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

☐ AUTOCAL SOLUTION (LOT #): (EXP. DATE):	☑ STANDARD SOLUTION (S) LIST LOT NUMBERS AND EXPIRATION DATES UNDER CALIBRATION CHECK
CALIBRATED PARAMETERS	CALIBRATION RANGES [1]
☐ pH	pH: +/- 0.2 S.U.
☐ COND	COND: +/- 1% OF CAL. STANDARD
☐ ORP	ORP: +/- 25 mV
☐ D.O.	D.O.: VARIES
☐ TURB	TURB: +/- 5% OF CAL. STANDARD
☐ _____	[1] CALIBRATION RANGES ARE SPECIFIC TO THE MODEL OF THE WATER QUALITY METER
☐ _____	

NOTES

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

Katy Remynga 3/3/2021
SIGNED DATE

CHECKED BY 3/8/21
DATE

TRC

KLI / BAP

WATER LEVEL DATA

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Compliance	DATE:	3/01/2021
PROJECT NUMBER:	418425.0001.0000	AUTHOR:	Katy Reminga, Javier Jasso

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
DE Karn Bottom Ash Pond						
DEK-MW-15002	1:45pm		5.84	15.70		
DEK-MW-15004	8:50am		27.75	41.75		
DEK-MW-15005	9:11am		8.70	22.35		
DEK-MW-15006	9:20am		8.00	21.50		
DE Karn Bottom Ash Pond and Lined Impoundment			8.23	19.64		
DEK-MW-18001	2:00pm		[illegible]	[illegible]		
DEK-MW-15003	1:23pm		16.46	27.84		
Karn Lined Impoundment						
OW-10	1:20pm		5.96	18.00		
OW-11	8:30am		21.45	25.45		
OW-12	1:41pm		16.98	23.40		
Background						
MW-15002	* see Meadock Landfill					
MW-15008						
MW-15016						
MW-15019						

ALL WATER LEVELS MUST INCLUDE REFERENCE POINT AND TAPE CORRECTION FACTOR (E.G., 1.1 + 0.00 T/PVC).

Katy Reminga 3/1/2021
SIGNED DATE

CHECKED 3/8/21
DATE

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Karn LF: 2021 GW Comp	PREPARED	CHECKED
PROJECT NUMBER: 418425.0000.0000	BY: KR, JJ, (JK) DATE: 3/1/21	BY: KR DATE: 3/17/2021

SAMPLE ID: KLI - PCS — WELL DIAMETER: ~~2"~~ ☐ 4" ☐ 6" ☒ OTHER N/A

WELL MATERIAL: ~~PVC~~ ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☒ OTHER N/A

SAMPLE TYPE: ~~GW~~ ☐ WW ☒ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME:	DATE:

PURGE METHOD: ~~PUMP~~ ~~PERISTALTIC PUMP~~ ☒ BAILER

DEPTH TO WATER: N/A T/ PVC

DEPTH TO BOTTOM: N/A T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: N/A ☐ LITERS ☐ GALLONS

COLOR: ~~clear~~ light gray ODOR: none

TURBIDITY: ☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1030	DATE: 3/1/21

PH: 8.65 SU — CONDUCTIVITY: 959 umhos/cm

ORP: 269.6 mV — DO: 12.42 mg/L

TURBIDITY: 37.9 NTU

☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 14.7 °C — OTHER:

COLOR: ~~Orange~~ light gray — ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: — FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
									INITIAL

N/A surface water sample

Collected from surface water just East of KLI-SCS Sump

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	250mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	B	☐ Y ☒ N					☐ Y ☐ N
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: Fedex — DATE SHIPPED: 3/1/21 — AIRBILL NUMBER: —

COC NUMBER: — SIGNATURE: [signature] — DATE SIGNED: 3/8/21

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Karn LF: 2021 GW Comp	PREPARED	CHECKED
PROJECT NUMBER: 418425.0000.0000	BY: KR, JJ. DATE: 7/1/2021	BY: KR DATE: 3/17/2021

SAMPLE ID: SW-Ditch — WELL DIAMETER: ~~☑ 2"~~ ☐ 4" ☐ 6" ☒ OTHER N/A

WELL MATERIAL: ~~☑ PVC~~ ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☒ OTHER N/A

SAMPLE TYPE: ~~☑ GW~~ ☐ WW ☒ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: —	DATE: —

PURGE METHOD: ~~☑ PUMP~~ ~~PERISTALTIC PUMP~~ ☒ BAILER

DEPTH TO WATER: N/A T/ PVC

DEPTH TO BOTTOM N/A T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: N/A ☐ LITERS ☐ GALLONS

COLOR: clear ODOR: none

TURBIDITY: ☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1000	DATE: 3/1/21

PH: 8.26 SU — CONDUCTIVITY: 907 umhos/cm

ORP: 317.1 mV — DO: 8.14 mg/L

TURBIDITY: 19.1 NTU

☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 15.1 °C — OTHER:

COLOR: clear — ODOR: none

FILTRATE (0.45 um) ☐ YES ☐ NO

FILTRATE COLOR: — FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
									INITIAL

N/A

Surface water sample

Lat: 43.64744444°N LONG: 83.83752060°W

horizontal error: 8 inches

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	250mL	plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	B	☐ Y ☒ N					☐ Y ☐ N
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: Fedex	DATE SHIPPED: 3/3/21	AIRBILL NUMBER: —
COC NUMBER: —	SIGNATURE:	DATE SIGNED: 3/8/21

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: KR, JJ	DATE: 3/1/2021	BY: JK	DATE: 3/3/21

SAMPLE ID: ~~MW-15002~~ DEK-MW-15002 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 3:10pm	DATE: 3/1/2021

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 5.90 T/ PVC

DEPTH TO BOTTOM: 15.10 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 6 ☒ LITERS ☐ GALLONS

COLOR: cloudy ODOR: none

TURBIDITY: ☐ NONE ☑ SLIGHT ☒ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 4:05pm	DATE: 3/1/2021

PH: 7.51 SU | CONDUCTIVITY: 1228 umhos/cm

ORP: -30.2 mV | DO: 1.51 mg/L

TURBIDITY: 3.96 NTU

☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 7.2 °C | OTHER:

COLOR: clear | ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: none | FILTRATE ODOR: NA

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
3:35pm	200	6.98	1227	91.3	1.81	2.07	6.9	5.90	INITIAL
3:40pm		7.17	1223	21.2	1.59	22.1	7.3	5.90	1L
3:45pm		7.19	1223	13.90	1.56	[illegible]	7.4	5.90	2L
3:50pm		7.24	1223	-5.0	1.55	8.44	7.3	5.90	3L
3:55pm		7.29	1225	-20.1	1.53	5.47	7.2	5.90	4L
4:00pm		7.32	1230	-29.7	1.52	4.12	7.1	5.90	5L
4:05pm		7.31	1228	-30.2	1.51	3.96	7.2	5.90	6L

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	125	P	HNO3 (C)	☐ Y ☒ N					☐ Y ☐ N
2	[illegible]	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	3/3/2021	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:	Katy Reminga	DATE SIGNED:	3/3/2021

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: (KR) JJ	DATE: 3/2/2021	BY: JK	DATE: 3/8/21

SAMPLE ID: OW-10 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 12:45 pm	DATE: 3/2/2021	SAMPLE	TIME: 1:35 pm	DATE: 3/2/2021
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.03 SU	CONDUCTIVITY: ~~0.712~~ umhos/cm	
			ORP: -62.4 mV	DO: 0.97 mg/L	
DEPTH TO WATER: 6.10 T/ PVC			TURBIDITY: ~~107~~ NTU 21.1		
DEPTH TO BOTTOM: 18.0 T/ PVC			☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 16.1 °C	OTHER:	
VOLUME REMOVED: 10 ☒ LITERS ☐ GALLONS			COLOR: clear	ODOR: none	
COLOR: clear	ODOR: none		FILTRATE (0.45 um) ☐ YES ☒ NO		
TURBIDITY			FILTRATE COLOR: clear	FILTRATE ODOR:	
☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD ☒ DUP- KL1		
DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER			COMMENTS: multiply cond x1000 (umhos) units (JK)		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
12:45 pm	200	7.11	0.648	54.5	1.31	107	9.3 °C	6.10	INITIAL
12:50		6.89	0.698	36.1	1.11	149	9.8	6.10	1 L
12:55		6.94	0.709	18.0	1.06	122	9.8	6.10	2 L
1:00		6.98	0.711	-5.6	1.02	76.7	10.0	6.10	3 L
1:05		7.0	8.709	-21.3	1.00	45.6	10.2	6.10	4 L
1:10		7.02	0.707	-31.6	0.99	34.9	10.10	6.10	5 L
1:15		7.02	0.706	-41.4	0.98	28.4	10.10	6.10	6 L
1:20		7.04	0.710	-54.1	0.97	30.1	10.10	6.10	7 L
1:25		7.03	0.710	-58.9	0.97	22.8	10.10	6.10	8 L
1:30		7.03	0.712	-59.2	0.97	19.4	10.10	6.10	9 L
1:35		7.03	0.712	-62.4	0.97	21.1	10.10	6.10	10 L

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	250	P	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P	B	☐ Y ☒ N					☐ Y ☐ N
2	VO	VOA	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	3/3/2021	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:	Katy Reminga	DATE SIGNED:	3/03/2021

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED			CHECKED		
PROJECT NUMBER:	418425.0001.0000	BY:	(KR) JJ	DATE: 3/3/21	BY: SK	DATE: 3/8/21

SAMPLE ID: KLI - SCS | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 8:50am	DATE: 3/3/21	SAMPLE	TIME: 0850	DATE: 3/3/21
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.75 SU	CONDUCTIVITY: 1,412 umhos/cm	
			ORP: 164.7 mV	DO: 4.10 mg/L	
DEPTH TO WATER: NA T/ PVC			TURBIDITY: 34.5 NTU		
DEPTH TO BOTTOM: NA T/ PVC			☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 8.2 °C	OTHER:	
VOLUME REMOVED: NA ☐ LITERS ☐ GALLONS			COLOR: clear	ODOR: none	
COLOR: clear	ODOR: none		FILTRATE (0.45 um) ☐ YES ☒ NO		
TURBIDITY ☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY			FILTRATE COLOR: NA	FILTRATE ODOR: NA	
			QC SAMPLE: ☐ MS/MSD ☐ DUP-		
DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER			COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
8:50am		7.75	1,412	164.7	4.10	34.5	8.2	—	INITIAL

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	125	P	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P	B	☐ Y ☒ N					☐ Y ☐ N
1	250	P	A	☐ Y ☒ N					☐ Y ☐ N
2	VOA	GO	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	3/3/2021	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:	Katy Remynga	DATE SIGNED:	3/3/2021

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED			CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: KR, JJ	DATE: 3/2/2021	BY: SK	DATE: 3/8/21	

SAMPLE ID: OW-12 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 4:30	DATE: 3/2/2021	SAMPLE	TIME: 3/2/2021	DATE: 5:00 pm

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 16.95 T/ PVC

DEPTH TO BOTTOM: 23.45 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 6 ☒ LITERS ☐ GALLONS

COLOR: ~~cloudy~~ orange/cloudy ODOR: none

TURBIDITY (KR) (JJ first): ☐ NONE ☒ SLIGHT ☒ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

PH: 7.00 SU | CONDUCTIVITY: 0.675 umhos/cm

ORP: 67.5 mV | DO: 0.97 mg/L 675 (SR)

TURBIDITY: 9.83 NTU

☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 11.6 °C | OTHER:

COLOR: clear | ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: | FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS: Multiply cond x1000 (wrong unit)

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
4:30	200	6.92	0.688	28.0	2.18	215	11.6	16.95	INITIAL
4:35		6.98	0.687	-30.7	1.23	79.2	11.4	16.95	1 L
4:40		6.97	0.685	-37.4	1.17	50.7	11.4	16.95	2 L
4:45		6.98	0.683	-47.3	1.10	34.3	11.4	16.95	3 L
4:50		7.00	0.677	-64.0	0.98	14.6	11.5	16.95	4 L
4:55		7.00	0.675	-66.0	0.97	9.70	11.5	16.95	5 L
5:00		7.00	0.675	-67.5	0.97	9.83	11.6	16.95	6 L

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE (ml)	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	125	P	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P	B	☐ Y ☒ N					☐ Y ☐ N
1	250	P	A	☐ Y ☒ N					☐ Y ☐ N
2	60	VOA	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: Fedex	DATE SHIPPED: 3/3/2021	AIRBILL NUMBER:
COC NUMBER:	SIGNATURE: Katy Remiga	DATE SIGNED: 3/3/2021

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: (KR), JJ	DATE: 3/2/2021	BY: JK	DATE: 3/8/21

SAMPLE ID: OW - 11 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 3:07 pm	DATE: 3/2/2021	SAMPLE	TIME: 3:45 pm	DATE: 3/2/2021
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 9.13 SU	CONDUCTIVITY: ~~0.364~~ umhos/cm	364 (JK)
			ORP: 31.9 mV	DO: 1.15 mg/L	
DEPTH TO WATER: 22.5 T/ PVC			TURBIDITY: 8.94 NTU		
DEPTH TO BOTTOM: 25.45 T/ PVC			☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 10.3 °C	OTHER:	
VOLUME REMOVED: 16 ☒ LITERS ☐ GALLONS			COLOR: clear	ODOR: none	
COLOR: clear	ODOR: none		FILTRATE (0.45 um) ☐ YES ☒ NO		
TURBIDITY			FILTRATE COLOR:	FILTRATE ODOR:	
☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD ☐ DUP-		
DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER			COMMENTS: multiply cond x1000 (uwomy units)		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
3:15	200	9.06	0.370	32.2	2.02	148	10.2	22.5	INITIAL
3:20		9.14	0.368	33.0	1.54	151	10.2	22.5	1 L
3:25		9.14	0.366	33.7	1.30	78.7	10.2	22.5	2 L
3:30		9.14	0.364	32.8	1.23	33.8	10.2	22.5	3 L
3:35		9.14	0.364	32.2	1.18	21.3	10.2	22.5	4 L
3:40		9.14	0.361	32.1	1.15	12.9	10.4	22.5	5 L
3:45		9.13	0.364	31.9	1.15	8.94	10.3	22.5	6 L

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	125	P	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P	B	☐ Y ☒ N					☐ Y ☐ N
1	250	P	A	☐ Y ☒ N					☐ Y ☐ N
2	40ml	VOA	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	3/3/2021	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:	Kody Reminga	DATE SIGNED:	3/3/2021

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: (KR) JJ	DATE: 3/2/2021	BY: JK	DATE: 3/8/21

SAMPLE ID: DGK-MW-18001 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 9.50am	DATE: 3/2/2020	SAMPLE	TIME: 10:25am	DATE: 3/2/2021
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.03 SU	CONDUCTIVITY: ~~0.624~~ 629 umhos/cm	
			ORP: 49.70 mV	DO: 1.18 mg/L	
DEPTH TO WATER: 8.50 T/ PVC			TURBIDITY: 3.78 NTU		
DEPTH TO BOTTOM: 19.09 T/ PVC			☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 8.20 °C	OTHER:	
VOLUME REMOVED: 6 ☒ LITERS ☐ GALLONS			COLOR: clear	ODOR: none	
COLOR: clear	ODOR: none		FILTRATE (0.45 um) ☐ YES ☒ NO		
TURBIDITY ☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY			FILTRATE COLOR:	FILTRATE ODOR:	
			QC SAMPLE: ☒ MS/MSD ☐ DUP-		
DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER			COMMENTS: Multiply Cond x1000 (wrong units)		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
9:55am	200	6.79	0.629	125.3	1.71	11.1	7.5°C	8.50	INITIAL
10:00am		6.90	0.630	98.4	1.43	5.30	7.9°C	8.50	1L
10:05		6.96	0.629	78.5	1.31	5.82	7.90°C	8.5	2L
10:10		7.04	0.629	67.6	1.24	4.76	8.10°C	8.5	3L
10:15		7.03	0.629	57.9	1.20	4.67	8.20°C	8.5	4L
10:20		7.03	0.629	54.2	1.18	4.78	8.20°C	8.5	5L
10.25		7.03	0.629	49.70	1.18	3.78	8.20°C	8.5	6L

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	125	P	B	☐ Y ☒ N					☐ Y ☐ N
1	125	P	A	☐ Y ☐ N					☐ Y ☐ N
2	40	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	3/3/2021	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:	Katy Kemiga	DATE SIGNED:	3/2/2021

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: (KR, JJ)	DATE: 3/2/2021	BY: JK	DATE: 3/8/21

SAMPLE ID: DEK-MW-15003 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 11:28am	DATE: 3/2/2021	SAMPLE	TIME: 11:50am	DATE: 3/2/2021
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.82 SU	CONDUCTIVITY: ~~0.340~~ 340 umhos/cm	
			ORP: 25.5 mV	DO: 0.99 mg/L	
DEPTH TO WATER: 16.50 T/ PVC			TURBIDITY: 2.01 NTU		
DEPTH TO BOTTOM: 27.89 T/ PVC			☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 14.3 °C	OTHER:	
VOLUME REMOVED: 4 ☒ LITERS ☐ GALLONS			COLOR: clear	ODOR: none	
COLOR: clear	ODOR: none		FILTRATE (0.45 um) ☐ YES ☐ NO		
TURBIDITY ☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY			FILTRATE COLOR:	FILTRATE ODOR:	
			QC SAMPLE: ☐ MS/MSD	☐ DUP-	
DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER			COMMENTS: multiply cond x1000 (wrong units)		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
11:35	200	7.81	0.325	40.2	1.23	3.78	14.3	16.50	INITIAL
11:40		7.89	0.332	34.0	1.03	3.92	14.5	16.50	1 L
11:45		7.89	0.334	32.9	1.02	3.34	14.5	16.50	2 L
11:50		7.86	0.338	28.7	1.00	2.61	14.3	16.5	3 L
11:50		7.82	0.340	25.5	0.99	2.01	14.3	16.5	4 L

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	250	P	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P	B	☐ Y ☒ N					☐ Y ☐ N
2	60 ml	VOA	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	3/3/2020	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:	Katy Remynga	DATE SIGNED:	3/2/2021

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: KR, JJ	DATE: 3/5/21	BY: JK	DATE: 3/8/21

SAMPLE ID: DEK-MW 15005 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1430	DATE: 3/2/21	SAMPLE	TIME: 1450	DATE: 3/2/21
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.57 SU	CONDUCTIVITY: 1097 umhos/cm	
			ORP: -79.0 mV	DO: 2.03 mg/L	
DEPTH TO WATER: 10.60 T/ PVC			TURBIDITY: 1.11 NTU		
DEPTH TO BOTTOM: 22.35 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 8.4 °C	OTHER:	
VOLUME REMOVED: 3 ☐ LITERS ☐ GALLONS			COLOR: clear	ODOR: none	
COLOR: clear	ODOR: none		FILTRATE (0.45 um) ☐ YES ☐ NO		
TURBIDITY			FILTRATE COLOR:	FILTRATE ODOR:	
☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD	☒ DUP- 02	
DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER			COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1420	100	4.00	1160	-10.7	10.0	5.60	7.6	8.60	INITIAL
1425		7.63	1103	-52.0	2.63	2.30	7.8	8.70	.5
1430		7.61	1099	-44.5	2.30	2.50	7.8	8.72	1
1435		7.59	1099	-58.0	2.00	2.41	8.4	8.72	1.5
1440		7.58	1095	-78.8	2.00	1.48	8.5	8.72	2
1445		7.57	1087	-78.9	2.00	1.35	8.1	8.70	2.5
1450		7.57	1097	-79.0	2.03	1.15	8.4	8.72	3

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	125	PWA	A	☐ Y ☑ N					☐ Y ☐ N
2	125	PI	A	☐ Y ☑ N					☐ Y ☐ N
2	125	PI	B	☐ Y ☑ N					☐ Y ☐ N
2	250	PI	D	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	FedEx	DATE SHIPPED:	3/3/21	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	3/5/21

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: KR, JJ	DATE: 3/5/21	BY: JK	DATE: 3/8/21

SAMPLE ID: DUPKMW-15006 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1511	DATE: 3/2/21	SAMPLE	TIME: 1536	DATE: 3/2/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.55 SU	CONDUCTIVITY: 1162	umhos/cm
			ORP: -70.3 mV	DO: 2.10	mg/L
DEPTH TO WATER:	8.61 T/ PVC		TURBIDITY: 2.95 NTU		
DEPTH TO BOTTOM:	21.50 T/ PVC		☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS		TEMPERATURE: 8.0 °C	OTHER:	
VOLUME REMOVED:	2.1 ☐ LITERS ☐ GALLONS		COLOR: clear	ODOR: none	
COLOR:	clear ODOR: none		FILTRATE (0.45 um) ☐ YES ☑ NO		
TURBIDITY			FILTRATE COLOR:	FILTRATE ODOR:	
☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD ☐ DUP-		
DISPOSAL METHOD:	☑ GROUND ☐ DRUM ☐ OTHER		COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1511	140	7.97	1247	-67.1	11.44	4.50	6.4	8.91	INITIAL
1516		7.67	1175	-72.1	2.69	2.82	7.5	8.95	1
1521		7.54	1145	-60.0	2.33	3.00	7.7	8.95	1
1526		7.55	1148	-69.8	2.15	3.15	7.8	8.95	1.5
1531		7.55	1160	-70.0	2.10	3.00	7.9	8.95	2
1536		7.55	1162	-70.3	2.10	2.95	8.0	8.95	2.5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	VOA	A	☐ Y ☑ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☐ N					☐ Y ☐ N
1	125	P1	B	☐ Y ☐ N					☐ Y ☐ N
1	250	DI	A	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	3/9/21	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	3/5/21

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: KR, JJ	DATE: 3/5/21	BY: JK	DATE: 3/8/21

SAMPLE ID: EKMW 150094	WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER	
WELL MATERIAL:	☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL	☐ OTHER
SAMPLE TYPE:	☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE	☐ OTHER

PURGING	TIME: 1552	DATE: 3/2/21	SAMPLE	TIME: 1620	DATE: 3/2/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP		PH: 7.43 SU	CONDUCTIVITY: 854	umhos/cm
	☐ BAILER		ORP: -170.7 mV	DO: 1.96	mg/L
DEPTH TO WATER: 27.65 T/ PVC			TURBIDITY: 1.71 NTU		
DEPTH TO BOTTOM: 41.75 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA	☐ LITERS ☐ GALLONS		TEMPERATURE: 11.5 °C	OTHER:	
VOLUME REMOVED: 6	☐ LITERS ☐ GALLONS		COLOR: clear	ODOR: non	
COLOR: Blackish	ODOR: non		FILTRATE (0.45 um) ☐ YES	☑ NO	
TURBIDITY			FILTRATE COLOR:	FILTRATE ODOR:	
☐ NONE ☐ SLIGHT ☐ MODERATE	☑ VERY		QC SAMPLE: ☐ MS/MSD	☐ DUP-	
DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER			COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1552	200	7.73	861	-71.12	11.02	130.0	8.4	27.51	INITIAL
1555		7.41	855	-97.0	2.54	68.2	11.4	27.72	1
1600		7.41	855	-120.0	2.10	10.0	11.7	27.72	2
1605		7.43	854	-130.0	2.00	6.0	11.3	27.72	3
1610		7.43	0852	-130.8	1.99	2.00	11.5	27.72	4
1615		7.43	0853	-130.5	1.98	1.90	11.6	27.72	5
1620		7.43	854	-130.7	1.96	1.71	11.5	27.72	6

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED		PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____							
NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	VOA	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PL	A	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: FedEx	DATE SHIPPED: 3/3/21	AIRBILL NUMBER: NA
COC NUMBER: NA	SIGNATURE:	DATE SIGNED: 3/5/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: KR, JJ	DATE: 3/1/21	BY: JK	DATE: 3/8/21

SAMPLE ID: FB#02 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME:	DATE:	SAMPLE	TIME: 1630	DATE: 3/2/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: _____ T/ PVC

DEPTH TO BOTTOM: _____ T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: _____ ☐ LITERS ☐ GALLONS

COLOR: _____ ODOR: _____

TURBIDITY

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

PH: NA SU | CONDUCTIVITY: NA umhos/cm

ORP: NA mV | DO: NA mg/L

TURBIDITY: NA NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: NA °C | OTHER: _____

COLOR: Clear | ODOR: None

FILTRATE (0.45 um) ☐ YES ☑ NO

FILTRATE COLOR: _____ | FILTRATE ODOR: _____

QC SAMPLE: ☐ MS/MSD ☐ DUP- _____

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
									INITIAL

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	1L	P	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	FedEx	DATE SHIPPED:	3/3/21	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	3/5/21

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

Consumers Energy

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251 • FAX (517) 788-2533

SAMPLING SITE: **DEK Bottom Ash Pond & LI – 2021 Q1**

PROJECT NUMBER: **21-0217**

SAMPLING TEAM: TRC – Katy + Javier

DATE SHIPPED: 3/3/2021

SITE SKETCHED ATTACHED? CIRCLE ONE: YES NO

Page 1 of 1

SEND REPORT TO: CDBatts

HD Register, TRC

PHONE:

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity					REMARKS
21-0217-01	3/2/2021	10:25am	GW	DEK-MW-15003		5	X	X	X	X					
-02	3/2/2021	10:25am	GW	DEK-MW-18001		5	X	X	X	X					
-03	3/2/2021	10:25am	GW	DEK-MW-18001 MS		4	X	X		X					
-04	3/2/2021	10:25am	GW	DEK-MW-18001 MSD		4	X	X		X					

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
Katy Remynga	3/3/2021	FedEx
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)
Fed Ex	3-4-2021 1130	Cecil Hansen

COMMENTS

3.6-5.2°C
#015402
ice

ORIGINAL TO LAB COPY TO CUSTOMER

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251 • FAX (517) 788-2533

SAMPLING SITE: **DEK Bottom Ash Pond – 2021 Q1**

PROJECT NUMBER: **21-0216**

SAMPLING TEAM:

DATE SHIPPED:

SITE SKETCHED ATTACHED? CIRCLE ONE: YES NO

Page 1 of 1

SEND REPORT TO: CDBatts

HD Register, TRC

PHONE:

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	ANALYSIS REQUESTED: Total Metals	Anions	TDS	Alkalinity					REMARKS
21-0216-01	3/1/2021	4:05 pm	GW	DEK-MW-15002		5	X	X	X	X					
-02	3/2/21	1420	GW	DEK-MW-15004		5	X	X	X	X					
-03	3/2/21	1450	GW	DEK-MW-15005		5	X	X	X	X					
-04	" "	1536	GW	DEK-MW-15006		5	X	X	X	X					
-05	3/2/21	—	W	DUP-DEK-BAP #02		5	X	X	X	X					
-06	" "	1630	W	FB-DEK-BAP		1	X								

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	COMMENTS
[signature]	3/3/21 1300	FedEx	23-5.3°C #015402 ice
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)	
FedEx	3-4-21 1130	[signature] Hansen	

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CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251 • FAX (517) 788-2533

SAMPLING SITE: **DEK Lined Impoundment – 2021 Q1**

PROJECT NUMBER: **21-0218**

SAMPLING TEAM: TRC - Katy + Javier

DATE SHIPPED: 3/3/2021

SITE SKETCHED ATTACHED? CIRCLE ONE: YES (NO)

Page 1 of 1

SEND REPORT TO: CDBatts

HD Register, TRC

PHONE

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity					REMARKS
21-0218-01	3/2/2021	1:35 pm	GW	OW-10		5	x	x	x	x					
-02	3/2/2021	3:45 pm	GW	OW-~~11~~12 3-4-2021		5	x	x	x	x					
-03	3/2/2021	5:00 pm	GW	OW-~~12~~13 3-4-2021		5	x	x	x	x					
-04	3/3/2021	8:50 am	GW	KLI-SCS		5	x	x	x	x					
-05	3/1/21	10:30 am	GW	KLI-PCS		5	x	x	x	x					
-06	3/1/21	10:00 am	GW	SW-DITCH		5	x	x	x	x					
-07	3/2/2021	--	GW	DUP-KLI		5	x	x	x	x					
-08	3/2/2021	1:35 pm	W	EB-KLI		1	x								
-09	3/2/2021	1:40 pm	W	FB-KLI		1	x								

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
Katy Kemingo	3/3/2021	Fedex
FedEx	3/4/2021 1130	Kelsey Hansen

COMMENTS: 3.6-5.2°C ice #015402

ORIGINAL TO LAB COPY TO CUSTOMER

Appendix C
Data Quality Reviews

Laboratory Data Quality Review
Groundwater Monitoring Event March 2021
DE Karn Bottom Ash Pond and Lined Impoundment

Groundwater samples were collected by TRC for the March 2021 sampling event. Samples were analyzed for total metals, anions, total dissolved solids, and alkalinity by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group 21-0217.

During the March 2021 sampling event, a groundwater sample was collected from each of the following wells:

- DEK-MW-15003
- DEK-MW-18001

Each sample was analyzed for one or more of 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
Alkalinity (Bicarbonate, Carbonate, and Total)	SM 2320B

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. 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, TDS, and alkalinity 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, and additional Part 115 constituents 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 metals, anions, and alkalinity. The recoveries were within the acceptance limits. Relative percent differences (RPDs) were not provided by the laboratory and therefore were not evaluated; further, 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 a sample from this data set.

Laboratory Data Quality Review
Groundwater Monitoring Event March 2021
DE Karn Lined Impoundment

Groundwater, water, and surface water samples were collected by TRC for the March 2021 sampling event. Samples were analyzed for total metals, anions, total dissolved solids, and alkalinity by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group 21-0218R.

During the March 2021 sampling event, a groundwater sample was collected from each of the following wells:

- OW-10
- OW-11
- OW-12

During the March 2021 sampling event, a water/surface water sample was collected from each of the following wells:

- KLI-SCS
- KLI-PCS
- SW-DITCH

Each sample was analyzed for one or more of 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
Alkalinity (Bicarbonate, Carbonate, and Total)	SM 2320B

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, TDS, and alkalinity 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, and additional Part 115 constituents will be utilized for the purposes of the detection monitoring program.
- Data are usable for the purposes of the detection monitoring program.
- When the data are evaluated through a detection or monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary:

- Mercury analysis was not initially performed by the laboratory as requested. The laboratory was requested to add mercury results to the laboratory report. Since the samples were analyzed past the method recommended hold time, the results have been flagged accordingly, as summarized in the attached table. Prior analyses at wells near the Karn Lined Impoundment have shown mercury is not present at concentrations above laboratory reporting limits, thus, the qualified non-detect results reported for this round do not adversely impact data usability.
- The metals container provided for sample DUP-KLI was received empty by the laboratory. The laboratory filled the preserved metals container with an unpreserved aliquot from the

anions container for this sample in order to create a preserved sample for metals analysis. The laboratory created this aliquot on 3/4/21 and did not prepare the sample for metals until 3/10/21; thus, there is no adverse impact on data usability since the sample was preserved more than 24 hours prior to preparation.

- One field blank (FB-KLI) and one equipment blank (EB-KLI) sample were collected. Target analytes were not detected in these blanks.
- MS and MSD analyses were not performed on a sample from this data set.
- The field duplicate pair samples were DUP-KLI and OW-10; relative percent differences (RPDs) between the parent and duplicate sample were within the QC limits with one exception.
    - The RPD for potassium (37.4%) was outside of the acceptance limits in the field duplicate pair. Potential uncertainty exists for potassium in groundwater samples OW-10, OW-11, OW-12, and DUP-KLI, as summarized in the attached table.
- Laboratory duplicate analyses were not performed on a sample from this data set.

Table 1
Summary of Data Non-Conformances for Groundwater Analytical Data
DE Karn Lined Impoundment – RCRA CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
OW-10	3/2/2021	Potassium	Field duplicate variability; potential uncertainty exists.
OW-11	3/2/2021		
OW-12	3/2/2021		
DUP-KLI	3/2/2021		
OW-10	3/2/2021	Mercury	Analyzed past the method recommended hold time, the results have been flagged accordingly; potential uncertainty exists.
OW-11	3/2/2021		
OW-12	3/2/2021		
KLI-SCS	3/3/2021		
KLI-PCS	3/1/2021		
SW-DITCH	3/1/2021		
DUP-KLI	3/2/2021		

Appendix D
Statistical Analysis

Appendix D
Statistical Summary for DE Karn Lined Impoundment
First Quarter 2021
Data from April 2019 to May 2021

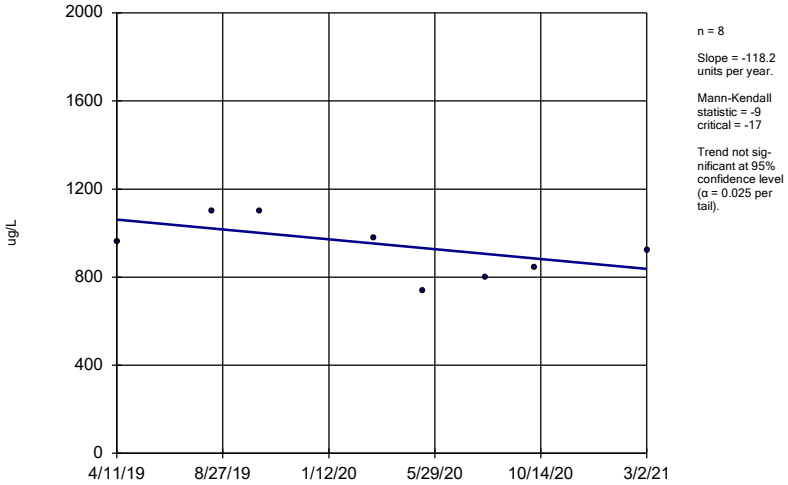
Karn Lined Impoundment Wells						
PARAMETER	**Range, Test, or Limit**	**DEK-MW-15003**	**DEK-MW-18001**	**OW-10**	**OW-11**	**OW-12**
Boron	Trend	O	O	O	↑*	O
Calcium	Trend	↓*	O	↑*	↓*	O
Chloride	Trend	O	O	O	O	O
Fluoride	Trend	O*	O	O*	↑*	O*
Iron	Trend	↓*	O	O	O	O
pH	Trend	O	O	O	↑*	O
Sulfate	Trend	O	↑*	O	O	O
Total Dissolved Solids	Trend	↓*	O	O	↓*	O

Notes:

O* = Non-detect
O = No trend
↑ = Upward trend, continuous
↑* = Upward trend, new
↑ = Upward trend, confirmed
↓ = Downward trend, continuous
↓* = Downward trend, new

Boron, Total

DEK-MW-15003



n = 8

Slope = -118.2 units per year.

Mann-Kendall statistic = -9 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

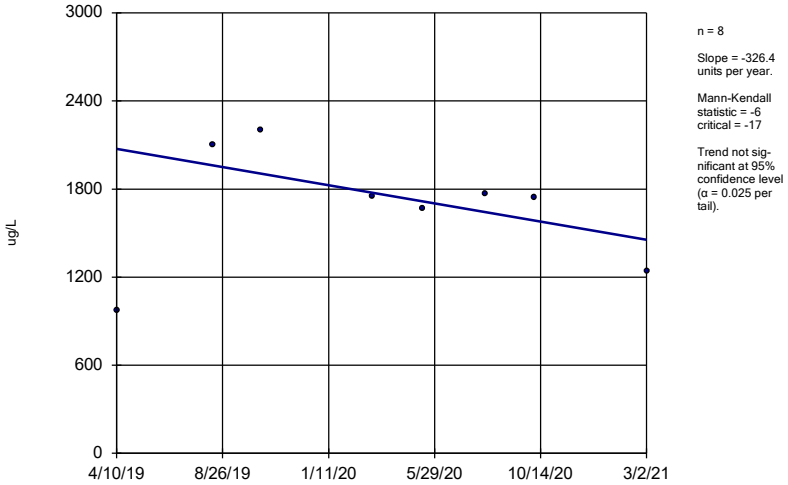
Sen's Slope Estimator Analysis Run 4/12/2021 4:22 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

DEK-MW-18001



n = 8

Slope = -326.4 units per year.

Mann-Kendall statistic = -6 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:22 PM

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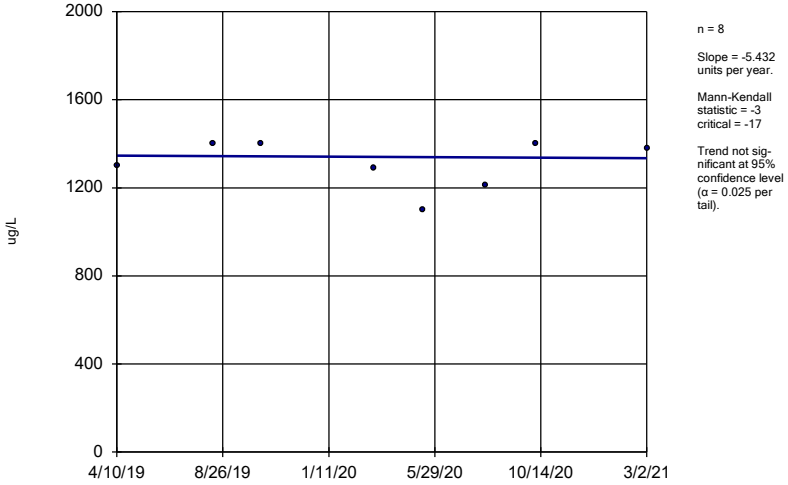
Boron, Total

OW-10



n = 8

Slope = -5.432 units per year.

Mann-Kendall statistic = -3 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:22 PM

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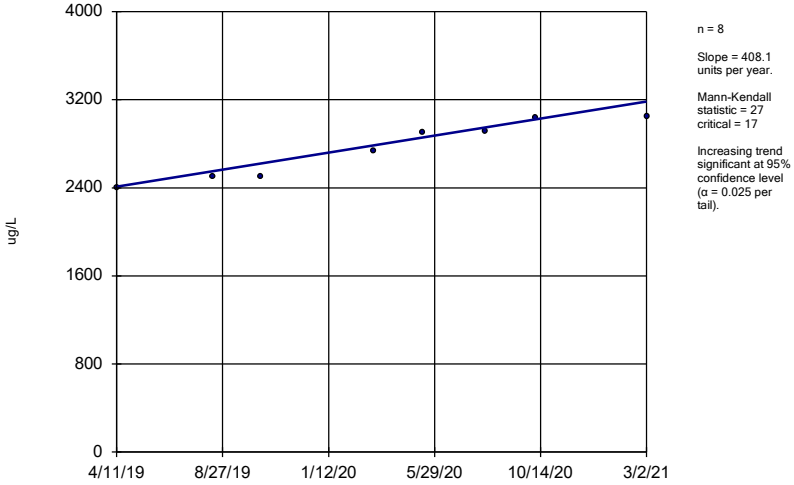
Boron, Total

OW-11



n = 8

Slope = 408.1 units per year.

Mann-Kendall statistic = 27 critical = 17

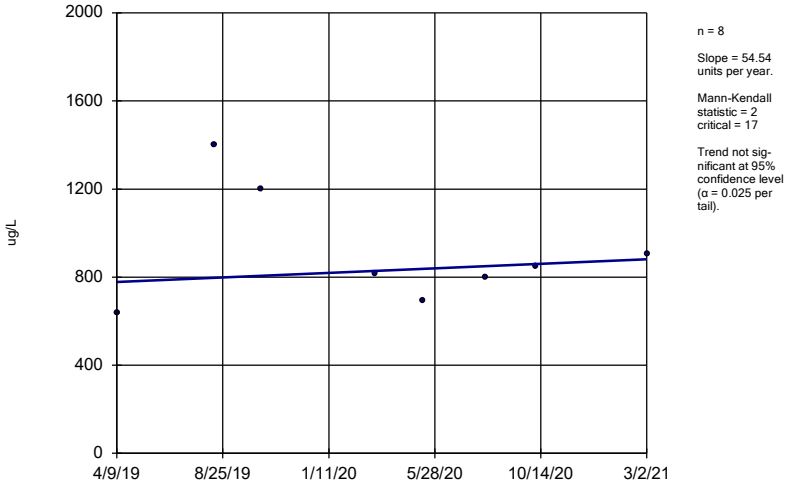
Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:22 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Boron, Total

OW-12



n = 8

Slope = 54.54 units per year.

Mann-Kendall statistic = 2 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:22 PM

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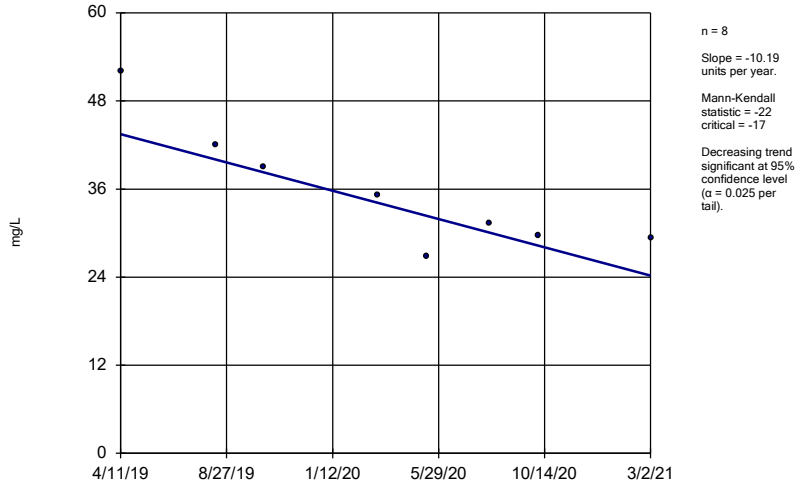
Calcium, Total

DEK-MW-15003



n = 8

Slope = -10.19 units per year.

Mann-Kendall statistic = -22 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

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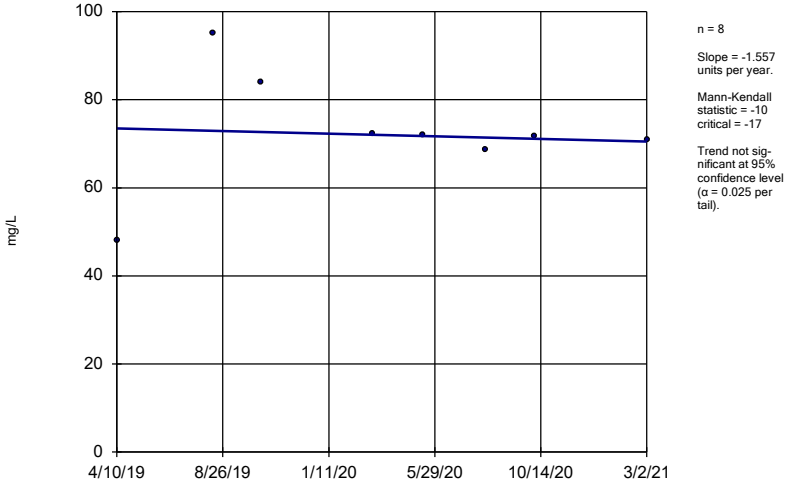
Calcium, Total

DEK-MW-18001



n = 8

Slope = -1.557 units per year.

Mann-Kendall statistic = -10 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

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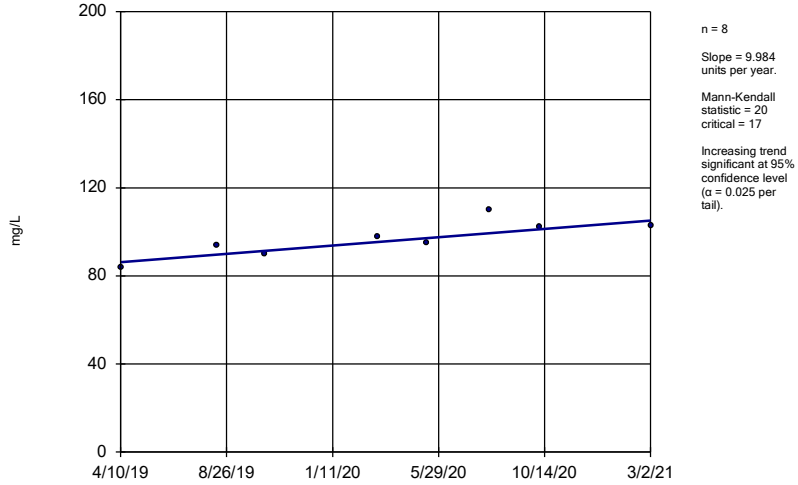
Calcium, Total

OW-10



n = 8

Slope = 9.984 units per year.

Mann-Kendall statistic = 20 critical = 17

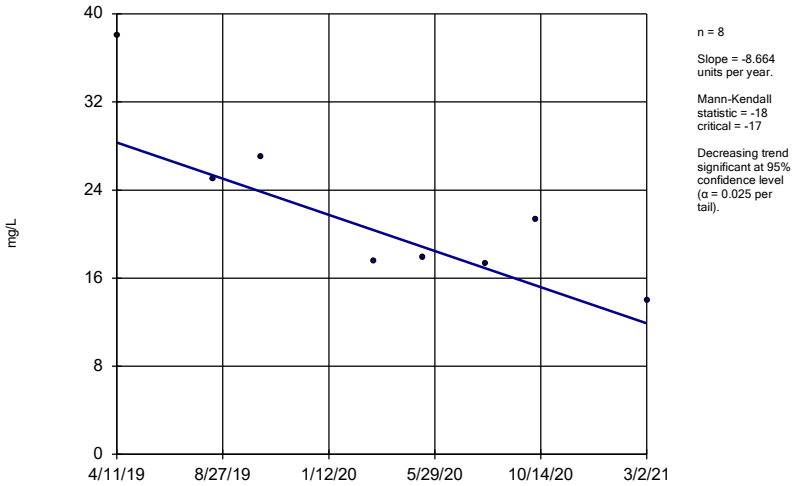
Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Calcium, Total

OW-11



n = 8

Slope = -8.664 units per year.

Mann-Kendall statistic = -18
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

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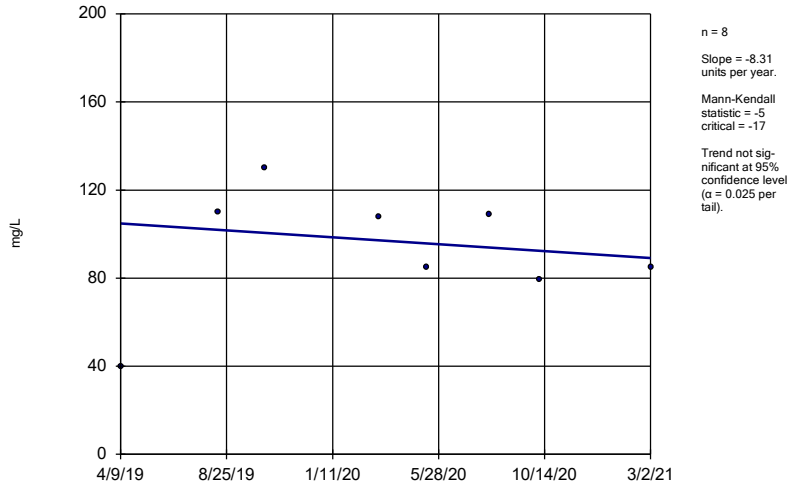
Calcium, Total

OW-12



n = 8

Slope = -8.31 units per year.

Mann-Kendall statistic = -5
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

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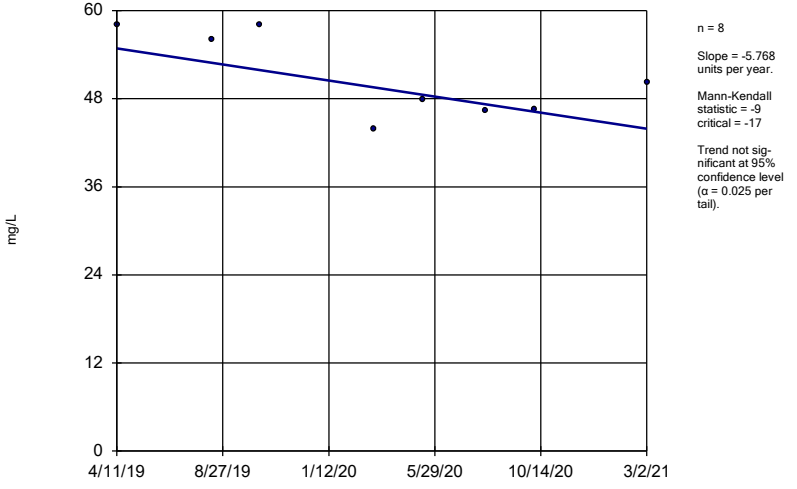
Chloride

DEK-MW-15003



n = 8

Slope = -5.768 units per year.

Mann-Kendall statistic = -9
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

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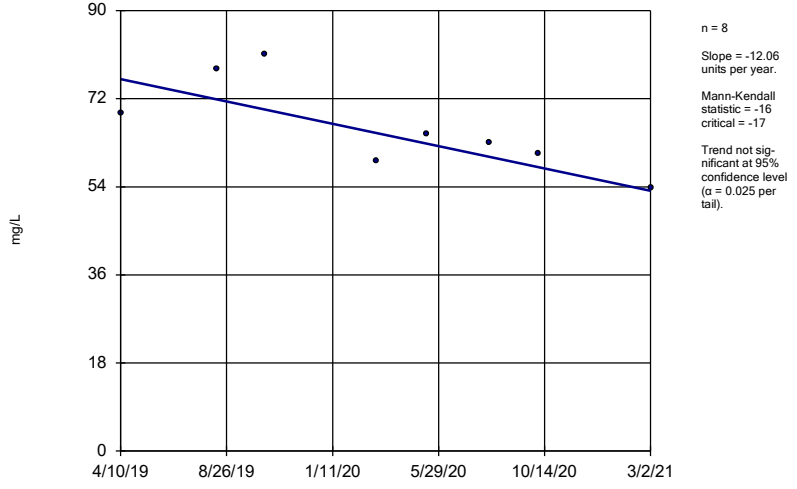
Chloride

DEK-MW-18001



n = 8

Slope = -12.06 units per year.

Mann-Kendall statistic = -16
critical = -17

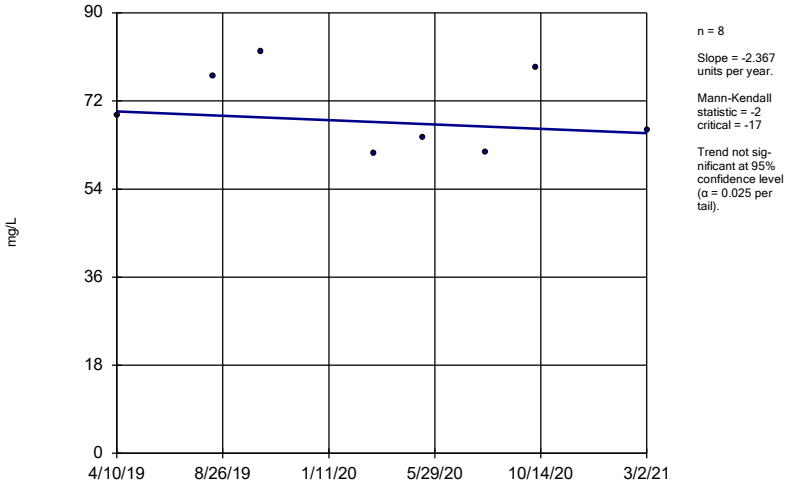
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Chloride

OW-10



n = 8

Slope = -2.367 units per year.

Mann-Kendall statistic = -2
critical = -17

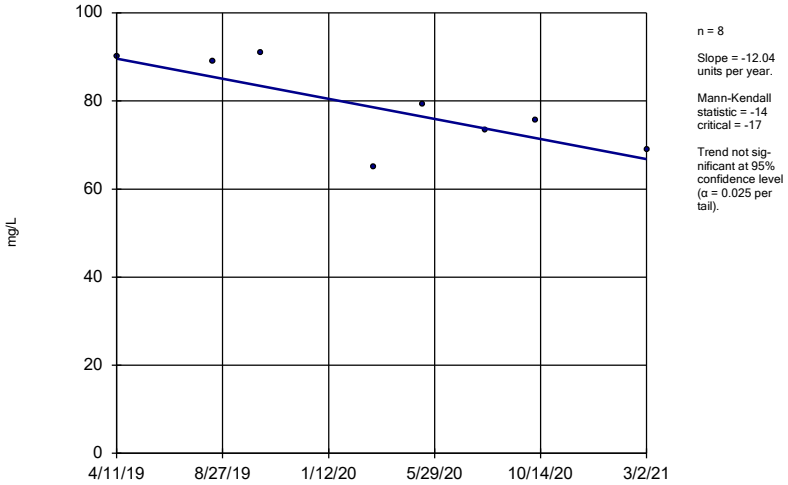
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Chloride

OW-11



n = 8

Slope = -12.04 units per year.

Mann-Kendall statistic = -14
critical = -17

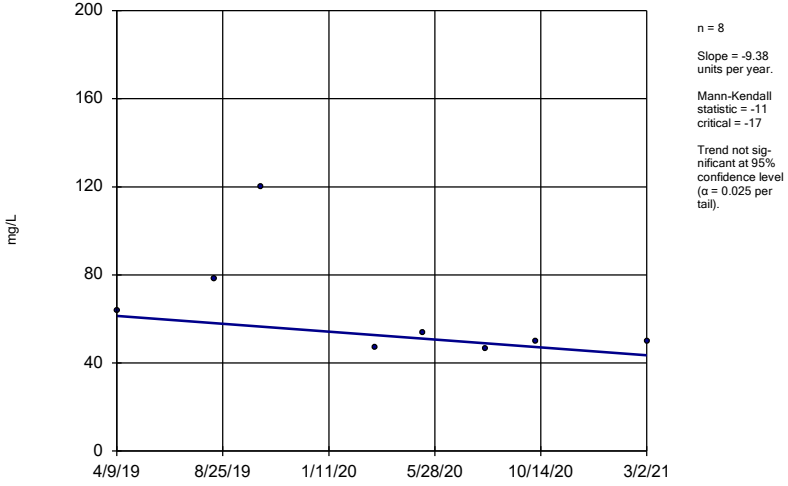
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Chloride

OW-12



n = 8

Slope = -9.38 units per year.

Mann-Kendall statistic = -11
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

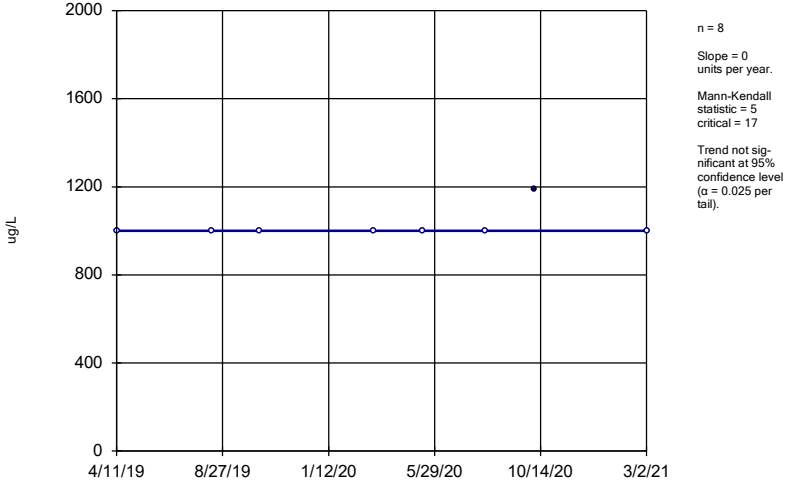
Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Hollow symbols indicate censored values.

Fluoride

DEK-MW-15003



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 5
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

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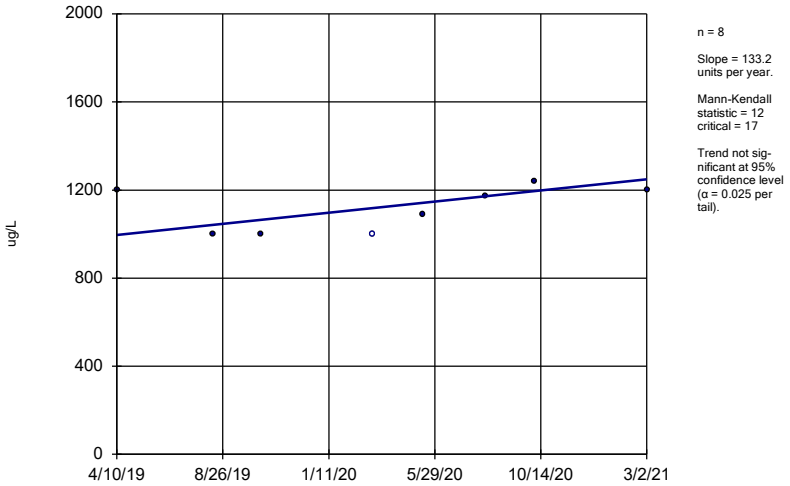
Fluoride

DEK-MW-18001



n = 8

Slope = 133.2 units per year.

Mann-Kendall statistic = 12
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

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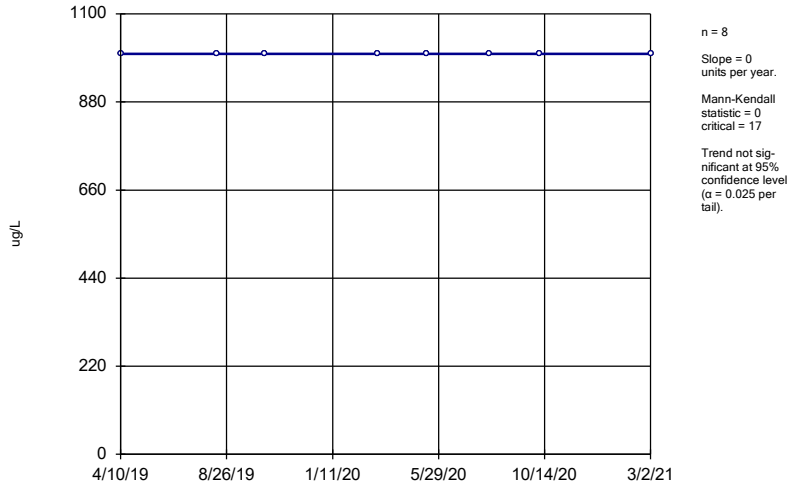
Hollow symbols indicate censored values.

Fluoride

OW-10



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

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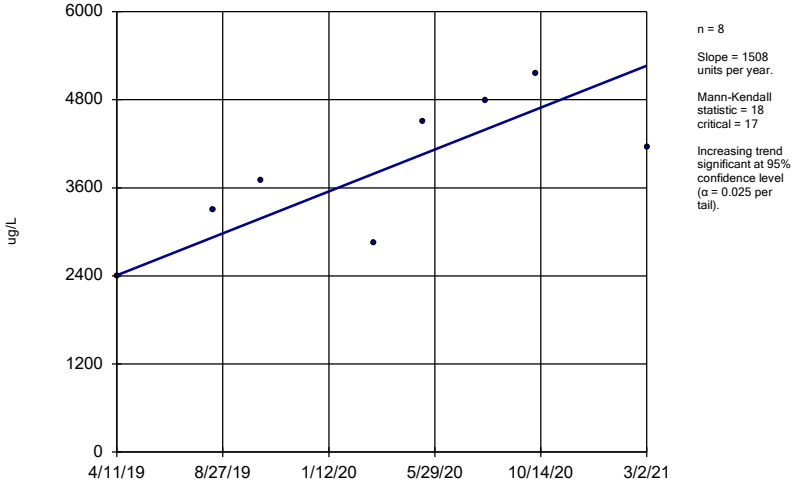
Fluoride

OW-11



n = 8

Slope = 1508 units per year.

Mann-Kendall statistic = 18
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

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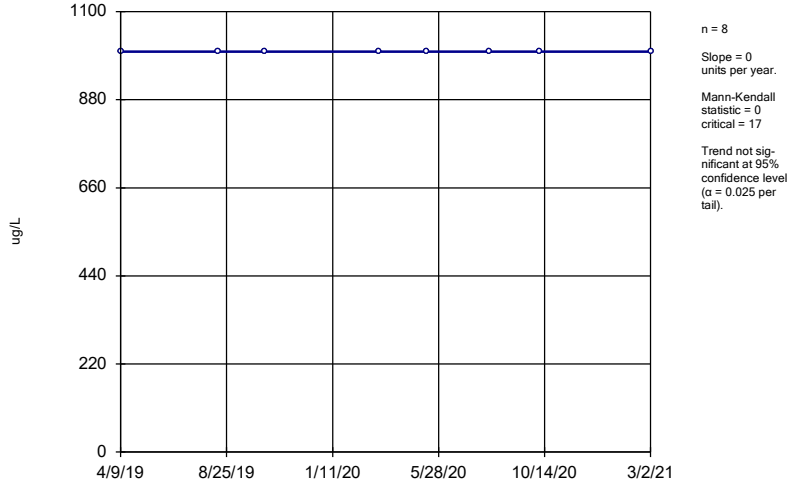
Hollow symbols indicate censored values.

Fluoride

OW-12



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0
critical = 17

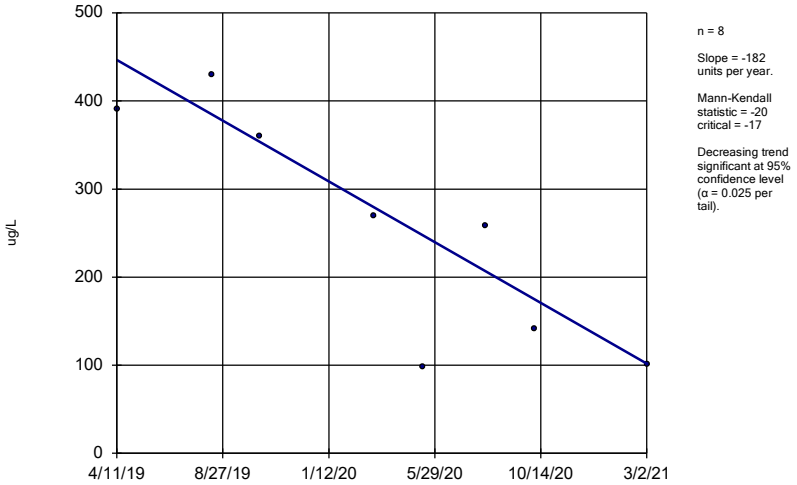
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Iron, Total

DEK-MW-15003



n = 8

Slope = -182 units per year.

Mann-Kendall statistic = -20 critical = -17

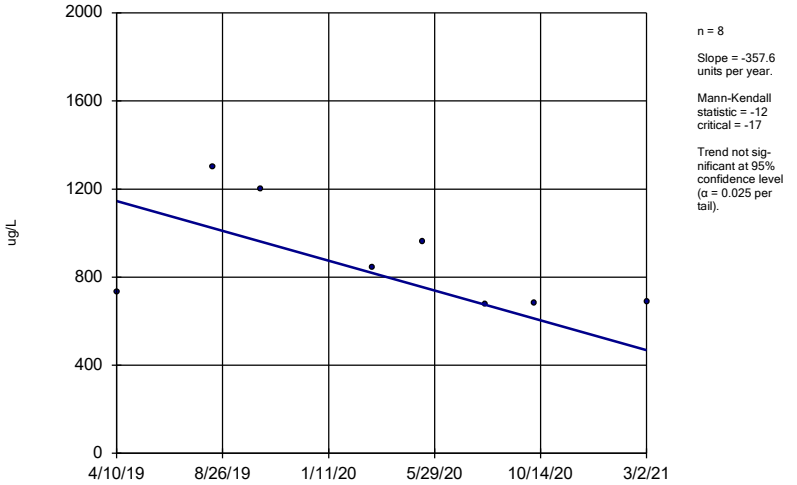
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Iron, Total

DEK-MW-18001



n = 8

Slope = -357.6 units per year.

Mann-Kendall statistic = -12 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

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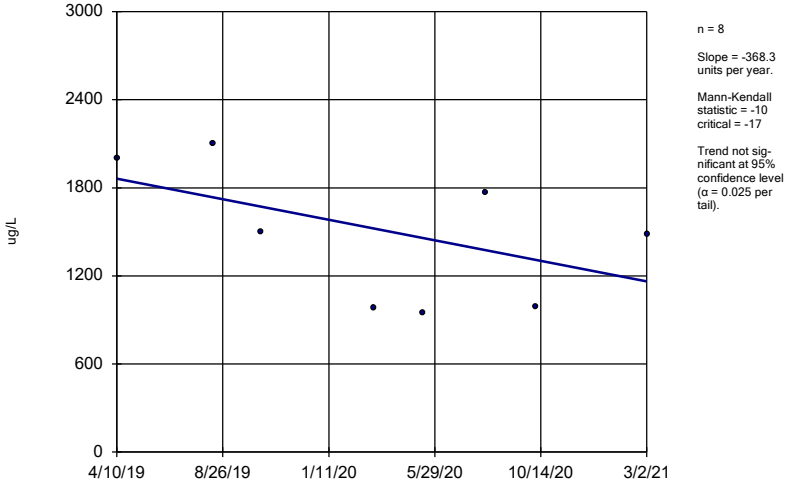
Iron, Total

OW-10



n = 8

Slope = -368.3 units per year.

Mann-Kendall statistic = -10 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

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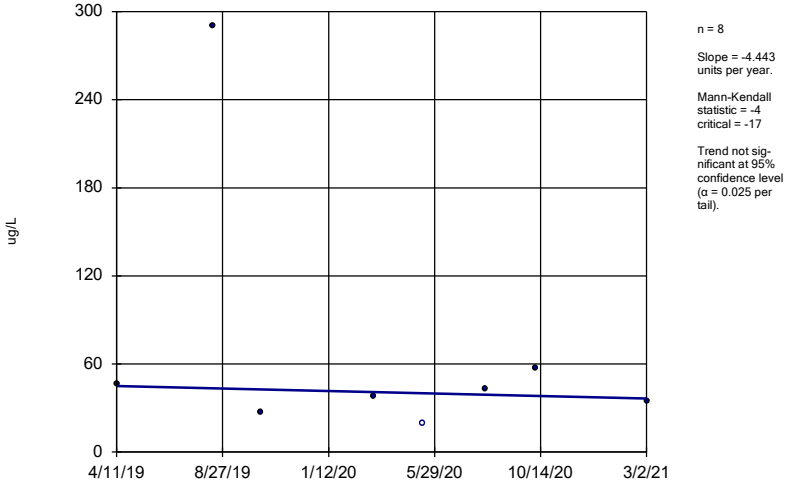
Hollow symbols indicate censored values.

Iron, Total

OW-11



n = 8

Slope = -4.443 units per year.

Mann-Kendall statistic = -4 critical = -17

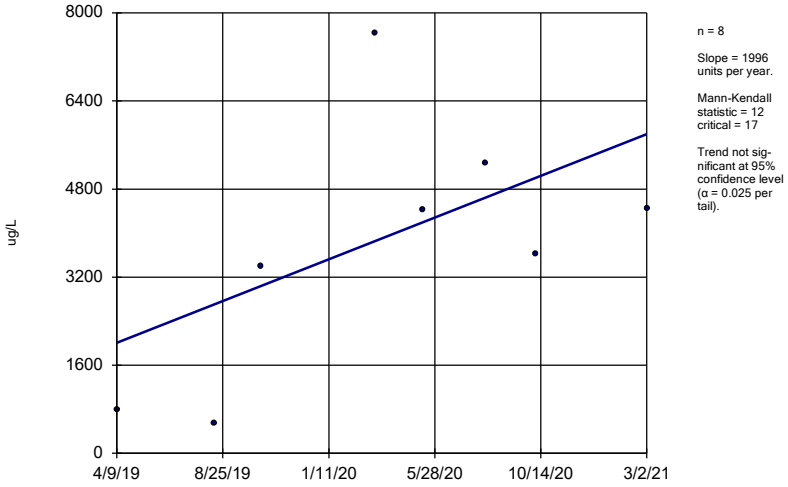
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Iron, Total

OW-12



n = 8

Slope = 1996 units per year.

Mann-Kendall statistic = 12
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

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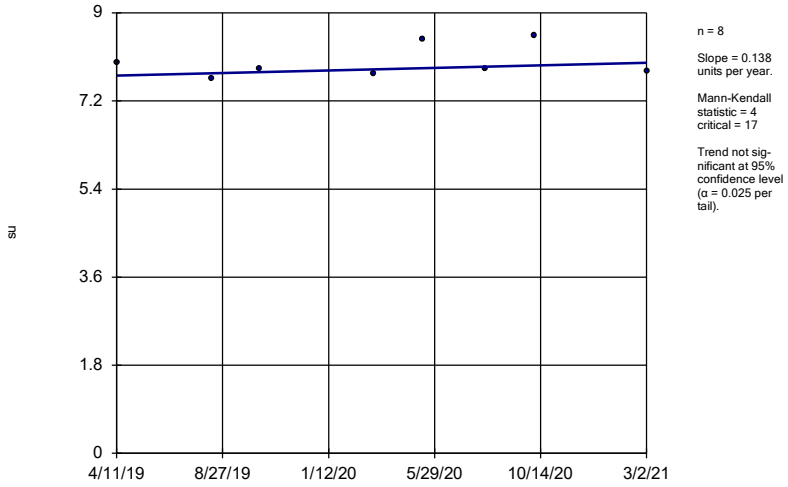
pH, Field

DEK-MW-15003



n = 8

Slope = 0.138 units per year.

Mann-Kendall statistic = 4
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

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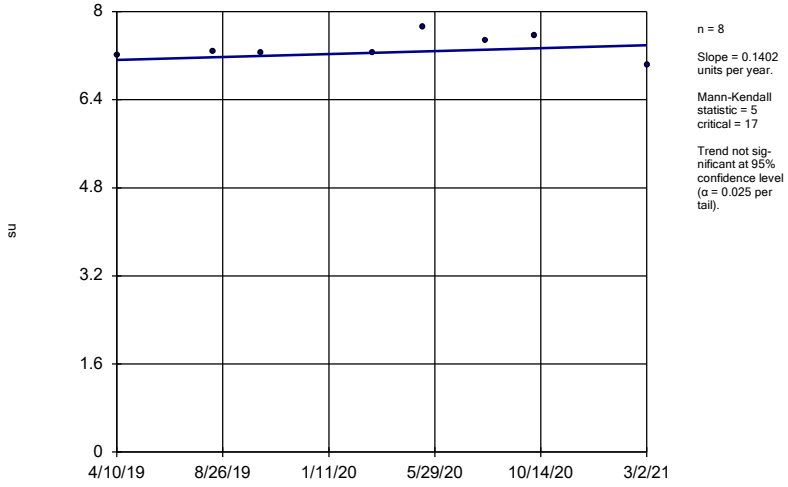
pH, Field

DEK-MW-18001



n = 8

Slope = 0.1402 units per year.

Mann-Kendall statistic = 5
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

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Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

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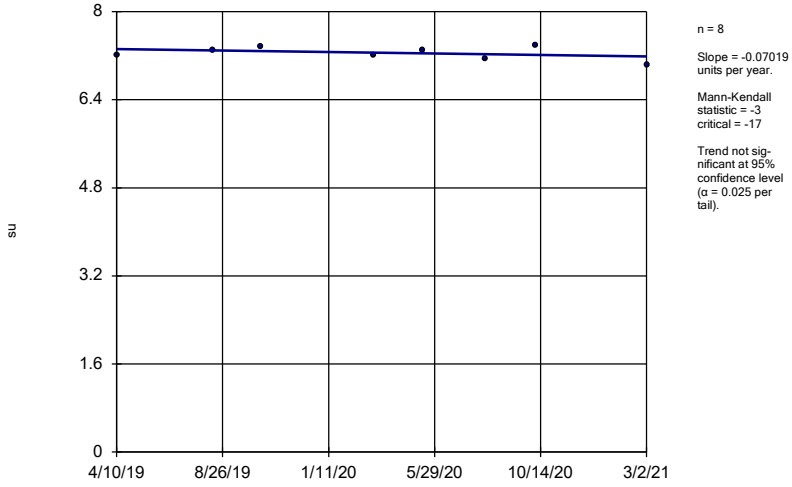
pH, Field

OW-10



n = 8

Slope = -0.07019 units per year.

Mann-Kendall statistic = -3
critical = -17

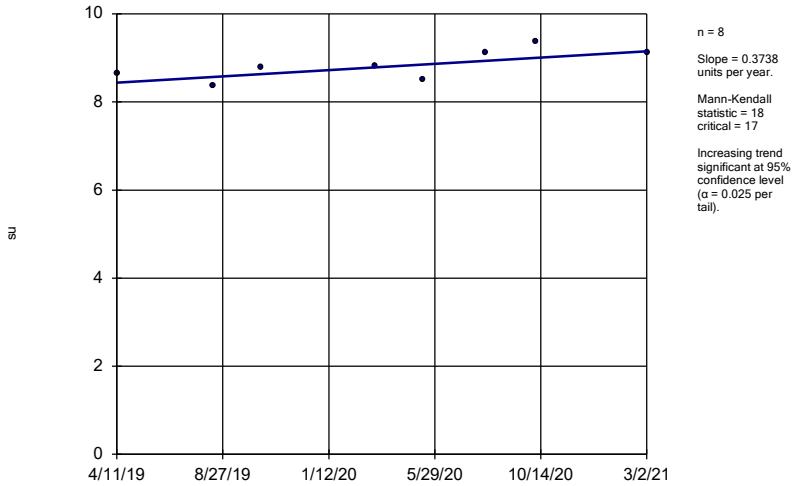
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

pH, Field

OW-11



n = 8

Slope = 0.3738 units per year.

Mann-Kendall statistic = 18
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

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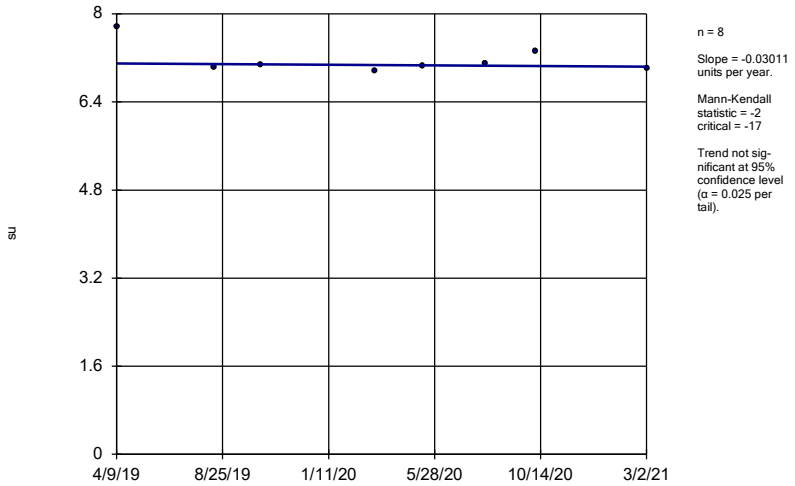
pH, Field

OW-12



n = 8

Slope = -0.03011 units per year.

Mann-Kendall statistic = -2
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

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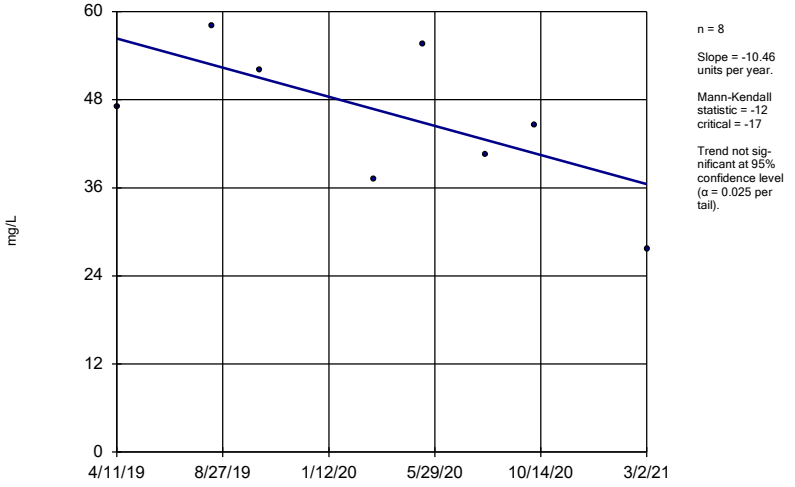
Sulfate

DEK-MW-15003



n = 8

Slope = -10.46 units per year.

Mann-Kendall statistic = -12
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

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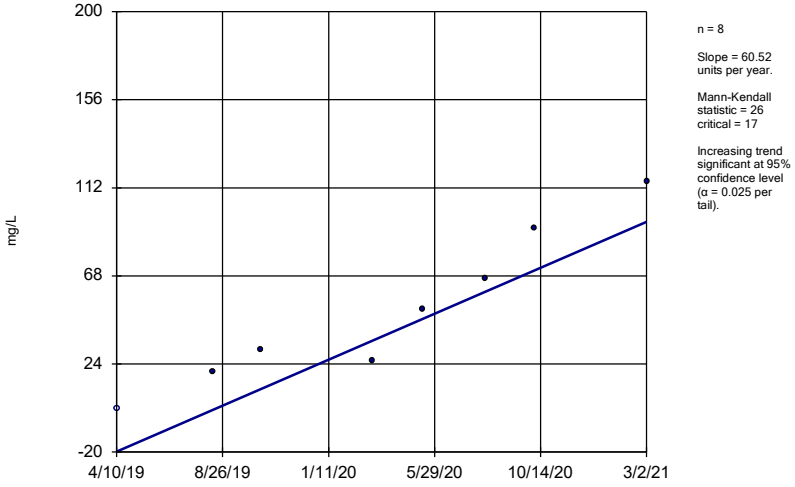
Hollow symbols indicate censored values.

Sulfate

DEK-MW-18001



n = 8

Slope = 60.52 units per year.

Mann-Kendall statistic = 26
critical = 17

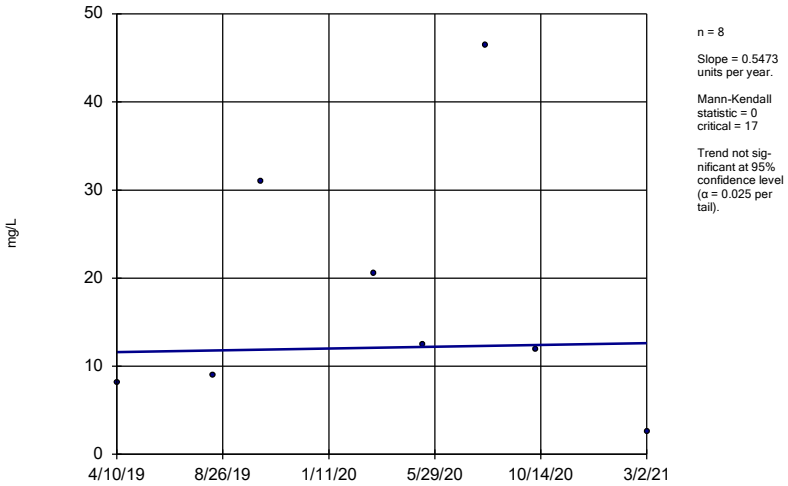
Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Sulfate

OW-10



n = 8

Slope = 0.5473 units per year.

Mann-Kendall statistic = 0
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

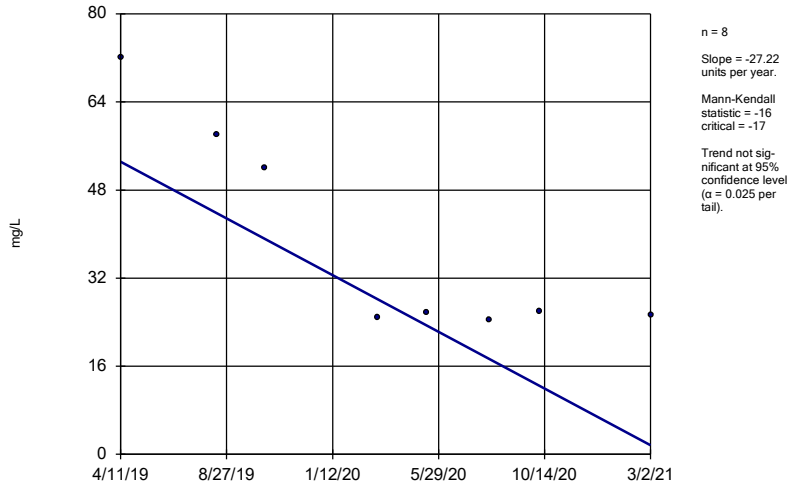
Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Sulfate

OW-11



n = 8

Slope = -27.22 units per year.

Mann-Kendall statistic = -16
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

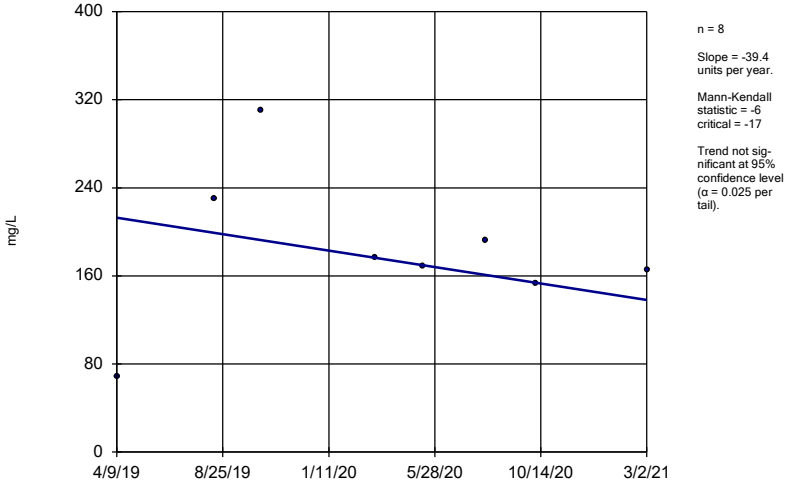
Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Sulfate

OW-12



n = 8

Slope = -39.4 units per year.

Mann-Kendall statistic = -6
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

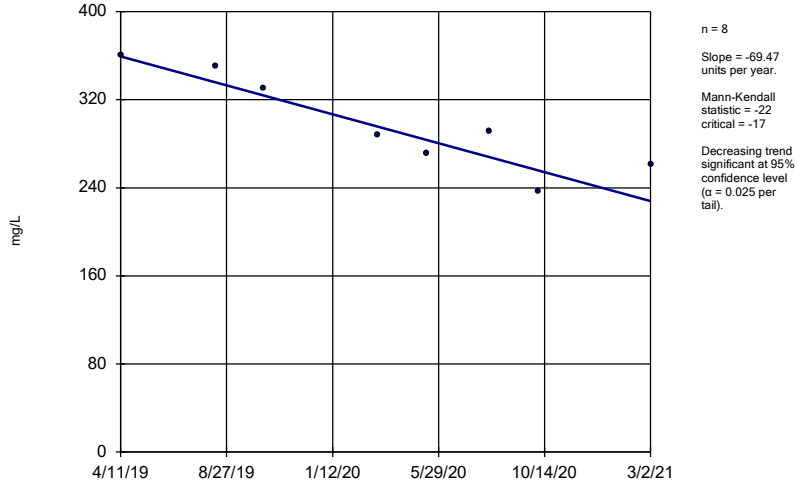
Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

DEK-MW-15003



n = 8

Slope = -69.47 units per year.

Mann-Kendall statistic = -22
critical = -17

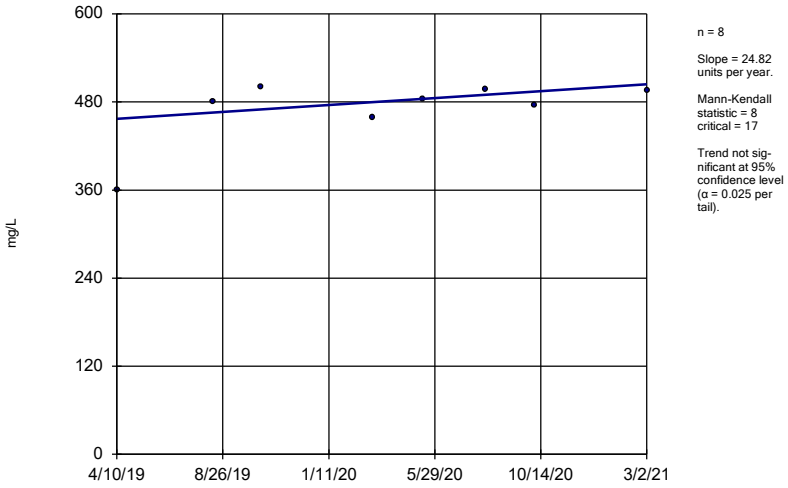
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Total Dissolved Solids

DEK-MW-18001



n = 8

Slope = 24.82 units per year.

Mann-Kendall statistic = 8
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

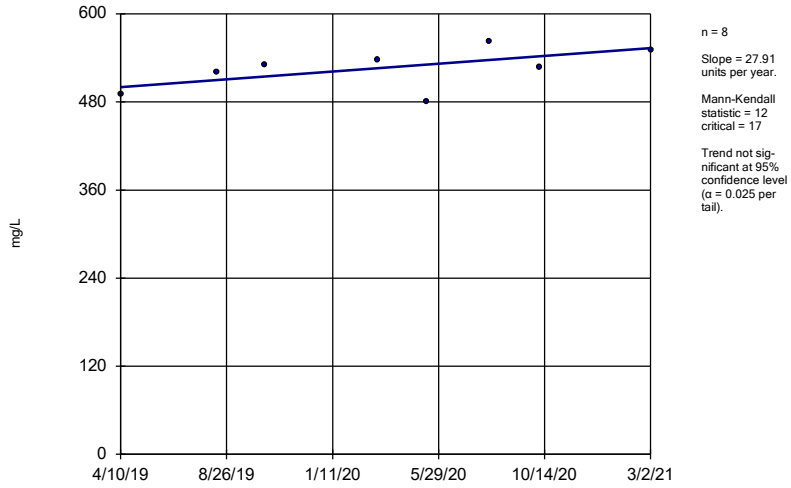
Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

OW-10



n = 8

Slope = 27.91 units per year.

Mann-Kendall statistic = 12
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

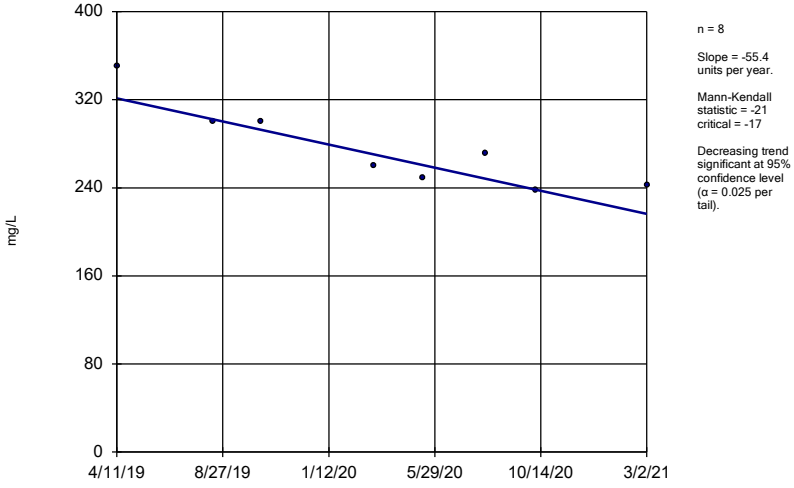
Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

OW-11



n = 8

Slope = -55.4 units per year.

Mann-Kendall statistic = -21
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

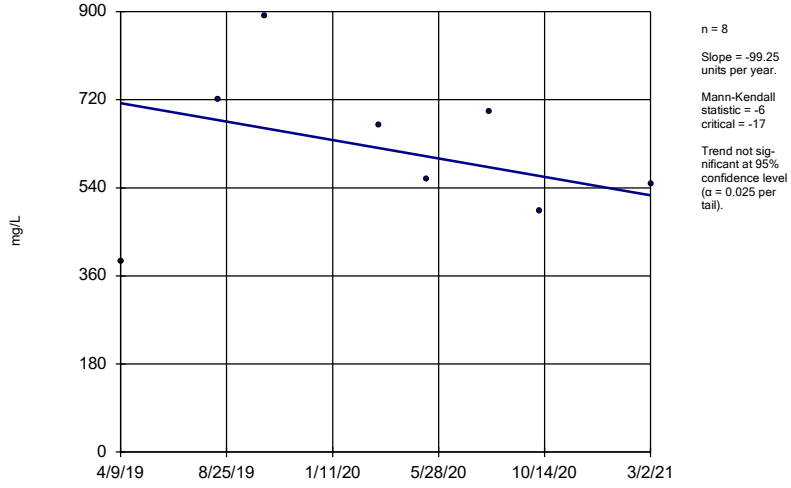
Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

OW-12



n = 8

Slope = -99.25 units per year.

Mann-Kendall statistic = -6
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:23 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q1.NE - Copy

Appendix E
Secondary Leachate Collection System Monitoring

April 30, 2021 ***TRANSMITTAL VIA EMAIL 04/30/2021***

Mr. Phil Roycraft
Michigan Department of Environment, Great Lakes, and Energy
Materials Management Division
Saginaw Bay District Office
401 Ketchum St, Suite B
Bay City, Michigan 48708

WRITTEN ASSESSMENT DETERMINATION AND RESULTS SUMMARY OF REMEDIAL ACTIONS TAKEN AND PLANNED FOR SECONDARY COLLECTION SYSTEM OF DE KARN LINED IMPOUNDMENT, ESSEXVILLE, MICHIGAN; WASTE DATA SYSTEM NUMBER 392503

Dear Mr. Roycraft,

This letter report serves as the first written assessment and summary of remedial actions taken and planned for the Karn Lined Impoundment Secondary Collection System following the submittal of a preliminary written assessment to Michigan Department of Environment, Great Lakes, and Energy (EGLE) on January 22, 2021. An evaluation of the chemical characteristics of the leak detection system required under Rule 437(6) of constituents monitored under the approved Hydrogeological Monitoring Plan (HMP) is summarized in this report but further characterized and discussed in the first quarter 2021 monitoring report submitted under a separate cover under April 30, 2021. A summary of the results of remedial actions taken and planned as requested in the EGLE letter dated February 23, 2021 is provided below as developed from investigation findings.

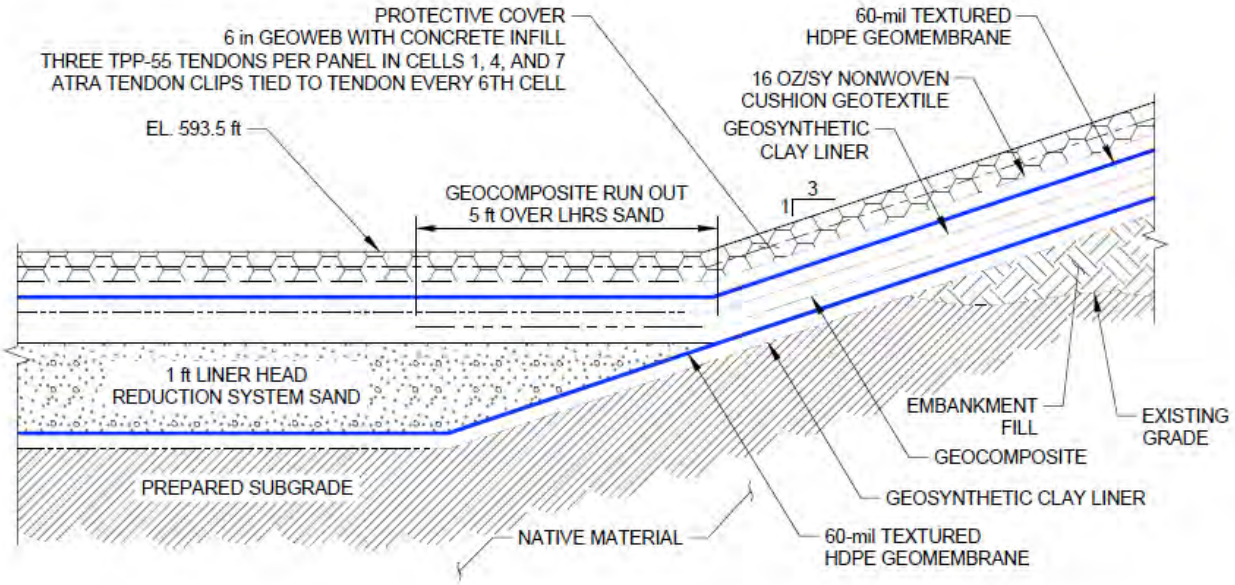
SUMMARY OF INVESTIGATIONS PERFORMED

Leak Detection Test – A leak detection survey for the primary liner system by Leak Location Services, Inc. conducted on January 13, 2021 (Attachment A) did not find any leaks in the primary geomembrane. The report results were limited to the eastern segment of the impoundment within 30-feet of the of the concrete-lined area (loading area for bottom ash). The visual limits of the survey would be limited to within 30-feet of the constructed bottom ash berm (Attachment B, Picture 01) demarking the approximate limits of bottom ash settling available for collection prior to the flow path basin enlarging for secondary settling in the primary settling basin.

Visual Observation Point #1 (VOP-1) – Following the leak detection survey, a detailed inspection of the ash loading area by plant staff yielded visual identification of damage to the liner system on January 21, 2021 at the point where the bottom ash sluice water is first discharged into the

primary basin (Attachment B, Picture 02). The size of the damaged area was determined to be approximately four inches in diameter (Attachment B, Picture 03). At the time of discovery, this location seemed to be the most likely source of the increasing weekly volume of liquids removed from the secondary collection system starting on December 10, 2020.

The damage to the geomembrane and concrete in this location was determined to be due to erosion from the discharge of bottom ash into the pond. This area of the bottom ash pond liner system was reinforced during construction by overlying the primary geomembrane consisting of a cellular confinement system (Geocell) with concrete infill to at least 6-inch to protect the primary liner system from the operation of heavy equipment necessary to excavate and stage bottom ash prior to hauling to the Weadock Landfill. Other components of the primary and secondary liner system at this location are depicted in Drawing Detail 2, Drawing 1278, Sheet 123 (Golder, 2020) – figure depicted below.

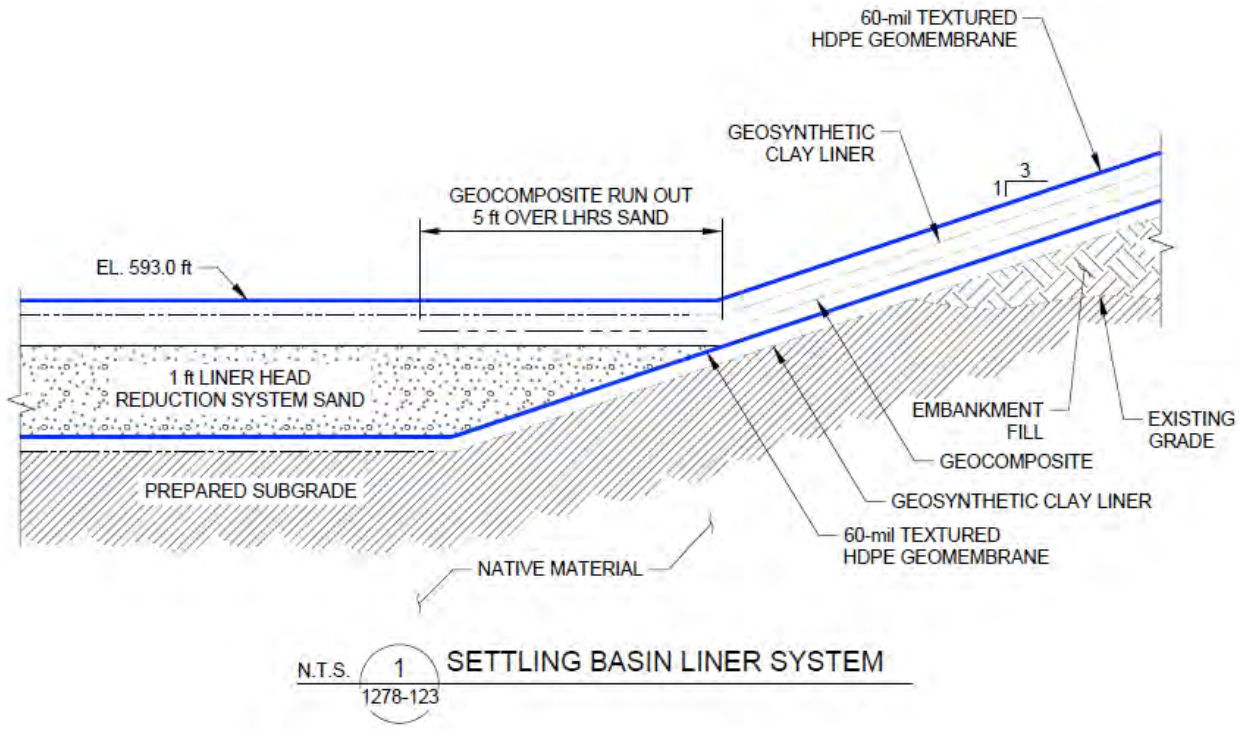


N.T.S. 2 SETTLING BASIN LINER SYSTEM WITH PROTECTIVE COVER
1278-123

Visual Observation Point #2 (VOP-2) - Consumers Energy completed a secondary investigation of the primary liner on March 6, 2021 after observing that secondary collection system weekly time-averaged flow rates had not demonstrated a decreasing trend after completing the mitigation measure to the identified leak in the liner system on January 21, 2021. This second

effort was coordinated with plant operations that started with temporarily ceasing discharge of the bottom ash sluice water so that the base of the primary liner starting from the concrete improved section (west side) of the Karn Lined Impoundment could be safely accessed (Attachment B, Picture 04). Once the process water discharge could be temporarily stopped, bottom ash was removed and the bottom ash stockpile could be completely cleared from the concrete lined area and a more thorough visual inspection of the area could be conducted by walk-down (Attachment B, Picture 05).

A detailed inspection of the concrete reinforced area and the initial transition to the geomembrane lined portion of the impoundment yielded a second location of the liner system that had been damaged (Attachment B, Picture 06). The second area of noted damage is located at N 782892.575 E 13263221.841 (NAD 83 state plane) and elevation 594.31-ft (NAVD88) (Figure 02). Further evaluation revealed damage to the primary and secondary liner components as a result of an excavator damaging the liner during bottom ash removal, though different from VOP-1 because the damaged area was outside of the area of concrete improvement. Components of the primary and secondary liner system at this location are depicted in Drawing Detail 1, Drawing 1278, Sheet 123 (Golder, 2020) – figure depicted below.



SUMMARY OF REMEDIAL ACTION PERFORMED

Remedial Action Performed at Visual Observation Point No.1 (VOP-1)

January 21, 2021 - Consumers Energy initially isolated the apparent leak in the liner system upon discovery by backfilling the entire hole with AquaBlok™ Composite Particle System (Bentonite Aggregate) to reduce leakage into the secondary collection system. The backfilled excavation was covered with a steel plate large enough to cover the point of impact from the discharging tubes to prevent future erosion from scour of the concrete pad and liner system.

March 10, 2021 – Consumers Energy mobilized Fisher Contracting to review repairs that could be made to the liner system. Based on the manner of erosion through the concrete pad and into the primary and secondary liner systems, including geonet systems, performing repairs during this mobilization was not possible without potentially, significantly damaging the liner system even further. Difficulty in performing repairs included:

- Removing Geoweb and concrete primarily to expose enough of the primary and secondary liner system to conduct repairs without further damaging the primary liner.
- Peeling back damaged geomembrane and geonet, by hand, in order to establish viable construction joints in the primary and secondary liner systems to repair geonet and geosynthetic clay liner, as well as weld geomembrane.

Attempting to break into concrete and liner system at Visual Observation Point No.1 (VOP-1) would risk further damage to liner system to complete repair in excess of the current measured leakage into the secondary collection system. The following specific activities were identified in the field as presenting the primary challenges:

- Saw cut into the concrete above liner system would be required to start removing larger portions of the concrete system. Because the concrete is reinforced with Geoweb, this task is at risk of damaging the underlying geomembrane and other components since the materials aren't uniform in strength.
- Once the primary cuts and removal are completed with saws, finish removal work will be necessary to be accomplished by hand with chisels. This work also puts the liner at risk because of the lack of uniformity of strength in material and opportunities to directly or indirectly the underlying geomembrane and other components.
- The extent to which concrete and geomembrane needs to be cut back cannot be assessed with a certainty because the mechanism of breaching was from a scouring, driving head from above and the damage underlying the concrete cannot be directly assessed. Moreover, the degree that a construction joint can be crafted for the geomembranes suitable to seaming to the repair patches, this could potentially require exposing and tearing a substantial area around the location that has been.

Ultimately, the repair team covered the hole with a geotextile in case of future repair and backfilled the area with concrete. The steel plate was placed over this construction area to reduce erosion due to scour (Attachment B, Picture 07).

Liner Repair Conducted at Visual Observation Point No. 2 (VOP-2)

March 6, 2021 – Fisher Contracting installed a physical barrier consisting of concrete Jersey Barriers on either side of the impoundment connected by a cable (Attachment B, Picture 08) that provides a visual barrier and prevents the excavator from operating beyond the extent of the concrete protected surface. The combination of engineering controls to ensure operation of the excavator remains on the concrete pad and operator coaching to ensure significance of cable barrier system are anticipated to minimize damage to liner from errant equipment operations.

March 10, 2021 – The mobilized contractor, Fisher Contracting, proceeded with cleaning off and repairing the primary and secondary liner components at this location. The primary and secondary liner systems were easier to access since the protective concrete surface was not present at this location impeding access to the liner components.

This repair was completed in accordance with Appendix A: CQA Memorandum of the Construction quality assurance documentation and certification report submitted at the time of the operating license application (Attachment B, Picture 09 – Picture 12). This repair was overseen by CQA personnel (Golder Associates, Inc.) collecting documentation and certified by a professional engineer in accordance with Rule R 299.4921 of the Part 115 Rules. The final certified CQA documentation is under review by the certifying engineer and will be provided to EGLE under a separate cover as soon as it is available.

WRITTEN ASSESSMENT

R 299.4437(g)(i) Assess the Source of Liquids and Amounts of Liquid by Source

The source of the liquids observed in the secondary liner is attributed to the apparent points of damage in two areas of the primary liner system identified on January 21, 2021 and March 6, 2021, respectively (VOP-1 and VOP-2). Entry of water laterally or from beneath the impoundment is considered unlikely since the base of the impoundment system was constructed at elevation 592.0-ft NAVD88 (Golder, 2020) relative to the static water level of the most recent measured closest-neighbor monitoring wells observed at 586.28-ft NAVD88 and 586.09-ft NAVD88 at Monitoring Well DEK-MW-15003 and OW-12, respectively (TRC, 2021). The distance between

the base of the impoundment and water table conservatively estimated based on DEK-MW-15003, that yields a groundwater isolation distance of 5.72-ft. This limits the point of entry of any liquids into the secondary collection system coming directly from the primary basin.

The amounts of liquids associated with the secondary collection system volume removal is maintained in the Karn Lined Impoundment Secondary Collection System Tracker. A graphical depiction of the calculated daily averaged flow rate on a weekly basis, monthly basis, and a three-month average basis (Figure 02). Consumers Energy initially began evaluating weekly observed recovery rates and normalized those rates to a daily average flow rate in order to analyze increasing values overlaying the operational timeline demonstrating that weekly values consistently increased until repairs were completed on March 10, 2021. This date immediately precedes the highest realized collection of daily average flow rate calculated on the day after the repairs were calculated (March 11, 2021) at 470.4 gallons/acre/day. Since the repairs were completed, the weekly daily average flow rate calculation has decreased back towards the Response Flow Rate of 25 gallons/acre/day reaching the lowest observed flow rate of 33.4 gallons/acre/day on April 7, 2021 and measuring 67.9 gallons/acre/day in the most recent event on April 28, 2021. This presentation of data shows how the range of daily average flow rates calculated on a weekly basis were clearly different before repairs were completed relative to after repairs were completed.

It is noteworthy that monthly daily average flow rates starting at the end of December 2021 (commencing with operating license issued on December 10, 2020) through the end of March 2021 depicts a similar trend to the weekly daily average flowrates indicting increased flow rates until the noted repairs were completed. After repairs were completed demonstrate a dramatic decrease in the monthly daily average is present, and the observed end of April value is lower than the December 2020 observed value. Consumers Energy concludes that work completed to repair the liner system at both damage locations has substantially decreased flow to the secondary collection system, though more time is necessary to see if the trend continues so that a three month calculated average of the daily average would be at 25 gallons/acre/day.

R 299.4437(g)(ii) Conduct Constituent Analysis of Liquids and Assess Hazard and Mobility

The Karn Lined Impoundment serves a dual purpose – it stores bottom ash sluiced from the Karn 1&2 electrical generating units and provides treatment through time retention and settling of solids prior to the water discharge through NPDES Outfall 001B. Unlike a solid waste landfill, the Karn Lined Impoundment operates with a consistent hydraulic head of approximately four feet over the primary liner with an intermediary 1-ft thick sand layer that acts as the Leachate Head Reduction System by equalizing the level and flow of water in the system. The additional head

over the liner creates a *potential* driving head that is up to four times stronger in the presence of defects or holes in the liner primary and/or secondary liners.

Groundwater is monitored for constituents in a two-stage process – detection monitoring and assessment monitoring – detailed in the approved HMP. The most recent reporting of groundwater for the first quarter 2021 sampling event (TRC, 2021) detailed that the Karn Lined Impoundment remains in detection monitoring (e.g. no evidence of release of a statistically significant increase (SSI) above background levels[1]). The lack of confirmed increasing trends of detection monitoring constituent concentrations observed in the groundwater monitoring system, and in particular, Monitoring Well OW-12 that is located approximately 40-ft downgradient of Visual Observation Point VOP-1, indicates that while a physical release of water may have occurred from the unit; a release of hazardous constituents has not been determined based on the time series of water quality data from the secondary collection system or analysis from the groundwater monitoring system.

Water quality data and trends for the secondary collection system (Attachment C) from the start of operation in June 2018 have been analyzed for detection and assessment monitoring constituents for coal ash impoundments approved in the hydrogeological monitoring plan. This analysis demonstrates that each monitored constituent is present at less than the Groundwater Protection Standard (GWPS) established under 40 CFR 257.95(h) or generic groundwater surface water interface (GSI) criteria adopted by the Department pursuant to Section 20120a or reginal background in the case of total dissolved solids with one exception limited to the first quarter 2021 sampling event (TRC, 2021).

Surface water grab samples were collected from the Karn Lined Impoundment primary and secondary collection systems during the first quarter 2021 sampling event for comparison to assess similarities in water quality and water chemistry, but to also assess potential of hazard and mobility of constituents. These results are reported in first quarter 2021 event (TRC, 2021). A few notable observations:

- Arsenic is higher in groundwater than the secondary collection system: Arsenic was observed in the primary and secondary collection systems at 4 ppb and 5 ppb, respectively. In contrast, the arsenic concentration observed in OW-12, the monitoring well located closest to the damaged liner areas, is 121 ppb, which is consistent with concentrations observed in August 2021, before the liner damage occurred, and groundwater does not appear to be influenced from a release from the unit.

[1] Consumers Energy will consider a positive statistically significant trend detected over two consecutive sampling rounds as an indicator that concentrations are increasing over time and the groundwater quality may be affected by an outside source, meaning there is a statistically significant increase (SSI) over background levels (Karn Lined Impoundment Hydrogeological Monitoring Plan, TRC, 2020).

- Vanadium is detected in the primary and secondary collection system and not in groundwater: Vanadium was present in the primary collection system sample at 52 ug/L, which is much higher than the vanadium concentration in the secondary collection system (11 ug/L). Vanadium was not detected in the well nearest the observed liner damage OW-11 (<2 ug/L).
- For indicator constituents, boron, sulfate, and total dissolved solids, the secondary collection system concentrations of 716 ppb, 395 mg/L, and 1,440 mg/L were greater than the respective concentrations observed in the primary collection system of 566 ppb, 77.1 mg/L, and 528 mg/L.
- Indicator parameter, pH, for primary collection system measured in the field at 8.7 standard units was 0.8 standard units greater than the secondary collection system observation
- Secondary Collection System chemistry has not appreciably changed: The time series plots in Attachment A show relatively stable trends in chemistry for samples collected from the primary collection system. Two constituents in the secondary collection system sample were present above relevant criteria this event:
    - Molybdenum was observed at 159 ug/L in the secondary collection system, as compared to the GSI criterion of 120 ug/L. Molybdenum concentrations observed in the primary collection system was 22 ug/L, which is below the GSI criterion and more similar to prior secondary collection system samples. The first quarter 2021 molybdenum concentration is higher than prior events and will be further evaluated next quarter. in the primary collection system.
    - Chloride observed at 108 mg/L in both the secondary collection system and the primary collection system sample, as compared to the GSI criterion of 50 ug/L. The first quarter 2021 chloride concentration is higher than prior events and will be further evaluated next quarter.

Comparison of results from the primary and secondary liner systems to the groundwater monitoring system results in addition to the groundwater flow and direction indicate that constituent concentrations observed in the primary basin and secondary liner do not have an apparent impact to the water quality in the Karn Lined Impoundment Groundwater Monitoring System. Furthermore, the primary contaminant of concern within the Karn ash management areas (arsenic) is not detected above generic Part 201 drinking water criteria (10 ppb) in either the primary basin or secondary collection system. It is noteworthy that constituents detected above relevant criteria in either the primary or secondary collection system samples for first quarter 2021 are limited to chloride, molybdenum, and vanadium. Molybdenum concentrations within the monitoring well network are stable or declining. Vanadium is present in all of the surface grab samples (primary basin, secondary collection system, and southwest ditch system) vanadium is not detected in the groundwater monitoring well network, except at OW-11, where

groundwater quality has been noted to have been influenced by a source other than the Karn Lined Impoundment.

R 299.4437(g)(iii) Assess Seriousness of Any Leaks or Lack of Necessity for Assessment

Locations of identified damage (VOP-1 and VOP-2) from January 21, 2021 and March 3, 2021 (Figure 01) were estimated to have 4-inch diameter and 3-ft by 2-ft areal breaches of the Primary Liner System, respectively.

As daily average flow rates continue to decrease back toward the Response Flow Rate, presence of contaminants observed in the secondary collection system or from the primary basin have been limited to the first quarter 2021 sampling event and only related to chloride, molybdenum and vanadium which do not appear to be impacting the nearest downgradient monitoring well, OW-12.

Given the reduction of measured flow rate in the secondary collection system and the lack of apparent impact to groundwater within the Karn Lined Impoundment Groundwater Monitoring System and immediately adjacent to the lined impoundment, Consumers Energy has demonstrated the lack of seriousness related to liner system damage at VOP-1 and VOP-2.

CONCLUSIONS

1. The use of secondary collection system flow rates as a leak detection system was successful. Increased flow rates triggered investigations by Consumers Energy that quickly identified deficiencies in the liner system and prompted actions to address the damaged liner.

2. Evaluation of the primary and secondary collection system and groundwater chemistry do not indicate a release of constituents monitored pursuant to the EGLE-approved hydrogeological monitoring plan; therefore, the unit has remained in Detection Monitoring.

3. Secondary Collection System water concentrations are consistently less than regulatory standard with the exception of the most recent event for molybdenum and vanadium in the most recent sampling event. These observations are unverified evidence of contamination and are not reflected in the results from the Karn Lined Impoundment Groundwater Monitoring System.

4. Repair of breach at Visual Observation Point No. 2 (VOP-2) has significantly reduced the flow rate from the secondary collection system observed on a weekly basis.

5. Consumers is continuing to monitor the success of the temporary mitigation efforts at VOP-1 while assessing options for a more permanent repair.

SUMMARY OF REMEDIAL ACTIONS PLANNED

Now that repairs have been completed and weekly-averaged flow rates of recovered water from the secondary collection system are decreasing towards the Response Flow Rate, the following actions are planned for ensuring continued safe operation of the Karn Lined Impoundment in a manner that doesn't harm human health or the environment:

1) Pump secondary Collection System on a weekly basis – Consumers Energy measures and records volume of water collected for secondary collection system and water elevation in sump and evaluates the calculated weekly daily average flow rate. Weekly recorded values will continue to be evaluated to determine if the recovery volume rates from the secondary collection system necessitate additional action/attempted liner and concrete repair at Visual Observation Point No. 1.

2) Now that Consumers Energy has confirmed that the Response Flow Rate has been exceeded based on the average of three consecutive monthly daily average flow rates, Consumers Energy will start submitting notifications of the secondary flowrates on a monthly basis to the Saginaw Bay District Office by the 7th day of the month following each month the Response Flow Rate is exceeded until the monthly average daily flow rate falls below 25 gallons per acre per day. The first notification will be provided by May 7, 2021.

3) Consumers Energy will report the evaluation of the chemical characteristics of the leak detection system required under Rule 437(6) in the quarterly groundwater monitoring report submitted for the Karn Lined Impoundment during the active life of the unit pursuant to the EGLE-approved HMP. The first report to be submitted in compliance with Rule 437(6) will be provided by April 30, 2021. Subsequent reports will be provided within 30-days following the end of each calendar quarter through the active life of the Karn Lined Impoundment unless demonstrations detailed in Rule 437 are submitted and accepted by EGLE to discontinue the reporting.

4) Consumers Energy will be updating actions, investigations, and further water quality analysis in the semi-annual progress report to the Assessment of Corrective Measures for the Karn Bottom Ash Pond by July 30, 2021.

5) Consumers Energy will collect at least one more sample from the Primary Collection basin, Secondary Collection System, and, SW Ditch to spatially compare changes in water grab samples relative to groundwater samples. These results will be reported in the second quarter 2021 groundwater monitoring report.

6) Consumers Energy is scheduled to cease operations of the Karn 1&2 Electrical Generating Units which are directly supported through the operation of the Karn Lined Impoundment. The coal-fired electrical generating units are scheduled to cease operation in 2023 leading to the initiation of the closure plan (Closure By Removal) of the Karn Lined Impoundment coordinated with the decommissioning of the Karn Units.

This written assessment serves as the first follow-up to the preliminary written assessment Consumers Energy provided on January 22, 2021 and now that an initial round of response actions were completed based on discovery of two locations of damaged geomembrane. Data from first quarter 2021 Karn Lined Impoundment groundwater monitoring event demonstrates that groundwater quality is consistent with previous monitoring events which indicates that if a physical release to groundwater occurred due to the apparent leak in the liner system, the effects on local groundwater quality are negligible.

Groundwater conditions will continue to be monitored through the quarterly monitoring program during the active life of the impoundment. Using the secondary collection system flow rates as a leak detection system was successful. The leak was identified, and actions were promptly taken to address the leak. The remedial actions performed and planned actions described in this written assessment are consistent with these findings and balance the need for response actions with safe access and quality repairs that can be implemented in light of the improvements achieved thus far.

Please feel free to contact me with any questions or clarifications.

Sincerely,

Harold D. Register, Jr., P.E.
Principal Engineer
Landfill Operations Compliance
Phone: (517) 788-2982
Email: harold.registerjr@cmsenergy.com

cc: Mr. Gary Schwerin, EGLE Saginaw Bay District Office
Ms. Lori Babcock, EGLE Saginaw Bay District Office
Mr. Caleb Batts, Consumers Energy
Ms. Darby Litz, TRC

Figures
Attachment A: Leak Detection Survey
Attachment B: Pictures
Attachment C: Water Quality Data and Trends

REFERENCES

(Golder, 2020). *Construction Quality Assurance Documentation and Certification, D.E. Karn Lined Bottom Ash Impoundment*, dated January 7, 2020.

(TRC, 2020). *Karn Lined Impoundment Hydrogeological Monitoring Plan,* August 2020.

(TRC, 2021). *First Quarter 2021 Hydrogeological Monitoring Report, DE Karn Lined Impoundment CCR Unit, Essexville, Michigan*, April 30, 2021.

FIGURES

Figure 01

Visual Observation Point No. 1 and Visual Observation Point No. 2

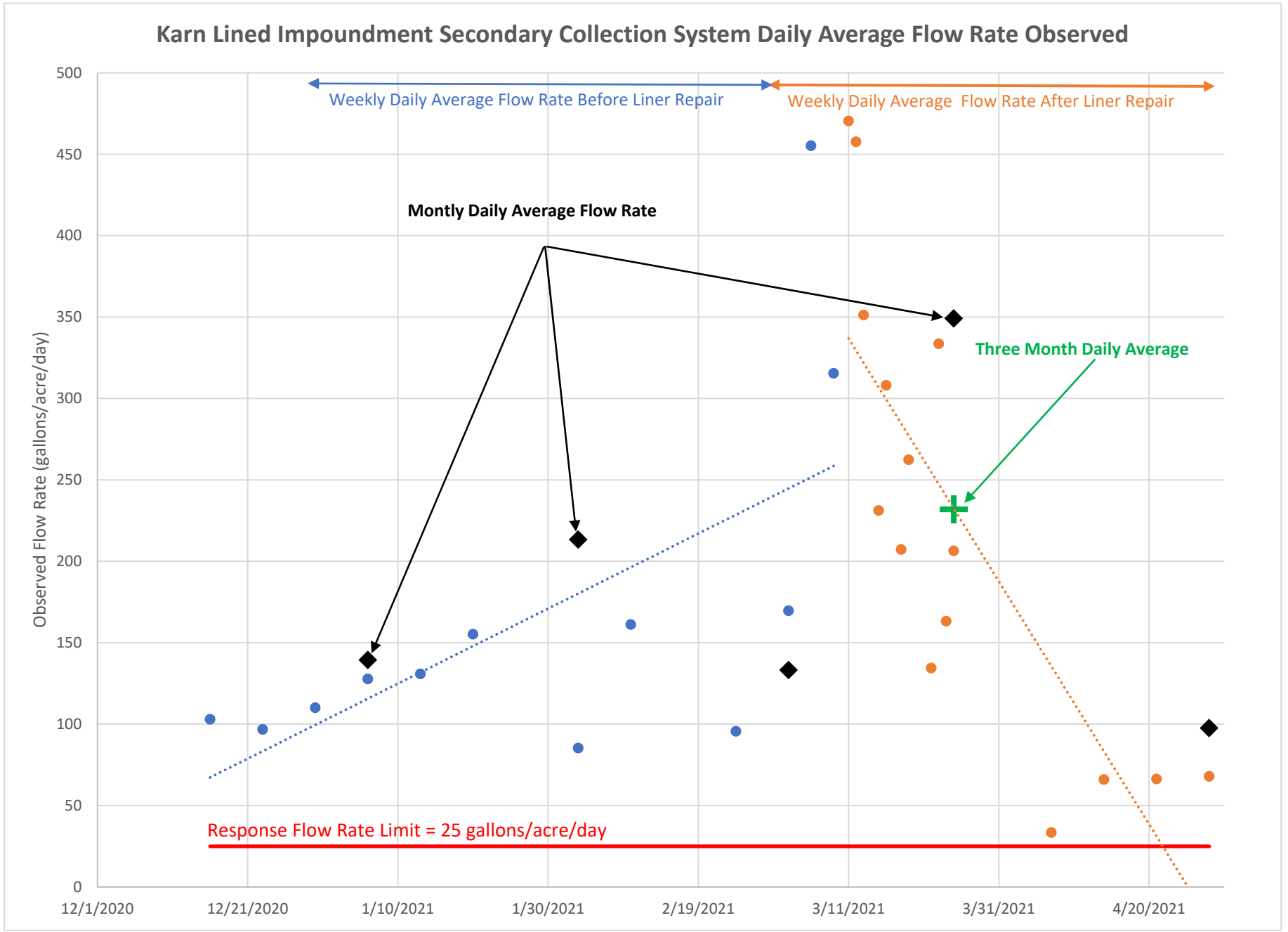

Karn Lined Impoundment Secondary Collection System Daily Average Flow Rate Observed
Observed Flow Rate (gallons/acre/day)
500
450
400
350
300
250
200
150
100
50
0
12/1/2020
12/21/2020
1/10/2021
1/30/2021
2/19/2021
3/11/2021
3/31/2021
4/20/2021
Weekly Daily Average Flow Rate Before Liner Repair
Weekly Daily Average Flow Rate After Liner Repair
Montly Daily Average Flow Rate
Three Month Daily Average
Response Flow Rate Limit = 25 gallons/acre/day

Figure 02

ATTACHMENT A

Leak Detection Survey

January 15, 2021

Mr. Caleb D. Batts
Consumers Energy
2742 N. Weadock Hwy
Essexville, MI 48732

Email: caleb.batts@cmsenergy.com

Subject: Proposal for the Geomembrane Leak Location Survey of the Settling Basin Located at the Consumers Energy De Karn Generating Plant near Essexville, Michigan
LLSI Project 3305

On January 13, 2020, Pissanu Gatesuwan of Leak Location Services, Inc. (LLSI) conducted a geomembrane leak location survey of the Settling Basin located at the Consumers Energy De Karn Generating Plant. The basin has an area of approximately 54,450 square feet and is lined from the bottom up with a prepared subgrade, 60-mil secondary HDPE, geosynthetic clay liner (GCL), 12-inches of sand, and a 60-mil HDPE primary geomembrane. There is 12 to 24-inches of ash covering the primary geomembrane. Approximately one quarter of the pond has concrete covering the primary geomembrane. The concrete makes contact with the earth ground outside the basin. This report documents the results of the survey.

I. RESULTS

A. Survey

No leaks were found during the survey of the Settling Basin primary geomembrane. The concrete covered primary geomembrane and the primary geomembrane extending approximately 30 feet east of the concrete could not be surveyed. The electrically grounded concrete produced a false positive audible signal that could not be reduced. This interfering signal could not be reduced once the survey equipment was approximately 30 feet east of the concrete-lined area.

B. Leak Detection Sensitivity

The leak location equipment was tested to document the leak detection sensitivity. A simulated leak was constructed by placing a 0.055 inch-diameter hole in a plastic container with a thickness approximating the thickness of the geomembrane. An insulated wire with a stripped end will enter the container through a sealed insulating penetration. The other end of the wire was connected to an electrode in contact with the conductive media between the geomembranes. The container was filled with water from the basin and submerged in the basin. Leak location scans were made to determine the maximum distance that the simulated leak can be reliably detected. The simulated leak could be detected from approximately five feet away.

II. PRINCIPLE OF THE ELECTRICAL SURVEY METHOD

A. General

The electrical leak location method detects electrical paths through the liner caused by water or moisture in the leaks. A voltage is impressed across the geomembrane being tested. Electrical current flowing through any leaks in the geomembrane produces localized anomalous areas of high current density near the leaks. These areas are located by making electrical potential measurement scans in or on the electrically conductive material covering the geomembrane.

B. Deep Water Survey

A towed probe survey may also be used to locate leaks in geomembranes that are covered with more than 30 inches of water and for testing side slopes covered with water. The sensor is towed down the side-slope across the short dimension of the basin and then back up the opposite side-slope along the established survey lines while the survey operators stand on opposite banks of the basin. The probe and cable are then moved to the next survey line and the process reversed.

The survey lines spaced approximately 2.5 feet apart are established by placing temporary marks on the liner side-slope near where the survey operators will stand. In this manner, the water does not have to be lowered for the testing and the geomembrane is tested under full hydrostatic load. In addition, long side-slopes can be tested by pulling the sensor up and down the side slope while survey personnel move around the perimeter of the basin.

When a leak is located, the position of the leak is determined by measuring the distance to the sensor when the sensor is at the leak. However, because the probe can only be maneuvered along the survey line, and because of the tolerances in the measurement accuracy, the positioning accuracy for located leaks is anticipated to be about two feet plus one or two percent of the distance to the leak to the edge of the basin. When the water is removed for repair, the leak must be located visually by the leak repair crew using the distance marks provided to guide the repair personnel.

If there are any questions regarding the electrical survey or this report, please contact us at (210) 408-1241. We appreciate the opportunity to have been of service to you.

Respectfully,

John Ortiz
Senior Project Manager

ATTACHMENT B

Pictures

Picture 01 – View of Karn Lined Impoundment Looking North

Picture 02 – View of Karn Lined Impoundment Looking West, Bottom Ash Discharge Point into Primary Basin

Picture 03 - Visual Identification of Primary Liner Damage – Shovel on the Right for Scale

Picture 04 – Safe Access onto Improved Section of Karn Lined Impoundment

Picture 05 – Walkdown and Inspection of Locations of Previous Bottom Ash Storage

Picture 06 – Observed Damage at Visual Observation Point No. 2

Picture 07 – Final Repair Completed at Visual Observation Point No. 1

Picture 08 – Installation of Cable Wire and Concrete Jersey Barrier Engineering Control

Picture 09 – Liner Repair at Visual Observation Point No. 2

Picture 10 – Liner Repair at Visual Observation Point No. 2

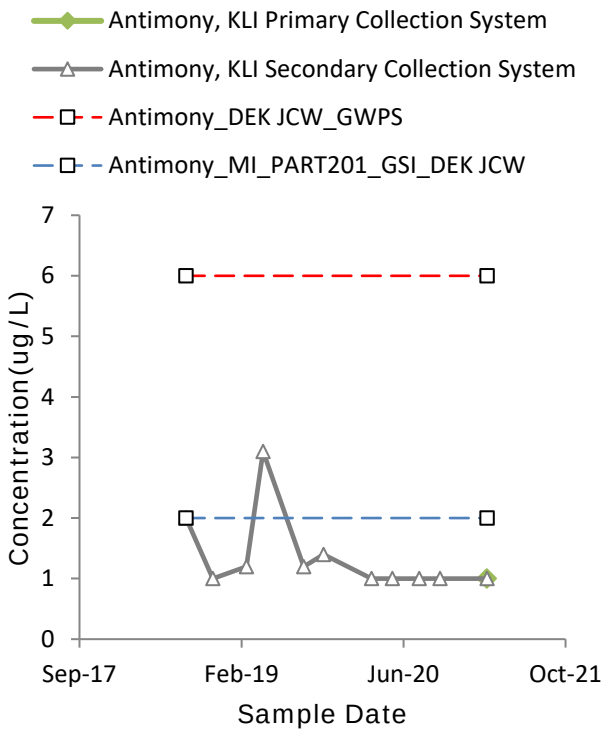
Picture 11 – Liner Repair at Visual Observation Point No. 2

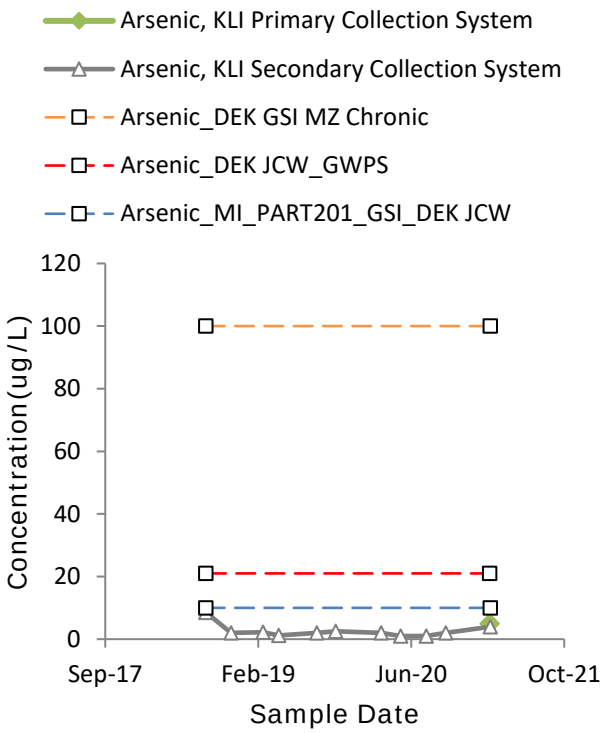
Picture 12 – Liner Repair at Visual Observation Point No. 2

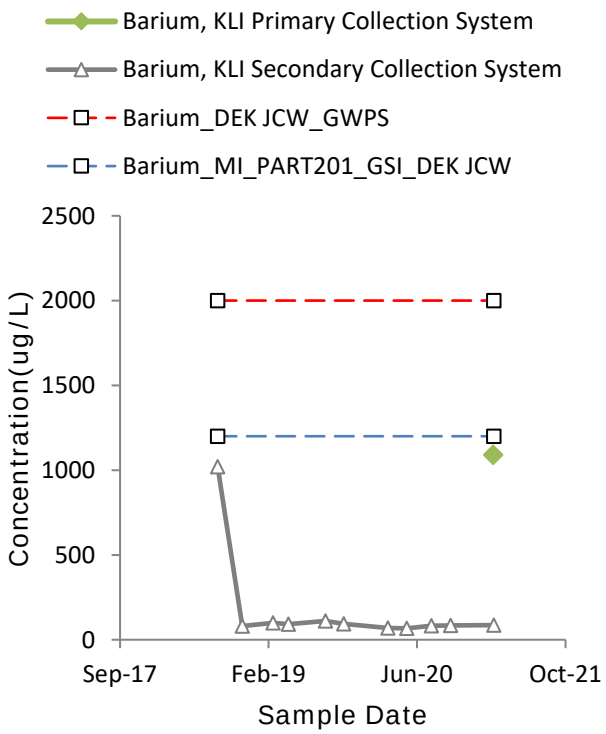
ATTACHMENT C

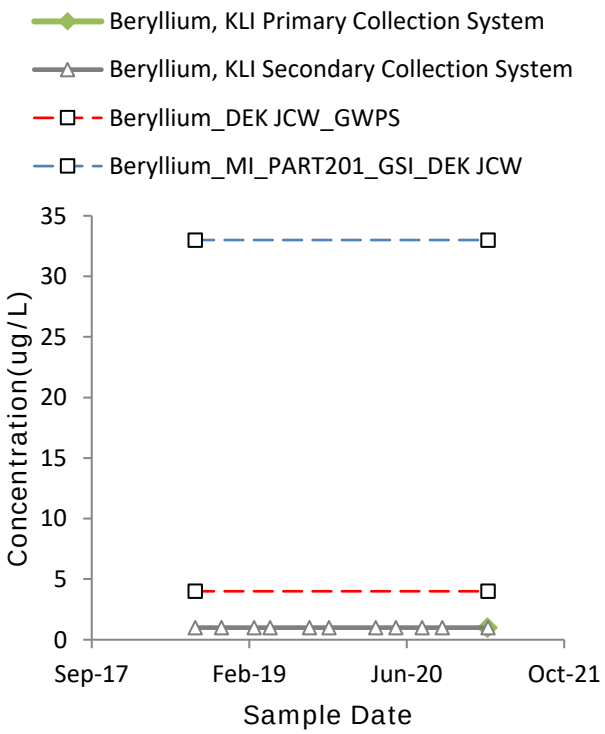
Water Quality Data and Trends

Water Quality Time Series

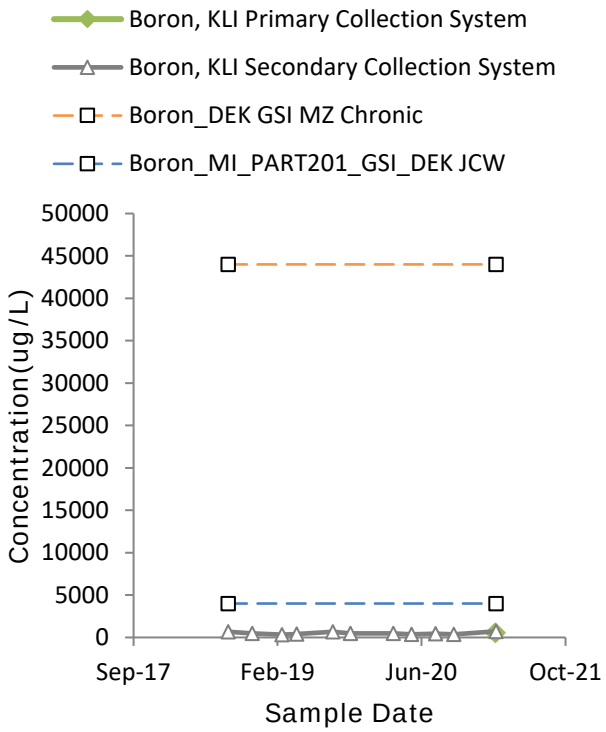


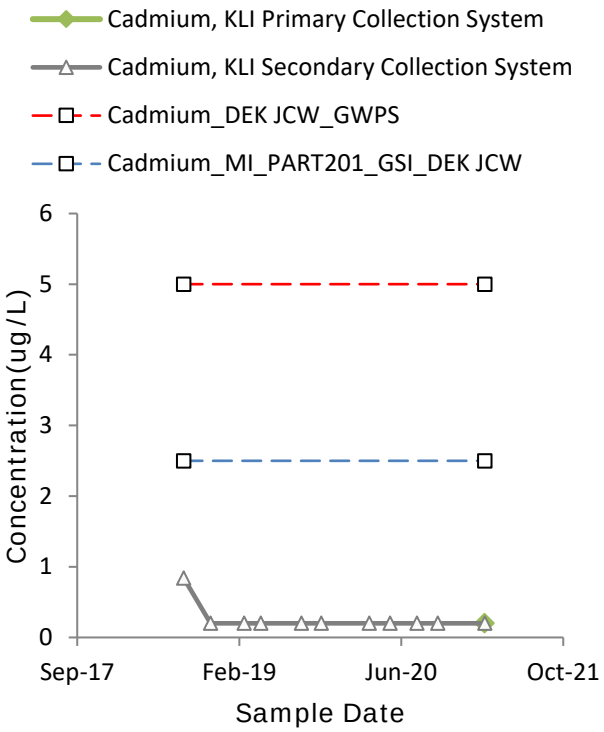


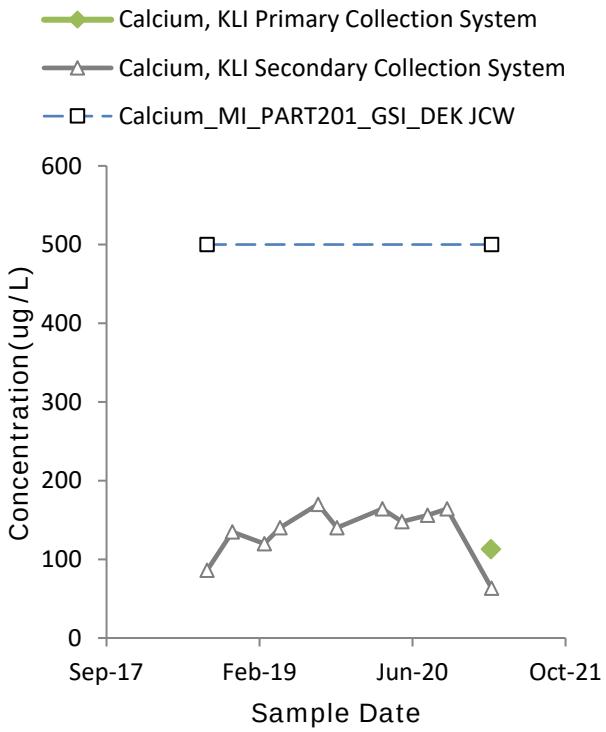


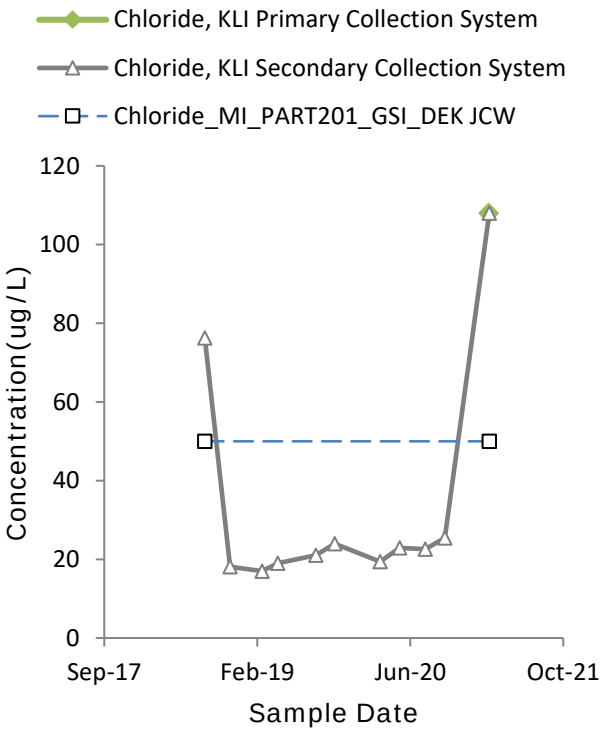


Water Quality Time Series

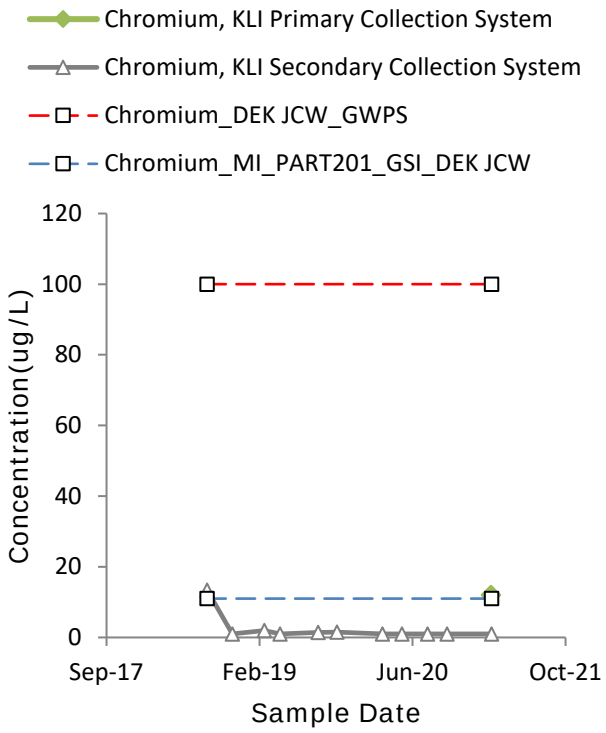


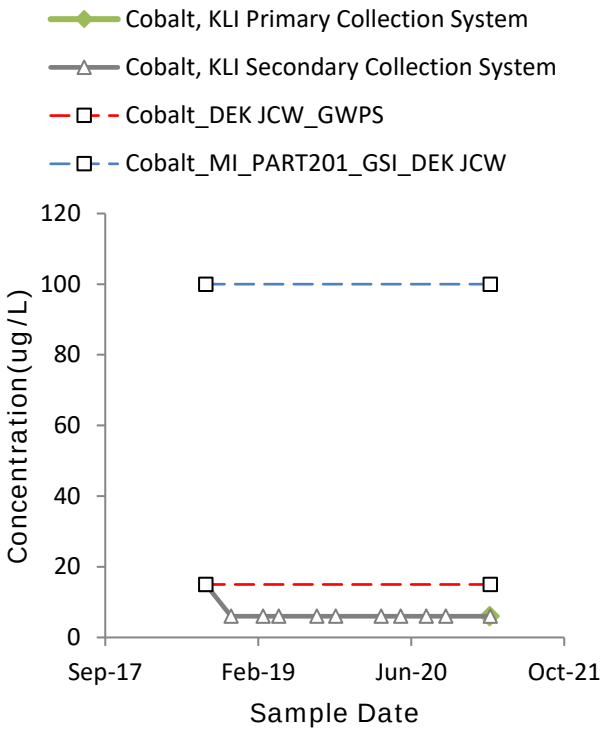


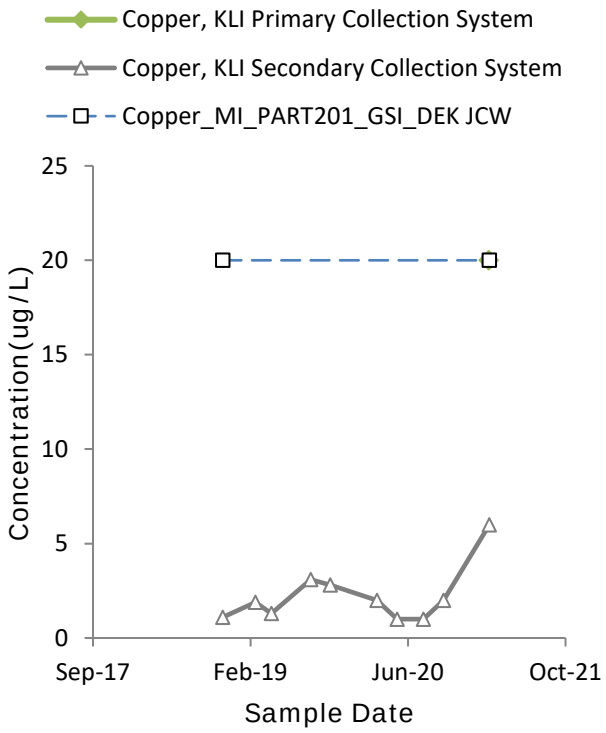


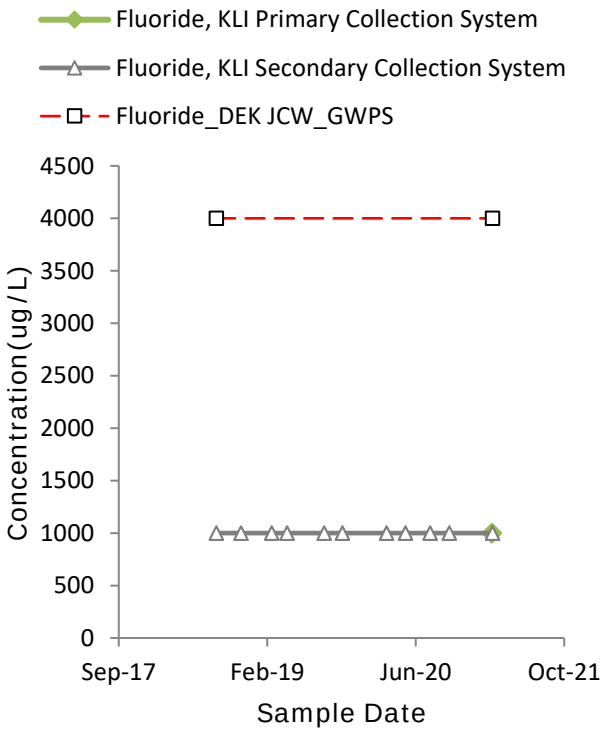


Water Quality Time Series

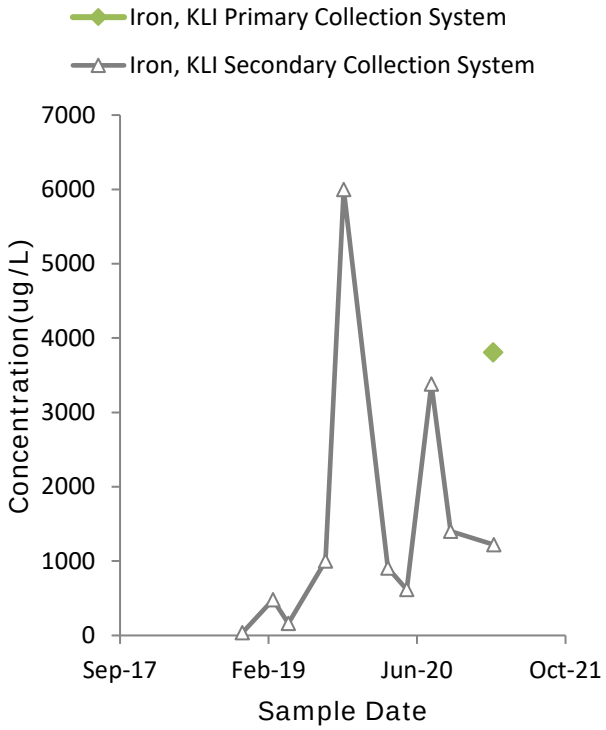


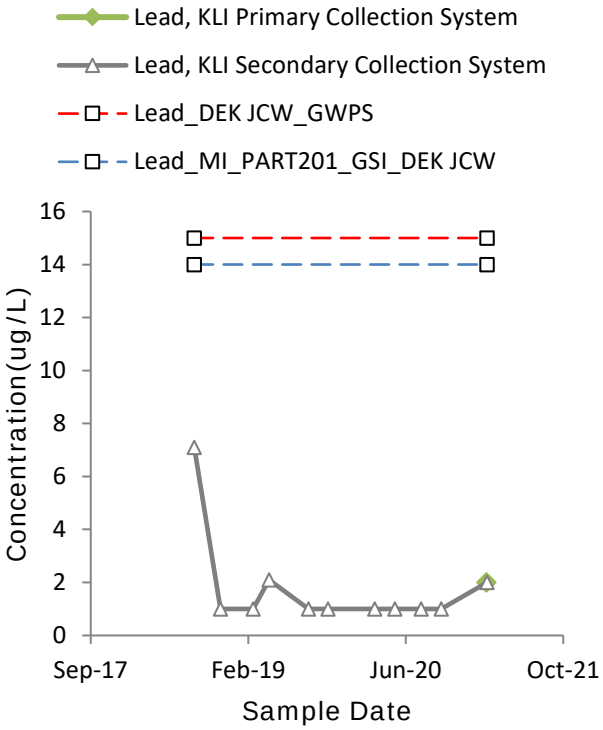


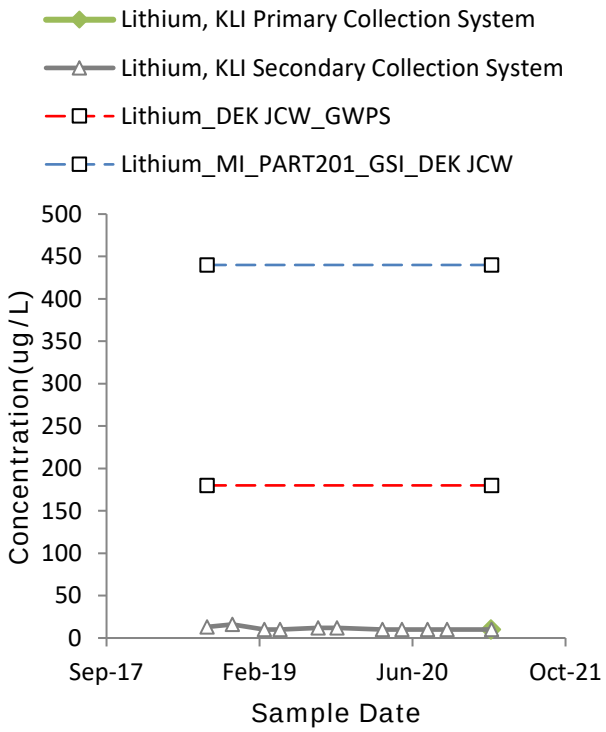


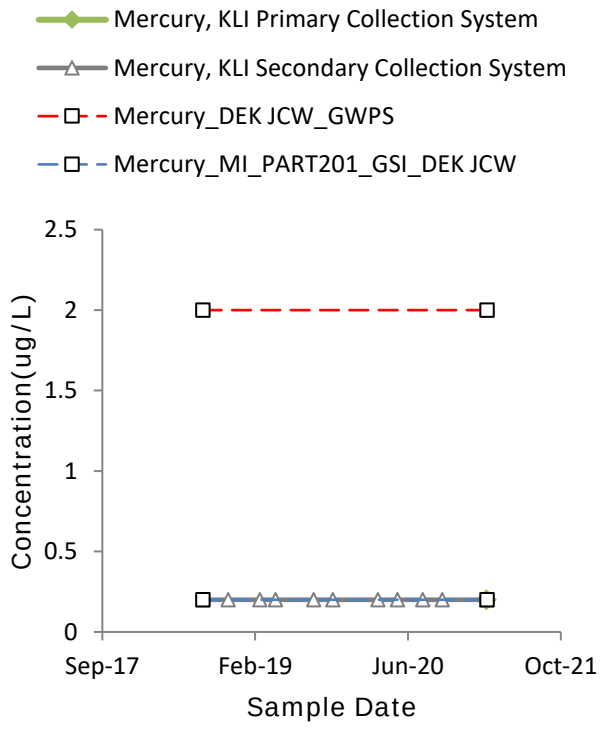


Water Quality Time Series

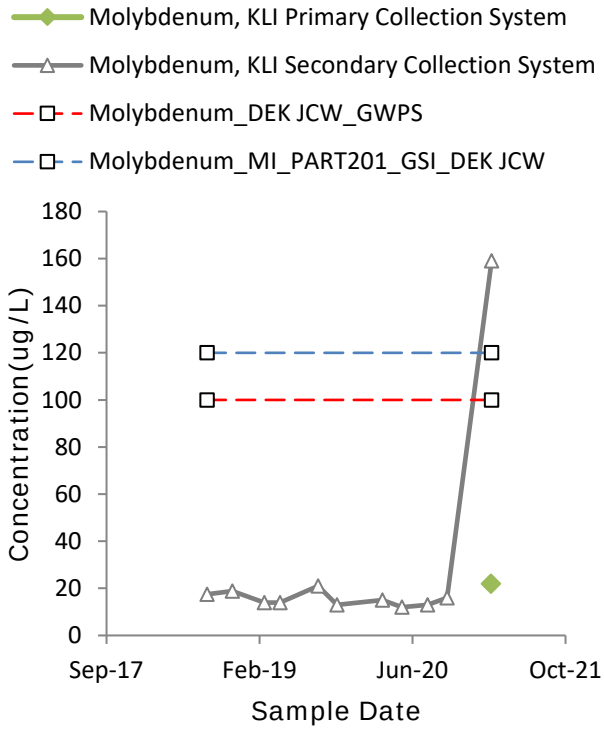


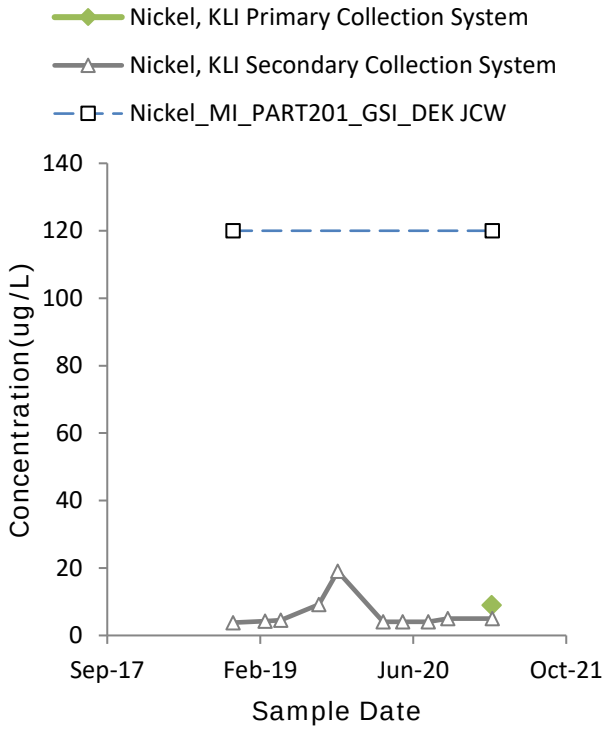


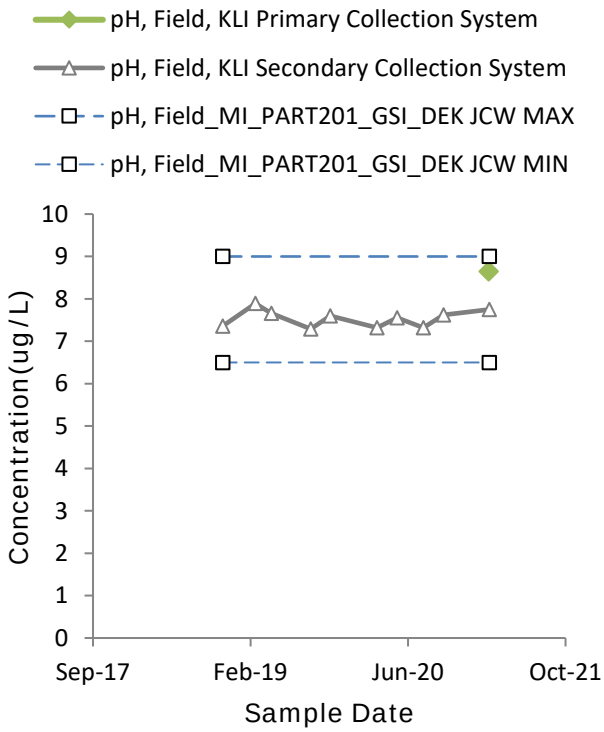


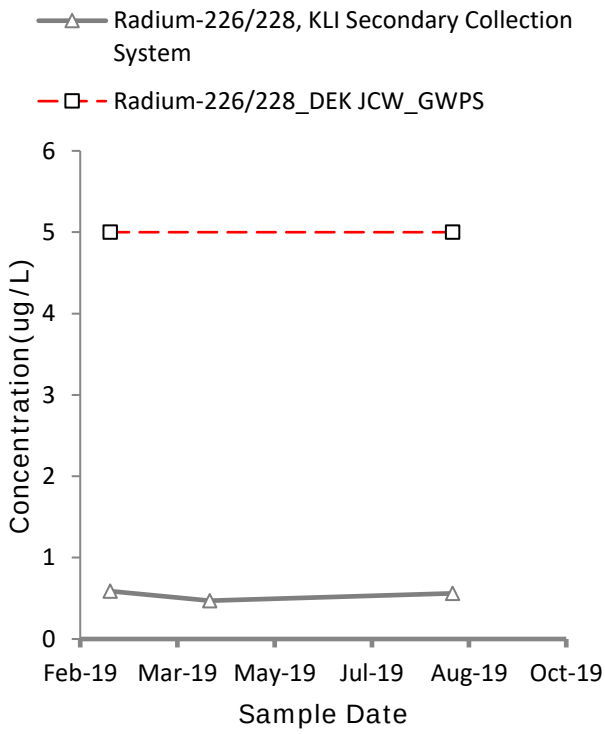


Water Quality Time Series









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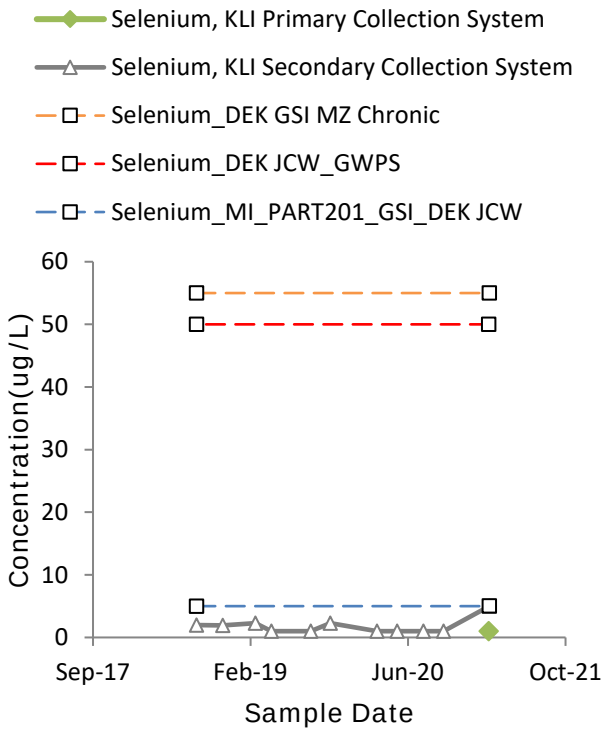

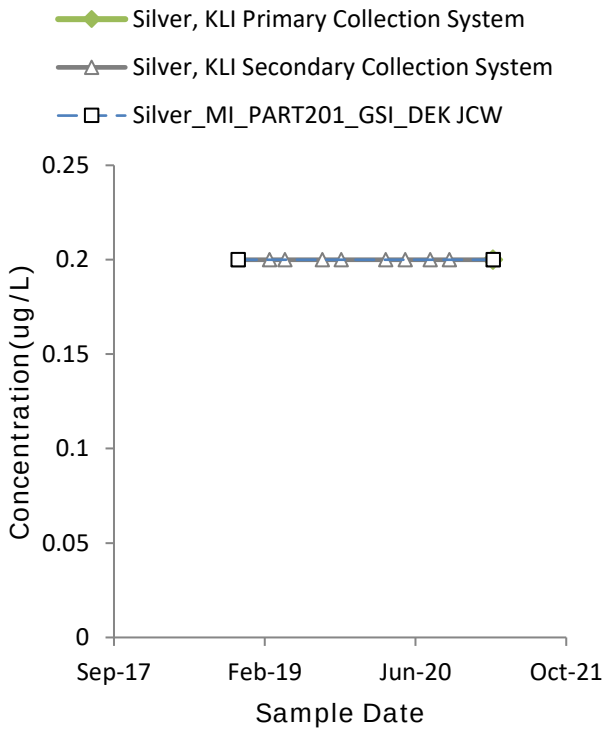

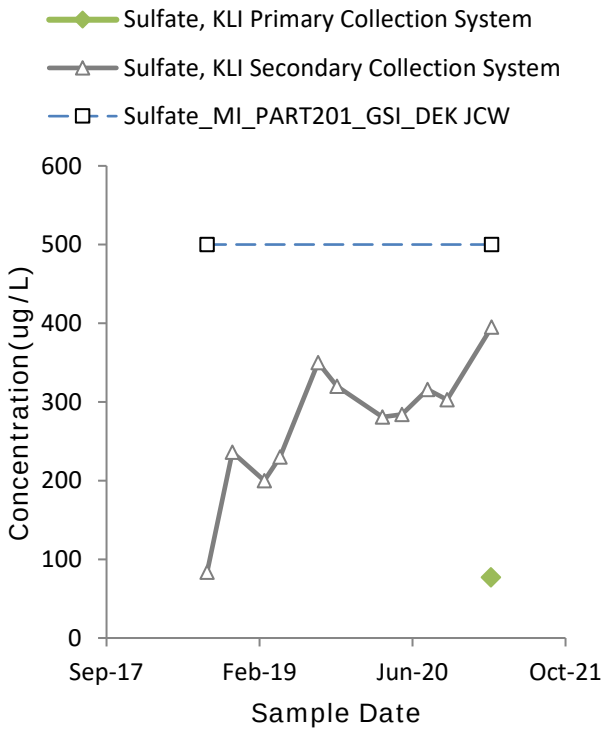

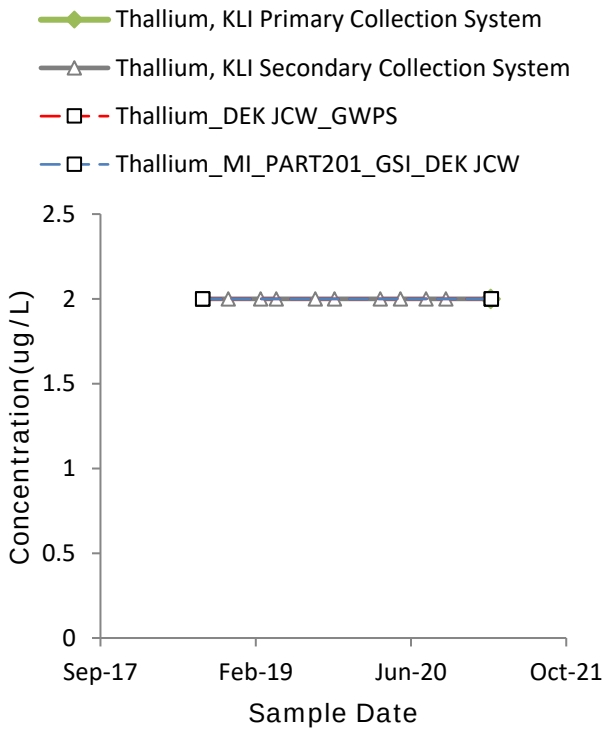

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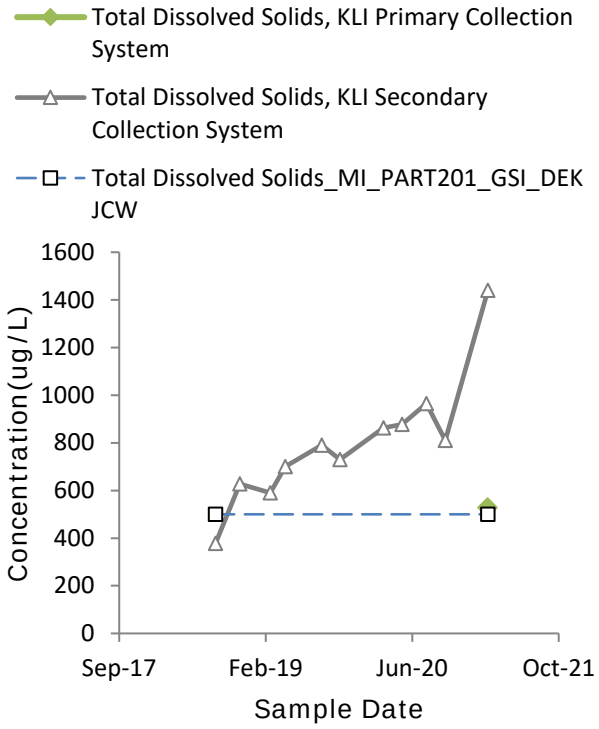

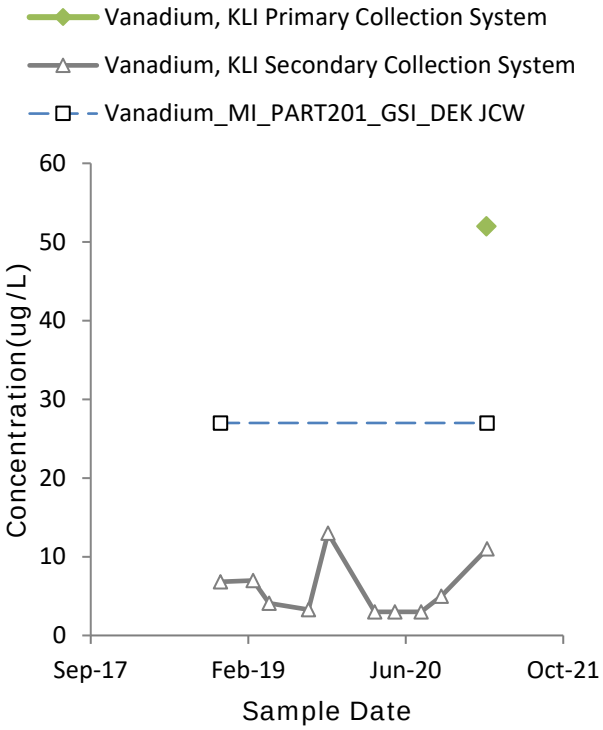

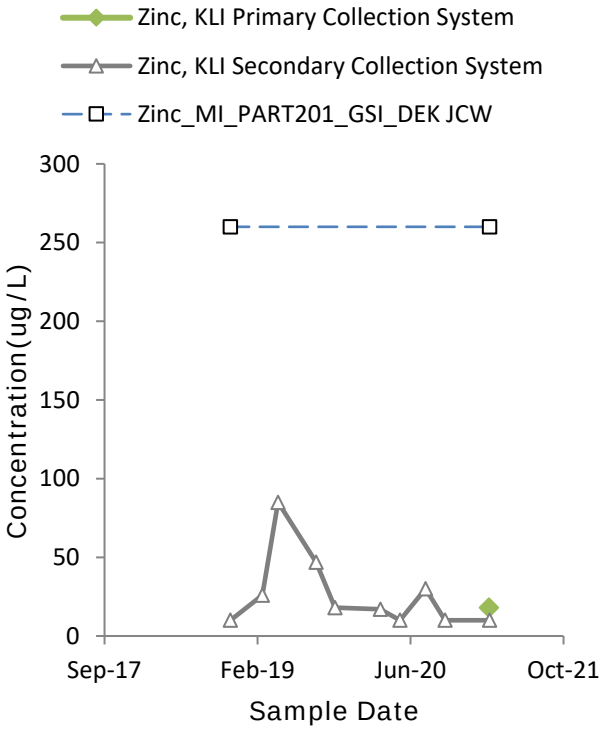

Second Quarter 2021 Hydrogeological Monitoring Report

DE Karn Lined Impoundment CCR Unit

Essexville, Michigan

July 2021

Prepared For:

Consumers Energy
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Prepared By:

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Darby Litz
Project Manager/Hydrogeologist

Graham Crockford, C.P.G.
Program Manager

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FIGURES

APPENDICES

1.0 Introduction

Pursuant to the Federal CCR Rule[1], Consumers Energy initiated a detection monitoring program for the Karn Lined Impoundment that went into service on June 7, 2018. After establishing the groundwater monitoring system and detection monitoring project pursuant to the requirements and schedule of §257.90 - §257.94, the State of Michigan enacted Public Act No. 640 of 2018 (PA 640) December 28, 2018 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 amendments to the solid waste statute amended state groundwater monitoring requirements for coal ash impoundments; therefore, Consumers Energy submitted the *Karn Lined Impoundment Hydrogeological Monitoring Plan* (HMP) to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to comply with the requirements of Part 115, Rule 299.4905, and the CCR Rule. The HMP was approved by the EGLE on November 13, 2020 and incorporated, by reference, in Solid Waste Disposal Area Operating License No. 9629 issued on December 10, 2020.

1.1 Statement of Adherence to Approved Hydrogeological Monitoring Plan

This Second Quarter 2021 Karn Lined Impoundment Hydrogeological Monitoring Report (Report) has been prepared by TRC on behalf of Consumers Energy to satisfy quarterly groundwater monitoring requirements during the active life of the coal ash impoundment. This Report was prepared in accordance with the items listed in Appendix A (Solid Waste Monitoring Submittal Components) of the May 15, 2015 Michigan Department of Environmental Quality (MDEQ) – Office of Waste Management and Radiological Protection, now the EGLE Materials Management Division (MMD), communication prescribing the format for solid waste disposal facility monitoring submittals as published in OWMRP-115-29, *Format for Solid Waste Disposal Facility Monitoring Submittals*, dated July 5, 2013. All references herein to the EGLE are inclusive of the MDEQ. Information contained in this report was prepared in adherence to the facility's approved HMP that was approved by the EGLE on November 13, 2020. This HMP is compliant with the requirements set forth in Public Act No. 640 of 2018 (PA 640) to amend the Natural Resources and Environmental Protection Act (NREPA), also known as Part 115 of PA 451 of 1994, as amended (Part 115) (a.k.a., Michigan Part 115 Solid Waste Management).

1.2 Program Summary

This Report provides results and summarizes the monitoring activities completed in the Second Quarter 2021 at the Karn Lined Impoundment located at 2742 Weadock Highway in Essexville, Michigan (Figure 1). Groundwater in the vicinity of the Karn Lined Impoundment has been documented to be affected by the management of CCR prior to the construction of the unit (January 2019, TRC). Given that the constituents associated with CCR currently managed at the Karn Lined Impoundment are indistinguishable from the constituents already present in groundwater from past operation of the former Karn Bottom Ash Pond, the compliance monitoring program for the Karn Lined Impoundment consists of two parts to evaluate if there are new releases from the unit:

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

1. Monitoring of secondary collection system flow rates and water quality to detect leaks in the liner; and
2. Groundwater monitoring to determine if there are potential new releases from the Karn Lined Impoundment.

Based on sampling results for the second quarter 2021, the Karn Lined Impoundment remains in detection monitoring in accordance with the HMP.

1.3 Site Overview

The Karn Lined Impoundment is located within the DE Karn Power Plant site (Site) located north of the former 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 former Karn Bottom Ash Pond that was closed by removal and the Karn Landfill that was certified closed and now in post-closure care.

1.4 Geology/Hydrogeology

The majority of the Karn Lined Impoundment area is comprised of surficial CCR and sand fill, as described in the HMP. 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, was generally encountered at 80 to 90 ft bgs.

The Site is bound by several surface water features (Figures 1 and 2): 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 Lined Impoundment, the shallow groundwater flow is generally radial, with a potentiometric high point near the unlined ditch north of the Karn Lined Impoundment and near DEK-MW-15003, flowing outward toward the surrounding surface water bodies.

2.0 Second Collection System Monitoring

Consumers Energy initiated secondary collection system flow monitoring to comply with the EGLE-approved HMP in December 2020. The SCS serves as a leak detection system and the SCS flow rate data is used to demonstrate compliance with Part 115. Consumers Energy continues to comply with the requirements for unmonitorable units under Rule 437 of the Part 115 Rules.

The Average Daily Flow Rate for the period from December 10, 2020 – January 6, 2021 was calculated as 137.0 gallons per acre per day (GPAD), which exceeded the Response Action Flow Rate of 25 GPAD. Although this calculated flow rate does not constitute the average flow rate for the previous three months per the definition of average daily flow rate under Part 115, Consumers provided a proactive notification and a preliminary written assessment of the flow rate exceedances to the EGLE January 15, 2021 and January 22, 2021, respectively. The use of secondary collection system flow rates as a leak detection system was successful. Increased flow rates triggered investigations by Consumers Energy that quickly identified deficiencies in the liner system and prompted actions to address the damaged liner. Following repairs to the liner, Consumers Energy continues to monitor improvements in the secondary collection system for improvements in the Daily Average Flow Rate. The Average Daily Flow Rate for the period from April 28, 2021 – June 30, 2021 was calculated as 79.5 gallons per acre per day (GPAD), which exceeded the Response Action Flow Rate of 25 GPAD. The last notification documenting weekly measurements and trends for weekly, monthly, and quarterly daily average flow rates is included in Appendix E.

In response to the exceedance of the SCS action flow rate (AFR), samples were collected from the surface water of the primary collection system (KLI-PCS) and from the secondary leachate collection system sump (KLI-SCS) in May 2021 to compare leachate chemistry to groundwater chemistry. The samples were analyzed for the following constituents:

- Primary Indicator Parameters: Section 11511a(3)(c) - Detection Monitoring Constituents
- Alternative Indicator Parameters: Section 11519b(2) - Assessment Monitoring Constituents
- Optional Analyses in support of Piper or Stiff diagrams

The KLI-PCS and KLI-SCS data were evaluated for comparison to groundwater quality and water chemistry and to also assess potential of hazard and mobility of constituents. A series of time-series plots are included in Appendix E to illustrate water quality data changes over time for the secondary collection system from the start of operation in June 2018 to present. This analysis demonstrates that each monitored constituent is generally present at concentrations less than the Groundwater Protection Standard (GWPS) established under 40 CFR 257.95(h) or generic groundwater surface water interface (GSI) criteria adopted by the Department pursuant to Section 20120a, with the exception of total dissolved solids and chloride. A few notable observations:

- **Arsenic is higher in groundwater than the secondary collection system:** Arsenic was detected in both the primary and secondary collection systems at 2 ug/L in May 2021. In contrast, the arsenic concentration observed in OW-12, the monitoring well located closest to the damaged liner areas, is 86 ppb, which is consistent with concentrations observed in

August 2021, before the liner damage occurred. Arsenic present in groundwater does not appear to be a result of a release from the unit.

- **Vanadium is detected in the primary and secondary collection system and not in groundwater**: Vanadium was present in the primary collection system sample at 52 ug/L in March 2021 and 16 ug/L in May 2021, which are higher than the vanadium concentration in the secondary collection system (11 ug/L in March and 6 ug/L in May). Vanadium was not detected in the well nearest the observed liner damage OW-12 (<2 ug/L).
- **Secondary Collection System chemistry has not appreciably changed:** The time series plots in Attachment A show relatively stable trends in chemistry for samples collected from the primary collection system. Two constituents in the secondary collection system sample were present above relevant criteria this event:
  - Chloride was observed at a concentration of 52.5 mg/L in the secondary collection system, which slightly exceeds the GSI criterion of 50 ug/L. Concentrations of chloride observed in the second quarter 2021 are much lower than the chloride concentration observed in the first quarter 2021, suggesting that the chloride concentration in the secondary collection system appears to be a transient condition. Additionally, chloride was identified as naturally elevated in the Phase II Discharge Evaluation (NRT, September 2005) and was eliminated as a constituent of concern when the mixing zone was first authorized based on the data supporting that conclusion. Chloride values are more closely linked to water coming through the system from the intake water than as a byproduct of the commingled ash and other waste products.
  - Total dissolved solids is observed at concentrations above the generic GSI criterion of 500 mg/L; however, the TDS concentration in the primary collection system leachate is significantly lower in concentration suggesting that the elevated TDS is not likely from the primary collection system leachate. Chloride, as described above, is a component of TDS, and TDS is regionally elevated in groundwater. TDS values are also more closely linked to water coming through the system from the intake water than as a byproduct of the commingled ash and other waste products.
  - The elevated concentration of molybdenum observed in the secondary collection system in the first quarter 2021 (159 ug/L) was not confirmed; the second quarter concentration was 35 ug/L and is below applicable criteria.

Water quality data collected for Second Quarter 2021 are included in the attached laboratory reports (Appendix A). Groundwater chemistry is discussed in Section 4.1. Groundwater conditions will continue to be monitored. Using the secondary collection system flow rates as a leak detection system was successful. The leak was identified in the fourth quarter of 2020, actions were promptly taken to address the leak. In January 2021, liner damage was noted in two areas denoted as Visual Observation Point No. 1 (VOP 1) and Visual Observation Point No. 2 (VOP 2). VOP 2 was repaired on March 10, 2021 and VOP 1 was repaired on May 24, 2021 as documented by Golder Associates Inc. Consumers Energy submitted the repair certification reports to the EGLE on May 25, 2021 and June 29, 2021, respectively. The results of the mitigation efforts continue to be monitored.

Consumers Energy continues to monitor the secondary collection system flow rates, record flow rates and head level on the secondary liner in the operating record and evaluate flow rate trends on a weekly basis. Written notifications of flow rates in the secondary collection system will be

provided monthly and evaluations of the chemical characteristics of liquid in the secondary collection system will be reported quarterly. In addition, Consumers Energy continues to provide quarterly updates on remedial actions performed on the leachate collection system through the quarterly groundwater monitoring report required by the HMP.

3.0 Groundwater Monitoring

3.1 Monitoring Well Network

In accordance with §257.91, Consumers Energy developed a groundwater monitoring system for the Karn Lined Impoundment prior to the initial receipt of waste in the CCR unit (TRC, 2018c). Given the radial groundwater flow direction and constituents associated with CCR currently managed at the Karn Lined Impoundment are indistinguishable from the constituents already present in groundwater from past operation of the Karn Bottom Ash Pond, the groundwater monitoring system design incorporates an *intrawell statistical approach* for detection monitoring as described in the HMP and in accordance with the "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance" (USEPA, 2009): Five monitoring wells that are screened in the uppermost saturated unit were selected for the Karn Lined Impoundment HMP detection monitoring (DEK-MW-15003, DEK-MW-18001, OW-10, OW-11, and OW-12). Monitoring well locations are shown on Figure 2.

3.2 May 2021 Detection Monitoring Event

In accordance with the HMP, TRC conducted the second quarter 2021 monitoring event for the Karn Lined Impoundment on May 3 through 6, 2021. In addition to the routine groundwater samples collected from the monitoring well network, a water sample was collected from a sump in the secondary collection system (KLI-SCS) and a surface water sample was collected from the primary collection system (KLI-PCS), as discussed in Section 2 above, such that leachate chemistry could be compared to groundwater chemistry. A sample of surface water was also collected from a ditch located north of the lined impoundment (SW-Ditch) to further evaluate site geochemistry (Figure 2). The SW-Ditch surface water grab sample represents water quality from the potentiometric high point adjacent to the Karn Lined Impoundment.

Groundwater samples collected during the May 2021 event were submitted to Consumers Energy Laboratory Services in Jackson, Michigan, for analysis of the following metals and inorganic indicator constituents. Radium analysis was performed by Eurofins TestAmerica in St Louis, Missouri.

Section 11511a(3)(c) – Detection Monitoring Constituents	Section 11519b(2) – Assessment Monitoring Constituents		
Boron	Antimony	Fluoride	Selenium
Calcium	Arsenic	Lead	Silver
Chloride	Barium	Lithium	Thallium
Fluoride	Beryllium	Mercury	Vanadium
Iron	Cadmium	Molybdenum	Zinc
pH	Chromium, total	Nickel	
Sulfate	Cobalt	Radium 226 and 228	
Total Dissolved Solids (TDS)	Copper	Selenium	

Samples were also analyzed for constituents identified in Section 11519b(2) – Assessment Monitoring Constituents and the additional constituent's magnesium, sodium, potassium, and bicarbonate, carbonate, and total alkalinity to provide additional evaluation of groundwater chemistry. Analytical results from the second quarter 2021 monitoring event are included in the attached laboratory reports (Appendix A).

Static water level measurements were collected at all locations after equilibration to atmospheric pressure and immediately prior to purging. The depth to water was recorded to the nearest 0.01-ft in accordance with the procedures in the HMP. Groundwater purging and sampling were conducted in accordance with low-flow sampling protocol. Static water elevation data are included in the attached field records (Appendix B).

Monitoring wells 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. Field notes are included as Appendix B. The samples were collected in vendor-provided, nitric acid pre-preserved (metals only) and unpreserved sample containers and submitted to the laboratory for analysis. Porewater sample preparation and analyses were performed in accordance with SW-846 "Test Methods for Evaluation Solid Waste – Chemical / Physical Methods," USEPA (latest revision). TRC followed chain of custody procedures to document the sample handling sequence.

TRC also collected quality assurance/quality control (QA/QC) samples during the groundwater sampling event. The QA/QC samples consisted of one field blank, one equipment blank, one field duplicate (OW-12), and field matrix spike/matrix spike duplicate samples collected at DEK-MW-18001.

3.2.1 Data Quality Review

Data were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The data were found to be complete and usable for the purposes of the HMP program. The data quality reviews for the Karn Lined Impoundment network wells are summarized in Appendix C.

3.2.2 Groundwater Flow Rate and Direction

Groundwater elevation data collected during the May 2021 groundwater monitoring events are provided in Table 1. The data were used to construct the groundwater contour map (Figure 3).

Groundwater elevations measured at the site in May 2021 are generally within the range of 581 to 587 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 data or within approximately 6 feet higher, flowing toward the bounding surface water features.

Although the point source discharge of sluiced bottom ash into the former Karn Bottom Ash Pond historically 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 in May 2021 demonstrate a reduction in groundwater elevation measurements by several feet when compared to measurement taken in June 2018. 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 and DEK-MW-15003 delineate the newly established groundwater elevation high point that was previously centered over the former Karn Bottom Ash Pond with porewater flow generally flowing radially towards the adjacent surface water features from this newly established potentiometric “high”, as illustrated in Figure 3.

The average hydraulic gradient observed on May 3, 2021 in the vicinity of the former Karn Bottom Ash Pond and Karn Lined Impoundment is estimated at 0.0039 ft/ft. The gradients were calculated using the monitoring well pair DEK MW 15004/DEK-MW-15005, as well as the well water elevation difference and distance between DEK-MW-15003 and the discharge channel. The discharge channel surface water elevation was taken from the NOAA gauging station data on the same dates as the water level measurements. 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 calculated to be 0.20 ft/day or 72 ft/year in May 2021 which is reduced relative to previous estimated seepage velocities (e.g., 0.33 ft/day or 120 ft/year August 2018).

Due to the operational changes of the former bottom ash pond and the completion of the landfill capping activities in 2020, the gradient between the area of the Karn Bottom Ash Pond and Karn Lined Impoundment and the surrounding surface water bodies is flattening out as compared to previous quarters and is also attempting to reach a new equilibrium, as expected. The general flow direction relative to the Karn Lined Impoundment is similar to that identified in previous monitoring rounds and continues to demonstrate that the downgradient wells are appropriately positioned to detect the presence of Appendix III/IV parameters that could potentially migrate from the Karn Lined Impoundment.

4.0 Data Evaluation

Based on sampling results for the second quarter 2021, the Karn Lined Impoundment remains in detection monitoring in accordance with the HMP. The following section summarizes the statistical approach applied to assess the second quarter 2021 groundwater data in accordance with the detection monitoring program.

Water quality data are included in the attached laboratory reports (Appendix A). Groundwater analytical data for the most recent quarterly monitoring event is summarized in Table 3 along with the associated Part 201 generic drinking water criteria, the generic GSI criteria, and the site-specific mixing-zone GSI criteria. Mixing-zone criteria are provided for the Karn-Weadock complex in the December 23, 2015 mixing zone determination that consists of arsenic, boron, and selenium. As such, arsenic, boron, and selenium are compared to site-specific mixing zone-based GSI criteria, and all other constituents are screened against generic GSI criteria. GSI compliance is evaluated through monitoring performed at the Karn Landfill in accordance with the EGLE-approved Consumers Energy's revised Karn Landfill HMP (Hydrogeological Monitoring Plan, Rev. 3, DE Karn Solid Waste Disposal Area) dated December 19, 2017.

4.1 Statistical Evaluation of Trends

Groundwater in the vicinity of the Karn Lined Impoundment has been affected by CCR management before commencement of operation (January 2019, TRC). Given that the constituents associated with CCR currently managed in the Karn Lined Impoundment are indistinguishable from the constituents already present in groundwater from past operation of the former Karn Bottom Ash Pond, intrawell trend tests, in conjunction with KLI-SCS flow rates, will be utilized to assess whether a release has occurred from operation of the unit. The detection monitoring constituent concentrations will be analyzed using Mann-Kendall and Sen's Slope trend tests to determine if there is an upward trend that may indicate a release from the Karn Lined Impoundment. The data will be analyzed in the context of the Site hydrogeologic characteristics and an assessment made as to whether the source of an upward trend, if identified, is from a possible release from the Karn Lined Impoundment, another on-site release, or on-site migration of nearby impact (i.e., former Karn Bottom Ash Pond).

Time-series plots and statistical trend analyses are used to evaluate groundwater quality each quarter, which are included as Appendix D. Consumers Energy manages and evaluates its analytical data using Sanitas™ Statistical Software (Sanitas™). Consumers Energy conducts intra-well trend analyses to examine data for each monitoring well-constituent pair in the groundwater monitoring system over time to determine if changes in water quality are occurring that may be associated with the Karn Lined Impoundment. Data from August 2019 through May 2021 were analyzed using Mann-Kendall and Sen's Slope at a significance level (α) of 0.025 per tail for each constituent/sampling point dataset to assess trends. Sen's Slope estimator was used to assess the magnitude of the slope and the Mann-Kendall test was used to determine if the slope was statistically significant. The graphical output of the Sen's Slope/Mann-Kendall trend tests and time series are presented in Appendix D. Appendix D also includes a table summarizing these trends and the associated statistical trend charts.

Data trends for detection monitoring constituents are generally stable (i.e., no trend) or declining for the majority of the monitoring well/constituent pairs with the following exceptions:

- A confirmed increasing trend in sulfate was observed in monitoring well DEK-MW-18001.
- A confirmed increasing trend was observed for calcium in monitoring well OW-10.
- Confirmed increasing trends were observed for boron and pH in monitoring well OW-11.

4.2 Detection Monitoring Data Discussion

Although preliminary detection monitoring trends noted in Section 4.1 exist, the groundwater conditions do not conclusively indicate a release from the unit. Groundwater quality is generally consistent with previous monitoring events. The location of one of the two identified liner damage locations is approximately 40-ft upgradient from monitoring well OW-12. Detection monitoring constituent concentrations at OW-12 exhibit no statistically significant increasing trends, indicating that if a release to groundwater occurred due to the apparent leak in the liner system, the effects on local groundwater quality at this point appear to be negligible. The three wells with noted trends are located much further away from where the release was likely to occur. Additionally, concentrations of several constituents observed at OW-11 are much higher than concentrations observed in the KLI-PCS and KLI-SCS, which support a source other than the Karn Lined Impoundment is affecting chemistry at OW-11. The confirmed increasing trends at OW-10 and DEK-MW-18001 will continue to be evaluated within context of changes in the site operational status. At this time, the increasing trend of calcium concentrations in monitoring well OW-10 and increasing of sulfate in monitoring well DEK-MW-18001 do not indicate a release from the unit, but instead are attributed to another change in conditions, such as groundwater flow regime or redox conditions as shown in Appendix F and discussed further in Section 4.3: Alternate Source Demonstration

4.3 Alternate Source Demonstration

At this time, Consumers Energy is asserting an Alternate Source Demonstration (ASD), for the following:

- Sulfate in monitoring well DEK-MW-18001
- Calcium in monitoring well OW-10; and
- Boron and pH in monitoring well OW-11.

Time-series plots included in Appendix F illustrate that the change in sulfate at DEK-MW-18001 and calcium in monitoring well OW-10 are likely a result of changes in the groundwater flow regime or redox conditions as a result of the Bottom Ash Pond closure activities, rather than a result of a release from the unit. The increasing concentrations began around the time of the dewatering and excavation that occurred in the adjacent Bottom Ash Pond area (April through July 2019), well before a leak in the Karn Lined Impoundment liner system was noted through the increase in the SCS daily average flow rate observed in December 2020.

Additionally, if the release from the liner damage likely occurred near the time of the increased SCS flow rate observed in December 2020, the only well close enough to the release to have been affected is OW-12, located near VOP 1. DEK-MW-18001 is approximately 130 feet away

from VOP 2 and OW-10 is over 500 feet away. Based on the interpreted groundwater contour map and potentiometric surface elevations observed near the KLI, a hydraulic gradient between the location of VOP 2 (approximate groundwater elevation of 586 ft NAVD88) and DEK-MW-18001 can be estimated at 0.0072. Using the mean hydraulic conductivity of 15 ft/day (ARCADIS, 2016) and an assumed effective porosity of 0.3, an estimated seepage velocity was calculated to be 0.36 ft/day or 132 ft/year between VOP 2 and DEK-MW-18001. These calculations indicate that it would take approximately a year for groundwater from near VOP 2 to reach DEK-MW-18001, and if the release occurred in early November, groundwater potentially affected by the release would not have had adequate time to reach DEK-MW-18001 or OW-12.

OW-11 does not appear to be downgradient of either area with noted liner damage, due to the well's position relative to the groundwater elevation high point, as shown in Figure 3. Furthermore, OW-11 has distinct chemistry as compared to the KLI-SCS data as shown in Table 3. Boron, which can be used as a conservative tracer, is nearly six times higher in OW-11 than what has been observed in the KLI-SCS samples, which indicate something other than the Karn Lined Impoundment is influencing chemistry at OW-11. The pH observed at OW-11 is nearly 2 standard units higher than what is observed in the KLI-SCS sample and other nearby wells. The continued used of OW-11 as a compliance well is being evaluated further, and if the well is determined to no longer be an appropriate compliance monitoring point, Consumers Energy will revise the HMP and recertify the well network.

5.0 Conclusions and Recommendations

Consumers Energy will continue the detection monitoring program for the Karn Lined Impoundment unit based on the data evaluations completed in Section 4.0 of this report in conformance with the Karn Lined Impoundment HMP. Although increasing trends for detection monitoring constituents were observed in three wells, these trends were found to not be a result of operation of the Karn Lined Impoundment. No SSIs over background limits were identified at the Karn Lined Impoundment during the May 2021 monitoring event. The use of secondary collection system flow rates as a leak detection system was successful. Increased flow rates observed in Q4 2020 triggered investigations by Consumers Energy that quickly identified deficiencies in the liner system and prompted actions to address the damaged liner. The results of the mitigation efforts continue to be monitored. The third quarter monitoring event is scheduled for July 2021.

6.0 References

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

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

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

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

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

Tables

Table 1
Summary of Groundwater Elevation Data
Karn Lined Impoundment, Essexville, Michigan

Well Location	TOC Elevation (ft)	Geologic Unit of Screen Interval	Screen Interval Elevation (ft)	May 3, 2021	
				Depth to Water (ft BTOC)	Groundwater Elevation (ft)
Background					
MW-15002	587.71	Sand	580.9 to 570.9	6.56	581.15
MW-15008	585.36	Sand with clay	578.7 to 568.7	4.13	581.23
MW-15016	586.49	Sand	581.2 to 578.2	4.38	582.11
MW-15019	586.17	Sand and Sand/Clay	579.5 to 569.5	4.85	581.32
DEK Bottom Ash Pond					
DEK-MW-15002	590.87	Sand	578.3 to 575.3	6.75	584.12
DEK-MW-15004	611.04	Sand	576.6 to 571.6	27.75	583.29
DEK-MW-15005	589.72	Sand	572.3 to 567.3	8.78	580.94
DEK-MW-15006	589.24	Sand	573.0 to 568.0	8.28	580.96
DEK Bottom Ash Pond & Karn Lined Impoundment					
DEK-MW-15003	602.74	Sand	578.8 to 574.8	15.40	587.34
DEK-MW-18001	593.47	Sand	579.2 to 574.2	8.41	585.06
OW-10	591.58	Silty Sand and Silty Clay	576.0 to 571.0	6.75	584.83
OW-11	607.90	Silt/Fly Ash	587.5 to 582.5	21.35	586.55
OW-12	603.07	Silty Sand	584.2 to 579.2	17.10	585.97
DEK Nature and Extent					
MW-01	597.02	Sand	573.0 to 570.0	16.10	580.92
MW-03	597.30	Sand	569.8 to 566.8	16.36	580.94
MW-06	589.44	Sand and Silty Sand	578.5 to 563.5	8.30	581.14
MW-08	598.78	Sand and Silty Clay	580.9 to 570.9	17.22	581.56
MW-10	596.97	Sand	582.5 to 572.5	16.00	580.97
MW-12	598.60	Sand	583.9 to 573.9	17.55	581.05
MW-14	594.37	Sand and Silty Clay	584.7 to 574.7	13.45	580.92
MW-16	595.80	Sand and Sand/Bottom Ash	584.1 to 574.1	14.92	580.88
MW-22	598.99	Ash/Sand	571.4 to 568.4	16.29	582.70
MW-23	595.57	Ash/Sand	576.9 to 571.9	13.09	582.48
DEK Static Water Level					
MW-02	597.34	Sand and Silty Clay	572.5 to 567.5	16.42	580.92
MW-04	598.01	NR	569.5 to 564.5	17.09	580.92
MW-17	597.91	Sand	577.0 to 574.0	13.00	584.91
MW-18	609.22	Silty Sand and Silty Clay	575.8 to 573.8	25.33	583.89
MW-19	597.28	NR	572.1 to 567.1	16.10	581.18
MW-20	632.75	Sand	582.3 to 579.3	51.73	581.02
MW-21	632.91	Sand	587.1 to 584.1	50.55	582.36
OW-01	631.33	NR	572.5 to 567.5	50.33	581.00
OW-02	598.01	Fly Ash	579.4 to 576.4	15.18	582.83
OW-03	597.94	Fly Ash and Sand	573.6 to 568.6	16.88	581.06
OW-04	590.21	Sand and Bottom/Fly Ash	579.1 to 574.1	9.26	580.95
OW-05	593.53	Sand	576.9 to 571.9	12.30	581.23
OW-06	603.95	NR	580.9 to 575.9	21.10	582.85
OW-07	596.41	Ash	583.3 to 580.3	13.38	583.03
OW-08	593.93	NR	581.0 to 576.0	10.66	583.27
OW-09	593.45	NR	585.5 to 580.5	10.12	583.33
OW-13	588.52	NR	579.5 to 574.5	4.68	583.84
OW-15	587.75	NR	572.8 to 567.8	4.00	583.75

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.

Table 2
Summary of Field Parameter Results: May 2021
Second Quarter 2021 Quarterly Report
Karn Lined Impoundment, Essexville, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (°C)	Turbidity (NTU)
Karn Lined Impoundment							
DEK-MW-15003	5/3/2021	1.88	13.0	8.0	340	14.9	4.63
DEK-MW-18001	5/3/2021	1.72	-64.3	7.3	558	10.6	2.37
OW-10	5/4/2021	1.68	-61.8	7.1	617	10.5	9.76
OW-11	5/4/2021	1.81	111.5	9.2	313	11.5	8.70
OW-12	5/4/2021	1.65	-85.8	7.2	559	12.6	7.53
KLI-PCS	5/4/2021	6.38	129.1	7.3	570	18.4	11.50
KLI-SCS	5/6/2021	3.19	53.9	7.5	1,436	12.5	4.89
SW-DITCH	5/4/2021	5.62	80.8	8.3	566	21.2	6.84

Notes:
mg/L - Milligrams per Liter.
mV - Millivolts.
SU - Standard Units.
umhos/cm - Micromhos per centimeter.
°C - Degrees Celsius.
NTU - Nephelometric Turbidity Unit.

Table 3
Summary of Groundwater Sampling Results (Analytical): May 2021
Second Quarter 2021 Quarterly Report
Karn Lined Impoundment, Essexville, Michigan

							Sample Location:	**DEK-MW-15003**	**DEK-MW-18001**	**OW-10**	**OW-12**	**OW-11**	**KLI-SCS**	**KLI-PCS**	**SW-DITCH**
							Sample Date:	5/3/2021	5/3/2021	5/4/2021	5/4/2021	5/4/2021	5/6/2021	5/4/2021	5/4/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Chronic-Based Mixing Zone GSI Criteria^	Acute-Based Mixing Zone GSI Criteria^	Downgradient					Supplemental		
Appendix III(1)															
Boron	ug/L	NC	**500**	**500**	NA	44,000	69,000	**862**	**1,180**	**1,300**	**747**	**3,300**	**580**	**598**	105
Calcium	mg/L	NC	NC	NC	500EE	NC	NC	27.4	65.2	107	75.1	12.9	112	66.9	62.2
Chloride	mg/L	250**	250E	250E	**50**	NC	NC	**50.6**	**51.6**	**75.1**	**60.8**	**67.1**	**52.5**	47.9	**52.2**
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	3,750	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250E**	**250E**	500EE	NC	NC	32.5	121	< 1	139	25.6	**466**	69.3	33.7
Total Dissolved Solids	mg/L	**500****	**500E**	**500E**	**500**	NC	NC	246	486	**549**	499	239	**1,260**	328	334
pH, Field	SU	**6.5 - 8.5****	**6.5 - 8.5E**	**6.5 - 8.5E**	**6.5 - 9.0**	NC	NC	8.0	7.3	7.1	7.2	**9.2**	7.5	7.3	8.3
Appendix IV(1)															
Antimony	ug/L	6	6	6	2	NC	NC	< 1	< 1	< 1	1	2	1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	NA	**100**	**680**	**545**	**92**	4	**86**	**742**	2	2	2
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC	42	135	184	67	37	66	345	128
Beryllium	ug/L	4	4	4	33	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5	5	2.5	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	0.6	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	NC	NC	< 1	< 1	4	< 1	< 1	< 1	3	1
Cobalt	ug/L	NC	40	100	100	NC	NC	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	3,750	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4	4	14	NC	NC	< 1	< 1	2	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	NC	NC	20	25	33	30	12	< 10	< 10	< 10
Mercury	ug/L	2	2	2	0.20#	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	**73**	**210**	**120**	NC	NC	25	< 5	< 5	13	**297**	35	22	< 5
Radium-226/228	pCi/L	5	NC	NC	NC	NC	NC	< 0.548	0.828	1.01	0.530	< 0.498	< 0.587	--	--
Selenium	ug/L	50	50	50	NA	55	120	1	< 1	3	1	3	7	1	< 1
Thallium	ug/L	2	2	2	2	NC	NC	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115(2)															
Iron	ug/L	**300****	**300E**	**300E**	500,000EE	NC	NC	141	**761**	**2,070**	**2,520**	40	164	255	232
Copper	ug/L	1,000**	1,000E	1,000E	20	NC	NC	< 1	< 1	6	< 1	< 1	3	3	6
Nickel	ug/L	NC	100	100	120	NC	NC	< 2	< 2	5	< 2	2	4	2	2
Silver	ug/L	100**	34	98	0.2	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	**62**	**27**	NC	NC	< 2	< 2	**6**	< 2	**536**	**6**	**16**	4
Zinc	ug/L	5,000**	2,400	5,000E	260	NC	NC	< 10	< 10	12	< 10	< 10	< 10	< 10	< 10

Notes:

Groundwater compliance is evaluated in accordance with the HMP to determine if a release from the unit has occurred and drinking water and GSI criteria are provided as screening levels only.

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; NA - not applicable; -- - not analyzed.

* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 30, 2013.

** - 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}. Mixing Zone 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 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 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

BOLD value indicates an exceedance of one or more of the listed criteria.

RED value indicates an exceedance of the MCL.

All metals were analyzed as total unless otherwise specified.

Table 4
Summary of Statistical Exceedances – May 2021
Karn Lined Impoundment
Essexville, Michigan

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
SUMMARY OF STATISTICAL EXCEEDANCES

Data is in (X) ug/L or ( ) mg/L unless otherwise stated

Facility: Karn Lined Impoundment – WDS# 392503

Well #	Location	Parameter	Part 201 GRCC	Statistical Limit (or 'CC' for Control Charts)	2 Qtr. 2021 (**bold** >201)	1 Qtr. 2021 (**bold** >201)		

No Exceedances

Figures

BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

N

1 " = 3,000 '
1:36,000

0 3,000 6,000 FEET

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

PROJECT:

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

TITLE:

SITE LOCATION MAP

DRAWN BY:	S. MAJOR
CHECKED BY:	J. KRENZ
APPROVED BY:	D. LITZ
DATE:	JULY 2020
PROJ. NO.:	367388.0001
FILE:	367388-001-004.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\367388-001-004.mxd -- Saved By: SMAJOR on 7/15/2020, 14:00:57 PM

LEGEND

- DEK BOTTOM ASH POND & LINED IMPOUNDMENT MONITORING WELL
- DEK BOTTOM ASH POND MONITORING WELL
- DEK LINED IMPOUNDMENT MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- SURFACE WATER GAUGING STATION
- NATURE AND EXTENT WELL
- SECONDARY CONTAINMENT SUMP (KLI-SCS)
- PRIMARY CONTAINMENT SYSTEM SAMPLE (KLI-PCS)
- SURFACE WATER SAMPLE (SW-DITCH)
- SLURRY WALL (APPROXIMATE)
- LINED IMPOUNDMENT (COVENANT BOUNDARY)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. WELL LOCATIONS SURVEYED BY ROWE PROFESSIONAL SERVICES COMPANY ON 11/4/2015.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).
4. A SINGLE WELL SYMBOL IS SHOWN FOR WELL PAIRS MW-01/MW-02, MW-03/MW-04, OW-02/MW-22, AND OW-07/MW-23 AS THE WELLS ARE LOCATED WITHIN 15-FT OF EACH OTHER.

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

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

TITLE:

SITE LAYOUT MAP

DRAWN BY:	A. ADAIR	PROJ NO.:	418425.0001
CHECKED BY:	J. KRENZ		
APPROVED BY:	L. DARBY		**FIGURE 2**
DATE:	APRIL 2021		

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

FILE NO.: 418425-101-002.mxd

Plot Date: 4/26/2021, 14:19:45 PM by AADAIR -- LAYOUT: ANSI B (11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 26976\1 DEKARN\2021 MXDs\2021 001 MARCH\418425-101-002.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

LEGEND

- DEK BOTTOM ASH POND & LINED IMPOUNDMENT MONITORING WELL
- DEK BOTTOM ASH POND MONITORING WELL
- DEK LINED IMPOUNDMENT MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- MONITORING WELL (STATIC ONLY)
- SURFACE WATER GAUGING STATION
- NATURE AND EXTENT WELL
- SLURRY WALL (APPROXIMATE)
- LINED IMPOUNDMENT (COVENANT BOUNDARY)
- GROUNDWATER ELEVATION CONTOUR (1' INTERVAL, DASHED WHERE INFERRED)
- *(580.50)* GROUNDWATER ELEVATION (FEET)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. WELL LOCATIONS SURVEYED BY ROWE PROFESSIONAL SERVICES COMPANY ON 11/4/2015.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.

N

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

CONSUMERS ENERGY COMPANY
DE KARN POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:

SHALLOW GROUNDWATER CONTOUR MAP MAY 3, 2021

DRAWN BY:	A. ADAIR	PROJ NO.:	418425.0001
CHECKED BY:	J. KRENZ		
APPROVED BY:	L. DARBY		**FIGURE 3**
DATE:	JULY 2021		

TRC
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FILE NO.: 418425-201-012.mxd

Plot Date: 7/28/2021, 12:48:26 PM by AADAIR -- LAYOUT: ANSI B (11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 26976\11 DEKARN\2021 MXDs\2021 002 MAY\418425-201-012.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

Appendix A
Laboratory Analytical Reports

Consumers Energy
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Laboratory Services
A CENTURY OF EXCELLENCE

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

To: CDBatts, Karn/Weadock

From: EBlaj, T-258

Date: Ma7 23, 2021

Subject: RCRA GROUNDWATER MONITORING – KARN LINED IMPOUNDMENT – 2021 Q2

CC: BTRunkel, P22-120
HDRegister, P22-521
BLSwanberg, P22-119

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

Chemistry Project: 21-0530

TRC Environmental, Inc. conducted groundwater monitoring at the DE Karn Lined Impoundment area on 05/04/2021 and 5/06/2021, for the 2nd Quarter monitoring 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 05/07/2021.

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

Reviewed and approved by:

Emil Blaj
Sr. Technical Analyst
Project Lead

ilac-MRA A2LA ACCREDITED Certificate #1097.04

CASE NARRATIVE

I. Sample Receipt

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

II. Methodology

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

III. Results/Quality Control

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

DEFINITIONS / QUALIFIERS

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

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

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

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Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q2-2021 DEK RCRA Lined Impoundment Wells
Date Received: 5/7/2021
Chemistry Project: 21-0530

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-0530-01	OW-10	Groundwater	05/04/2021 10:45 AM	DEK Lined Impoundment
21-0530-02	OW-11	Groundwater	05/04/2021 08:45 AM	DEK Lined Impoundment
21-0530-03	OW-12	Groundwater	05/04/2021 12:05 PM	DEK Lined Impoundment
21-0530-04	KLI-SCS	Groundwater	05/06/2021 10:24 AM	DEK Lined Impoundment
21-0530-05	KLI-PCS	Groundwater	05/04/2021 11:44 AM	DEK Lined Impoundment
21-0530-06	SW-DITCH	Groundwater	05/04/2021 12:05 PM	DEK Lined Impoundment
21-0530-07	DUP-KLI	Groundwater	05/04/2021 12:00 AM	DEK Lined Impoundment
21-0530-08	EB-KLI	Water	05/04/2021 12:05 PM	DEK Lined Impoundment
21-0530-09	FB-KLI	Water	05/04/2021 12:05 PM	DEK Lined Impoundment

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-10**
Lab Sample ID: 21-0530-01
Matrix: Groundwater

Laboratory Project: **21-0530**
Collect Date: 05/04/2021
Collect Time: 10:45 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0530-01-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/12/2021	AB21-0512-13

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

Aliquot: 21-0530-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/13/2021	AB21-0514-08
Arsenic	4		ug/L	1	05/13/2021	AB21-0514-08
Barium	184		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	1300		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	107000		ug/L	1000	05/14/2021	AB21-0514-08
Chromium	4		ug/L	1	05/13/2021	AB21-0514-08
Cobalt	ND		ug/L	6	05/13/2021	AB21-0514-08
Copper	6		ug/L	1	05/13/2021	AB21-0514-08
Iron	2070		ug/L	20	05/13/2021	AB21-0514-08
Lead	2		ug/L	1	05/13/2021	AB21-0514-08
Lithium	33		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	17600		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	ND		ug/L	5	05/13/2021	AB21-0514-08
Nickel	5		ug/L	2	05/13/2021	AB21-0514-08
Potassium	5240		ug/L	100	05/14/2021	AB21-0514-08
Selenium	3		ug/L	1	05/13/2021	AB21-0514-08
Silver	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Sodium	66200		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	6		ug/L	2	05/13/2021	AB21-0514-08
Zinc	12		ug/L	10	05/13/2021	AB21-0514-08

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

Aliquot: 21-0530-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	75100		ug/L	1000	05/12/2021	AB21-0512-03
Fluoride	ND		ug/L	1000	05/12/2021	AB21-0512-03
Sulfate	ND		ug/L	1000	05/12/2021	AB21-0512-03

Total Dissolved Solids by SM 2540C

Aliquot: 21-0530-01-C03-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	549		mg/L	10	05/10/2021	AB21-0510-07

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-10**
Lab Sample ID: 21-0530-01
Matrix: Groundwater

Laboratory Project: **21-0530**
Collect Date: 05/04/2021
Collect Time: 10:45 AM

Alkalinity by SM 2320B

Aliquot: 21-0530-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	363000		ug/L	10000	05/13/2021	AB21-0513-12
Alkalinity Bicarbonate	363000		ug/L	10000	05/13/2021	AB21-0513-12
Alkalinity Carbonate	ND		ug/L	10000	05/13/2021	AB21-0513-12

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-11**
Lab Sample ID: 21-0530-02
Matrix: Groundwater

Laboratory Project: **21-0530**
Collect Date: 05/04/2021
Collect Time: 08:45 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0530-02-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/12/2021	AB21-0512-13

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

Aliquot: 21-0530-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	2		ug/L	1	05/13/2021	AB21-0514-08
Arsenic	742		ug/L	1	05/13/2021	AB21-0514-08
Barium	37		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	3300		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	0.6		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	12900		ug/L	1000	05/14/2021	AB21-0514-08
Chromium	ND		ug/L	1	05/13/2021	AB21-0514-08
Cobalt	ND		ug/L	6	05/13/2021	AB21-0514-08
Copper	ND		ug/L	1	05/13/2021	AB21-0514-08
Iron	40		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	12		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	1650		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	297		ug/L	5	05/13/2021	AB21-0514-08
Nickel	2		ug/L	2	05/13/2021	AB21-0514-08
Potassium	5060		ug/L	100	05/14/2021	AB21-0514-08
Selenium	3		ug/L	1	05/13/2021	AB21-0514-08
Silver	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Sodium	60500		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	536		ug/L	2	05/13/2021	AB21-0514-08
Zinc	ND		ug/L	10	05/13/2021	AB21-0514-08

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

Aliquot: 21-0530-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	67100		ug/L	1000	05/12/2021	AB21-0512-03
Fluoride	3750		ug/L	1000	05/12/2021	AB21-0512-03
Sulfate	25600		ug/L	1000	05/12/2021	AB21-0512-03

Total Dissolved Solids by SM 2540C

Aliquot: 21-0530-02-C03-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	239		mg/L	10	05/10/2021	AB21-0510-07

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-11**
Lab Sample ID: 21-0530-02
Matrix: Groundwater

Laboratory Project: **21-0530**
Collect Date: 05/04/2021
Collect Time: 08:45 AM

Alkalinity by SM 2320B

Aliquot: 21-0530-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	72000		ug/L	10000	05/13/2021	AB21-0513-12
Alkalinity Bicarbonate	23000		ug/L	10000	05/13/2021	AB21-0513-12
Alkalinity Carbonate	49000		ug/L	10000	05/13/2021	AB21-0513-12

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-12**
Lab Sample ID: 21-0530-03
Matrix: Groundwater

Laboratory Project: **21-0530**
Collect Date: 05/04/2021
Collect Time: 12:05 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0530-03-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/12/2021	AB21-0512-13

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

Aliquot: 21-0530-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	1		ug/L	1	05/13/2021	AB21-0514-08
Arsenic	86		ug/L	1	05/13/2021	AB21-0514-08
Barium	67		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	747		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	75100		ug/L	1000	05/14/2021	AB21-0514-08
Chromium	ND		ug/L	1	05/13/2021	AB21-0514-08
Cobalt	ND		ug/L	6	05/13/2021	AB21-0514-08
Copper	ND		ug/L	1	05/13/2021	AB21-0514-08
Iron	2520		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	30		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	21800		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	13		ug/L	5	05/13/2021	AB21-0514-08
Nickel	ND		ug/L	2	05/13/2021	AB21-0514-08
Potassium	6030		ug/L	100	05/14/2021	AB21-0514-08
Selenium	1		ug/L	1	05/13/2021	AB21-0514-08
Silver	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Sodium	52300		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	ND		ug/L	2	05/13/2021	AB21-0514-08
Zinc	ND		ug/L	10	05/13/2021	AB21-0514-08

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

Aliquot: 21-0530-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	60800		ug/L	1000	05/12/2021	AB21-0512-03
Fluoride	ND		ug/L	1000	05/12/2021	AB21-0512-03
Sulfate	139000		ug/L	1000	05/12/2021	AB21-0512-03

Total Dissolved Solids by SM 2540C

Aliquot: 21-0530-03-C03-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	499		mg/L	10	05/10/2021	AB21-0510-07

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-12**
Lab Sample ID: 21-0530-03
Matrix: Groundwater

Laboratory Project: **21-0530**
Collect Date: 05/04/2021
Collect Time: 12:05 PM

Alkalinity by SM 2320B

Aliquot: 21-0530-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	161000		ug/L	10000	05/13/2021	AB21-0513-12
Alkalinity Bicarbonate	161000		ug/L	10000	05/13/2021	AB21-0513-12
Alkalinity Carbonate	ND		ug/L	10000	05/13/2021	AB21-0513-12

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A CENTURY OF EXCELLENCE

Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-SCS**
Lab Sample ID: 21-0530-04
Matrix: Groundwater

Laboratory Project: **21-0530**
Collect Date: 05/06/2021
Collect Time: 10:24 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0530-04-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/12/2021	AB21-0512-13

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

Aliquot: 21-0530-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	1		ug/L	1	05/13/2021	AB21-0514-08
Arsenic	2		ug/L	1	05/13/2021	AB21-0514-08
Barium	66		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	580		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	112000		ug/L	1000	05/14/2021	AB21-0514-08
Chromium	ND		ug/L	1	05/13/2021	AB21-0514-08
Cobalt	ND		ug/L	6	05/13/2021	AB21-0514-08
Copper	3		ug/L	1	05/13/2021	AB21-0514-08
Iron	164		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	ND		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	33000		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	35		ug/L	5	05/13/2021	AB21-0514-08
Nickel	4		ug/L	2	05/13/2021	AB21-0514-08
Potassium	4220		ug/L	100	05/14/2021	AB21-0514-08
Selenium	7		ug/L	1	05/13/2021	AB21-0514-08
Silver	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Sodium	267000		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	6		ug/L	2	05/13/2021	AB21-0514-08
Zinc	ND		ug/L	10	05/13/2021	AB21-0514-08

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

Aliquot: 21-0530-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	52500		ug/L	1000	05/12/2021	AB21-0512-03
Fluoride	ND		ug/L	1000	05/12/2021	AB21-0512-03
Sulfate	466000		ug/L	1000	05/17/2021	AB21-0512-03

Total Dissolved Solids by SM 2540C

Aliquot: 21-0530-04-C03-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1260		mg/L	10	05/10/2021	AB21-0510-07

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-SCS**
Lab Sample ID: 21-0530-04
Matrix: Groundwater

Laboratory Project: **21-0530**
Collect Date: 05/06/2021
Collect Time: 10:24 AM

Alkalinity by SM 2320B

Aliquot: 21-0530-04-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	410000		ug/L	10000	05/13/2021	AB21-0513-12
Alkalinity Bicarbonate	410000		ug/L	10000	05/13/2021	AB21-0513-12
Alkalinity Carbonate	ND		ug/L	10000	05/13/2021	AB21-0513-12

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-PCS**
Lab Sample ID: 21-0530-05
Matrix: Groundwater

Laboratory Project: **21-0530**
Collect Date: 05/04/2021
Collect Time: 11:44 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0530-05-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/12/2021	AB21-0512-13

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

Aliquot: 21-0530-05-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/13/2021	AB21-0514-08
Arsenic	2		ug/L	1	05/13/2021	AB21-0514-08
Barium	345		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	598		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	66900		ug/L	1000	05/14/2021	AB21-0514-08
Chromium	3		ug/L	1	05/13/2021	AB21-0514-08
Cobalt	ND		ug/L	6	05/13/2021	AB21-0514-08
Copper	3		ug/L	1	05/13/2021	AB21-0514-08
Iron	255		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	ND		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	13200		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	22		ug/L	5	05/13/2021	AB21-0514-08
Nickel	2		ug/L	2	05/13/2021	AB21-0514-08
Potassium	2940		ug/L	100	05/14/2021	AB21-0514-08
Selenium	1		ug/L	1	05/13/2021	AB21-0514-08
Silver	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Sodium	30700		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	16		ug/L	2	05/13/2021	AB21-0514-08
Zinc	ND		ug/L	10	05/13/2021	AB21-0514-08

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

Aliquot: 21-0530-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	47900		ug/L	1000	05/12/2021	AB21-0512-03
Fluoride	ND		ug/L	1000	05/12/2021	AB21-0512-03
Sulfate	69300		ug/L	1000	05/12/2021	AB21-0512-03

Total Dissolved Solids by SM 2540C

Aliquot: 21-0530-05-C03-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	328		mg/L	10	05/10/2021	AB21-0510-07

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-PCS**
Lab Sample ID: 21-0530-05
Matrix: Groundwater

Laboratory Project: **21-0530**
Collect Date: 05/04/2021
Collect Time: 11:44 AM

Alkalinity by SM 2320B

Aliquot: 21-0530-05-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	116000		ug/L	10000	05/13/2021	AB21-0513-12
Alkalinity Bicarbonate	113000		ug/L	10000	05/13/2021	AB21-0513-12
Alkalinity Carbonate	ND		ug/L	10000	05/13/2021	AB21-0513-12

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **SW-DITCH**
Lab Sample ID: 21-0530-06
Matrix: Groundwater

Laboratory Project: **21-0530**
Collect Date: 05/04/2021
Collect Time: 12:05 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0530-06-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/12/2021	AB21-0512-13

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

Aliquot: 21-0530-06-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/13/2021	AB21-0514-08
Arsenic	2		ug/L	1	05/13/2021	AB21-0514-08
Barium	128		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	105		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	62200		ug/L	1000	05/14/2021	AB21-0514-08
Chromium	1		ug/L	1	05/13/2021	AB21-0514-08
Cobalt	ND		ug/L	6	05/13/2021	AB21-0514-08
Copper	6		ug/L	1	05/13/2021	AB21-0514-08
Iron	232		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	ND		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	17200		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	ND		ug/L	5	05/13/2021	AB21-0514-08
Nickel	2		ug/L	2	05/13/2021	AB21-0514-08
Potassium	2750		ug/L	100	05/14/2021	AB21-0514-08
Selenium	ND		ug/L	1	05/13/2021	AB21-0514-08
Silver	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Sodium	31600		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	4		ug/L	2	05/13/2021	AB21-0514-08
Zinc	ND		ug/L	10	05/13/2021	AB21-0514-08

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

Aliquot: 21-0530-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	52200		ug/L	1000	05/12/2021	AB21-0512-03
Fluoride	ND		ug/L	1000	05/12/2021	AB21-0512-03
Sulfate	33700		ug/L	1000	05/12/2021	AB21-0512-03

Total Dissolved Solids by SM 2540C

Aliquot: 21-0530-06-C03-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	334		mg/L	10	05/10/2021	AB21-0510-07

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **SW-DITCH**
Lab Sample ID: 21-0530-06
Matrix: Groundwater

Laboratory Project: **21-0530**
Collect Date: 05/04/2021
Collect Time: 12:05 PM

Alkalinity by SM 2320B

Aliquot: 21-0530-06-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	170000		ug/L	10000	05/13/2021	AB21-0513-12
Alkalinity Bicarbonate	170000		ug/L	10000	05/13/2021	AB21-0513-12
Alkalinity Carbonate	ND		ug/L	10000	05/13/2021	AB21-0513-12

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **DUP-KLI**
Lab Sample ID: 21-0530-07
Matrix: Groundwater

Laboratory Project: **21-0530**
Collect Date: 05/04/2021
Collect Time: 12:00 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0530-07-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/12/2021	AB21-0512-13

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

Aliquot: 21-0530-07-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/13/2021	AB21-0514-08
Arsenic	87		ug/L	1	05/13/2021	AB21-0514-08
Barium	68		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	752		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	75500		ug/L	1000	05/14/2021	AB21-0514-08
Chromium	ND		ug/L	1	05/13/2021	AB21-0514-08
Cobalt	ND		ug/L	6	05/13/2021	AB21-0514-08
Copper	ND		ug/L	1	05/13/2021	AB21-0514-08
Iron	2530		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	29		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	21800		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	13		ug/L	5	05/13/2021	AB21-0514-08
Nickel	ND		ug/L	2	05/13/2021	AB21-0514-08
Potassium	6080		ug/L	100	05/14/2021	AB21-0514-08
Selenium	1		ug/L	1	05/13/2021	AB21-0514-08
Silver	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Sodium	52700		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	ND		ug/L	2	05/13/2021	AB21-0514-08
Zinc	ND		ug/L	10	05/13/2021	AB21-0514-08

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

Aliquot: 21-0530-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	61800		ug/L	1000	05/12/2021	AB21-0512-03
Fluoride	ND		ug/L	1000	05/12/2021	AB21-0512-03
Sulfate	141000		ug/L	1000	05/12/2021	AB21-0512-03

Total Dissolved Solids by SM 2540C

Aliquot: 21-0530-07-C03-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	497		mg/L	10	05/10/2021	AB21-0510-07

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **DUP-KLI**
Lab Sample ID: 21-0530-07
Matrix: Groundwater

Laboratory Project: **21-0530**
Collect Date: 05/04/2021
Collect Time: 12:00 AM

Alkalinity by SM 2320B

Aliquot: 21-0530-07-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	162000		ug/L	10000	05/13/2021	AB21-0513-12
Alkalinity Bicarbonate	162000		ug/L	10000	05/13/2021	AB21-0513-12
Alkalinity Carbonate	ND		ug/L	10000	05/13/2021	AB21-0513-12

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **EB-KLI**
Lab Sample ID: 21-0530-08
Matrix: Water

Laboratory Project: **21-0530**
Collect Date: 05/04/2021
Collect Time: 12:05 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0530-08-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/12/2021	AB21-0512-13

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

Aliquot: 21-0530-08-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/13/2021	AB21-0514-08
Arsenic	ND		ug/L	1	05/13/2021	AB21-0514-08
Barium	ND		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	ND		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	ND		ug/L	1000	05/14/2021	AB21-0514-08
Chromium	ND		ug/L	1	05/13/2021	AB21-0514-08
Cobalt	ND		ug/L	6	05/13/2021	AB21-0514-08
Copper	ND		ug/L	1	05/13/2021	AB21-0514-08
Iron	ND		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	ND		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	ND		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	ND		ug/L	5	05/13/2021	AB21-0514-08
Nickel	ND		ug/L	2	05/13/2021	AB21-0514-08
Potassium	ND		ug/L	100	05/14/2021	AB21-0514-08
Selenium	ND		ug/L	1	05/13/2021	AB21-0514-08
Silver	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Sodium	ND		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	ND		ug/L	2	05/13/2021	AB21-0514-08
Zinc	ND		ug/L	10	05/13/2021	AB21-0514-08

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **FE-KLI**
Lab Sample ID: 21-0530-09
Matrix: Water

Laboratory Project: **21-0530**
Collect Date: 05/04/2021
Collect Time: 12:05 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0530-09-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/12/2021	AB21-0512-13

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

Aliquot: 21-0530-09-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/13/2021	AB21-0514-08
Arsenic	ND		ug/L	1	05/13/2021	AB21-0514-08
Barium	ND		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	ND		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	ND		ug/L	1000	05/14/2021	AB21-0514-08
Chromium	ND		ug/L	1	05/13/2021	AB21-0514-08
Cobalt	ND		ug/L	6	05/13/2021	AB21-0514-08
Copper	ND		ug/L	1	05/13/2021	AB21-0514-08
Iron	ND		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	ND		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	ND		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	ND		ug/L	5	05/13/2021	AB21-0514-08
Nickel	ND		ug/L	2	05/13/2021	AB21-0514-08
Potassium	ND		ug/L	100	05/14/2021	AB21-0514-08
Selenium	ND		ug/L	1	05/13/2021	AB21-0514-08
Silver	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Sodium	ND		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	ND		ug/L	2	05/13/2021	AB21-0514-08
Zinc	ND		ug/L	10	05/13/2021	AB21-0514-08

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Analytical Report

Report Date: 05/23/21

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-0530

Inspection Date: 5.7.21 **Inspection By:** CVH

Sample Origin/Project Name: DEK LI

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx _____ UPS _____ USPS _____ Airborne _____

Other/Hand Carry (whom) TRC

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

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

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

Loose/Unpackaged Containers _____ Other _____

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

Damaged Shipment Observed: None ✓ Dented _____ Leaking _____

Other _____

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

Shipping Containers Received: Opened _____ Sealed ✓

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

CoC ✓ Work Request _____ Air Data Sheet _____ Other _____

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

As-Received Temperature Range 2.0-5.0°C Samples Received on Ice: Yes ✓ No _____

M&TE # and Expiration 015402 6.4.21

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

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or ~~60mL~~)	14				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	10				
24 mL vial (glass)					
250 ~~500~~ mL (plastic)	1				
Other _____					

PG 2 of 2 not needed

CHAIN OF CUSTODY

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SAMPLING SITE	PROJECT NUMBER	ANALYSIS REQUESTED	Page 1 of 1
DEK Lined Impoundment – 2021 Q2	21-0530		SEND REPORT TO CDBatts
SAMPLING TEAM: DRC	DATE SHIPPED	SITE SKETCHED ATTACHED? CIRCLE ONE YES NO	HD Register, TRC PHONE

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity					REMARKS
21-0530-01	5/4/21	10:45	GW	OW-10		5	x	x	x	x					
-02	5/4/21	8:45	GW	OW-11		5	x	x	x	x					
-03	5/4/21	12:05	GW	OW-12		5	x	x	x	x					
-04	5/6/21	10:24	GW	KLI-SCS		5	x	x	x	x					
-05	5/4/21	11:44	GW	KLI-PCS		5	x	x	x	x					
-06	5/4/21	12:05	GW	SW-DITCH		5	x	x	x	x					
-07	5/4/21	—	GW	DUP-KLI		5	x	x	x	x					
-08	5/4/21	12:05	W	EB-KLI		1	x								
-09	5/4/21	12:05	W	FB-KLI		1	x								

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	COMMENTS
[signature]	5-7-21 1151	[signature]	2.0 - 5.0°C 015402 6.4.21
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	
		[signature]	

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135 W. Trail St.
Jackson, MI 49201

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

To: CDBatts, Karn/Weadock

From: EBlaj, T-258

Date: May 23, 2021

Subject: RCRA GROUNDWATER MONITORING – KARN BAP & LINED IMP. WELLS – 2021 Q2

CC: BTRunkel, P22-120
HDRegister, P22-521
BLSwanberg, P22-119

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

Chemistry Project: 21-0529

TRC Environmental, Inc. conducted groundwater monitoring at the DEKarn Bottom Ash Pond and Lined Impoundment Wells area on 05/03/2021, for the 2nd Quarter monitoring 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 05/05/2021.

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

Reviewed and approved by:

Emil Blaj
Sr. Technical Analyst
Project Lead

ilac-MRA A2LA ACCREDITED Certificate #1097.04

CASE NARRATIVE

I. Sample Receipt

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

II. Methodology

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

III. Results/Quality Control

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

DEFINITIONS / QUALIFIERS

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

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

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

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Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q2-2021 DEK RCRA Bottom Ash Pond & Lined Impoundment
Date Received: 5/5/2021
Chemistry Project: 21-0529

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-0529-01	DEK-MW-15003	Groundwater	05/03/2021 12:33 PM	DEK Bottom Ash Pond & Lined Impoundment
21-0529-02	DEK-MW-18001	Groundwater	05/03/2021 11:28 AM	DEK Bottom Ash Pond & Lined Impoundment
21-0529-03	DEK-MW-18001 MS	Groundwater	05/03/2021 11:28 AM	DEK Bottom Ash Pond & Lined Impoundment
21-0529-04	DEK-MW-18001 MSD	Groundwater	05/03/2021 11:28 AM	DEK Bottom Ash Pond & Lined Impoundment

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-15003**
Lab Sample ID: 21-0529-01
Matrix: Groundwater

Laboratory Project: **21-0529**
Collect Date: 05/03/2021
Collect Time: 12:33 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0529-01-C01-A01 Analyst: TMR

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.1	05/12/2021	AB21-0512-13

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

Aliquot: 21-0529-01-C01-A02 Analyst: EB

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/13/2021	AB21-0514-08
Arsenic	545		ug/L	1	05/13/2021	AB21-0514-08
Barium	42		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	862		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	27400		ug/L	1000	05/14/2021	AB21-0514-08
Chromium	ND		ug/L	1	05/13/2021	AB21-0514-08
Cobalt	ND		ug/L	6	05/13/2021	AB21-0514-08
Copper	ND		ug/L	1	05/13/2021	AB21-0514-08
Iron	141		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	20		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	4330		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	25		ug/L	5	05/13/2021	AB21-0514-08
Nickel	ND		ug/L	2	05/13/2021	AB21-0514-08
Potassium	4470		ug/L	100	05/14/2021	AB21-0514-08
Selenium	1		ug/L	1	05/13/2021	AB21-0514-08
Silver	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Sodium	46900		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	ND		ug/L	2	05/13/2021	AB21-0514-08
Zinc	ND		ug/L	10	05/13/2021	AB21-0514-08

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

Aliquot: 21-0529-01-C02-A01 Analyst: DMW

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	50600		ug/L	1000	05/06/2021	AB21-0506-07
Fluoride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Sulfate	32500		ug/L	1000	05/06/2021	AB21-0506-07

Total Dissolved Solids by SM 2540C

Aliquot: 21-0529-01-C03-A01 Analyst: CET

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	246		mg/L	10	05/07/2021	AB21-0507-02

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-15003**
Lab Sample ID: 21-0529-01
Matrix: Groundwater

Laboratory Project: **21-0529**
Collect Date: 05/03/2021
Collect Time: 12:33 PM

Alkalinity by SM 2320B

Aliquot: 21-0529-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	86200		ug/L	10000	05/11/2021	AB21-0511-11
Alkalinity Bicarbonate	86200		ug/L	10000	05/11/2021	AB21-0511-11
Alkalinity Carbonate	ND		ug/L	10000	05/11/2021	AB21-0511-11

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001**
Lab Sample ID: 21-0529-02
Matrix: Groundwater

Laboratory Project: **21-0529**
Collect Date: 05/03/2021
Collect Time: 11:28 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0529-02-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/12/2021	AB21-0512-13

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

Aliquot: 21-0529-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/13/2021	AB21-0514-08
Arsenic	92		ug/L	1	05/13/2021	AB21-0514-08
Barium	135		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	1180		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	65200		ug/L	1000	05/14/2021	AB21-0514-08
Chromium	ND		ug/L	1	05/13/2021	AB21-0514-08
Cobalt	ND		ug/L	6	05/13/2021	AB21-0514-08
Copper	ND		ug/L	1	05/13/2021	AB21-0514-08
Iron	761		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	25		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	12300		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	ND		ug/L	5	05/13/2021	AB21-0514-08
Nickel	ND		ug/L	2	05/13/2021	AB21-0514-08
Potassium	4180		ug/L	100	05/14/2021	AB21-0514-08
Selenium	ND		ug/L	1	05/13/2021	AB21-0514-08
Silver	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Sodium	69700		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	ND		ug/L	2	05/13/2021	AB21-0514-08
Zinc	ND		ug/L	10	05/13/2021	AB21-0514-08

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

Aliquot: 21-0529-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	51600		ug/L	1000	05/07/2021	AB21-0506-07
Fluoride	ND		ug/L	1000	05/07/2021	AB21-0506-07
Sulfate	121000		ug/L	1000	05/07/2021	AB21-0506-07

Total Dissolved Solids by SM 2540C

Aliquot: 21-0529-02-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	486		mg/L	10	05/07/2021	AB21-0507-02

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Analytical Report

Report Date: 05/23/21

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001**
Lab Sample ID: 21-0529-02
Matrix: Groundwater

Laboratory Project: **21-0529**
Collect Date: 05/03/2021
Collect Time: 11:28 AM

Alkalinity by SM 2320B

Aliquot: 21-0529-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	191000		ug/L	10000	05/11/2021	AB21-0511-11
Alkalinity Bicarbonate	191000		ug/L	10000	05/11/2021	AB21-0511-11
Alkalinity Carbonate	ND		ug/L	10000	05/11/2021	AB21-0511-11

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001 MS**
Lab Sample ID: 21-0529-03
Matrix: Groundwater

Laboratory Project: **21-0529**
Collect Date: 05/03/2021
Collect Time: 11:28 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0529-03-C01-A01 Analyst: TMR

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	99.8		%	0.2	05/12/2021	AB21-0512-13

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

Aliquot: 21-0529-03-C01-A02 Analyst: EB

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	108		%	1	05/13/2021	AB21-0514-08
Arsenic	117		%	1	05/13/2021	AB21-0514-08
Barium	109		%	5	05/13/2021	AB21-0514-08
Beryllium	113		%	1	05/13/2021	AB21-0514-08
Boron	115		%	20	05/13/2021	AB21-0514-08
Cadmium	104		%	0.2	05/13/2021	AB21-0514-08
Calcium	123		%	1000	05/14/2021	AB21-0514-08
Chromium	98		%	1	05/13/2021	AB21-0514-08
Cobalt	104		%	6	05/13/2021	AB21-0514-08
Copper	98		%	1	05/13/2021	AB21-0514-08
Iron	88		%	20	05/13/2021	AB21-0514-08
Lead	103		%	1	05/13/2021	AB21-0514-08
Lithium	110		%	10	05/13/2021	AB21-0514-08
Magnesium	112		%	1000	05/14/2021	AB21-0514-08
Molybdenum	114		%	5	05/13/2021	AB21-0514-08
Nickel	97		%	2	05/13/2021	AB21-0514-08
Potassium	117		%	100	05/14/2021	AB21-0514-08
Selenium	118		%	1	05/13/2021	AB21-0514-08
Silver	104		%	0.2	05/13/2021	AB21-0514-08
Sodium	117		%	1000	05/14/2021	AB21-0514-08
Thallium	102		%	2	05/13/2021	AB21-0514-08
Vanadium	101		%	2	05/13/2021	AB21-0514-08
Zinc	101		%	10	05/13/2021	AB21-0514-08

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

Aliquot: 21-0529-03-C02-A01 Analyst: DMW

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	117		%	1000	05/07/2021	AB21-0506-07
Fluoride	90		%	1000	05/07/2021	AB21-0506-07
Sulfate	102		%	1000	05/07/2021	AB21-0506-07

Alkalinity by SM 2320B

Aliquot: 21-0529-03-C03-A01 Analyst: DLS

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	97		%	10000	05/11/2021	AB21-0511-11

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001 MSD**
Lab Sample ID: 21-0529-04
Matrix: Groundwater

Laboratory Project: **21-0529**
Collect Date: 05/03/2021
Collect Time: 11:28 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0529-04-C01-A01 Analyst: TMR

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	100.0		%	0.2	05/12/2021	AB21-0512-13

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

Aliquot: 21-0529-04-C01-A02 Analyst: EB

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	110		%	1	05/13/2021	AB21-0514-08
Arsenic	118		%	1	05/13/2021	AB21-0514-08
Barium	112		%	5	05/13/2021	AB21-0514-08
Beryllium	113		%	1	05/13/2021	AB21-0514-08
Boron	106		%	20	05/13/2021	AB21-0514-08
Cadmium	105		%	0.2	05/13/2021	AB21-0514-08
Calcium	121		%	1000	05/14/2021	AB21-0514-08
Chromium	97		%	1	05/13/2021	AB21-0514-08
Cobalt	104		%	6	05/13/2021	AB21-0514-08
Copper	97		%	1	05/13/2021	AB21-0514-08
Iron	91		%	20	05/13/2021	AB21-0514-08
Lead	102		%	1	05/13/2021	AB21-0514-08
Lithium	108		%	10	05/13/2021	AB21-0514-08
Magnesium	114		%	1000	05/14/2021	AB21-0514-08
Molybdenum	115		%	5	05/13/2021	AB21-0514-08
Nickel	96		%	2	05/13/2021	AB21-0514-08
Potassium	114		%	100	05/14/2021	AB21-0514-08
Selenium	115		%	1	05/13/2021	AB21-0514-08
Silver	104		%	0.2	05/13/2021	AB21-0514-08
Sodium	121		%	1000	05/14/2021	AB21-0514-08
Thallium	102		%	2	05/13/2021	AB21-0514-08
Vanadium	100		%	2	05/13/2021	AB21-0514-08
Zinc	100		%	10	05/13/2021	AB21-0514-08

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

Aliquot: 21-0529-04-C02-A01 Analyst: DMW

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	115		%	1000	05/07/2021	AB21-0506-07
Fluoride	94		%	1000	05/07/2021	AB21-0506-07
Sulfate	102		%	1000	05/07/2021	AB21-0506-07

Alkalinity by SM 2320B

Aliquot: 21-0529-04-C03-A01 Analyst: DLS

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	96		%	10000	05/11/2021	AB21-0511-11

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Analytical Report

Report Date: 05/23/21

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-0529

Inspection Date: 5/5/21 **Inspection By:** LVH

Sample Origin/Project Name: DEK BAP + LI

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx ✓ UPS _____ USPS _____ Airborne _____

Other/Hand Carry (whom) _____

Tracking Number: 786749796241 Shipping Form Attached: Yes ✓ No _____

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

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

Loose/Unpackaged Containers _____ Other _____

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

Damaged Shipment Observed: None ✓ Dented _____ Leaking _____

Other _____

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

Shipping Containers Received: Opened _____ Sealed ✓

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

CoC ✓ Work Request _____ Air Data Sheet _____ Other _____

Temperature of Containers: Measure the temperature of several sample containers

As-Received Temperature Range 0.3 · 1.6 °C Samples Received on Ice: Yes ✓ No _____

M&TE # and Expiration 015402 4.4.21

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

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

PG. 2 of 2 not needed

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Consumers Energy

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SAMPLING SITE	PROJECT NUMBER	ANALYSIS REQUESTED	Page 1 of 1
DEK Bottom Ash Pond & LI – 2021 Q2	21-0529		SEND REPORT TO CDBatts; HD Register, TRC; PHONE
SAMPLING TEAM: TRC	DATE SHIPPED: 5-4-21	SITE SKETCHED ATTACHED? CIRCLE ONE: YES NO	

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity					REMARKS
21-0529-01	5-3-21	1233	GW	DEK-MW-15003		5	x	x	x	x					
-02	5-3-21	1128	GW	DEK-MW-18001		5	x	x	x	x					
-03	5-3-21	1128	GW	DEK-MW-18001 MS		4	x	x		x					
-04	5-3-21	1128	GW	DEK-MW-18001 MSD		4	x	x		x					

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	COMMENTS
[signature]	5-4-21 / 1630	Fedex	0.3-1.6°C 015402
Fed Ex	5-5-21 1100	[signature] Hansen	

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ANALYTICAL REPORT

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Tel: (330)497-9396

Laboratory Job ID: 240-149192-1
Client Project/Site: Karn/Weadock CCR Karn Lined Impoundment

For:
TRC Environmental Corporation.
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Ann Arbor, Michigan 48108-7080

Attn: Darby Litz

Kris Brooks

Authorized for release by:
6/17/2021 1:20:04 PM

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Definitions/Glossary

Client: TRC Environmental Corporation. Job ID: 240-149192-1
Project/Site: Karn/Weadock CCR Karn Lined Impoundment

Qualifiers

Rad

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

Glossary

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

Job ID: 240-149192-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

Job Narrative
240-149192-1

Comments
The EPA Method 904.0 Radium-228, EPA Method 903.0 Radium-226, and Ra226_Ra228 Combined Radium 226 and Radium 228 analyses were performed at the Eurofins TestAmerica St. Louis laboratory.

Receipt
The samples were received on 5/12/2021 8:00 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 0.8º C.

RAD
Method 903.0: Radium 226 prep batch 160-510304
Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative. Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date. OW-10 (240-149192-1), OW-11 (240-149192-2), OW-12 (240-149192-3), DUP-KLI (240-149192-4), EB-01 (240-149192-5), KLI-SCS (240-149192-6), (LCS 160-510304/1-A), (LCSD 160-510304/2-A) and (MB 160-510304/22-A)

Method 904.0: Radium-228 Batch 510305

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative. Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date. OW-10 (240-149192-1), OW-11 (240-149192-2), OW-12 (240-149192-3), DUP-KLI (240-149192-4), EB-01 (240-149192-5), KLI-SCS (240-149192-6), (LCS 160-510305/1-A), (LCSD 160-510305/2-A) and (MB 160-510305/22-A)

Method PrecSep_0: Ra-228 Batch 160-510305: Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: OW-11 (240-149192-2), OW-12 (240-149192-3), DUP-KLI (240-149192-4), EB-01 (240-149192-5) and KLI-SCS (240-149192-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

Method PrecSep_0: Ra-228 Batch 160-510305: The following samples were prepared at a reduced aliquot due to Matrix: OW-10 (240-149192-1). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead of a sample duplicate (DUP) to demonstrate batch precision.

Method PrecSep_0: Ra-228 Batch 160- 510305: During the in-growth process, the following samples needed to be filtered due to sediment present in the sample: OW-10 (240-149192-1) and KLI-SCS (240-149192-6). This is an indicator of matrix interference.

Method PrecSep STD: Ra-226 Batch 160-510304: Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: OW-11 (240-149192-2), OW-12 (240-149192-3), DUP-KLI (240-149192-4), EB-01 (240-149192-5) and KLI-SCS (240-149192-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

Method PrecSep STD: Ra-226 Batch 160-510304: The following samples were prepared at a reduced aliquot due to Matrix: OW-10 (240-149192-1). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead of a sample duplicate (DUP) to demonstrate batch precision.

Method PrecSep STD: Ra-226 Batch 160-510304: During the in-growth process, the following samples needed to be filtered due to sediment present in the sample: OW-10 (240-149192-1) and KLI-SCS (240-149192-6). This is an indicator of matrix interference.

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

Method Summary

Client: TRC Environmental Corporation. Job ID: 240-149192-1
Project/Site: Karn/Weadock CCR Karn Lined Impoundment

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

Protocol References:

EPA = US Environmental Protection Agency

None = None

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

Laboratory References:

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

Sample Summary

Client: TRC Environmental Corporation.
Job ID: 240-149192-1
Project/Site: Karn/Weadock CCR Karn Lined Impoundment

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
240-149192-1	OW-10	Water	05/04/21 10:45	05/12/21 08:00	
240-149192-2	OW-11	Water	05/04/21 08:45	05/12/21 08:00	
240-149192-3	OW-12	Water	05/04/21 12:05	05/12/21 08:00	
240-149192-4	DUP-KLI	Water	05/04/21 00:00	05/12/21 08:00	
240-149192-5	EB-01	Water	05/04/21 12:05	05/12/21 08:00	
240-149192-6	KLI-SCS	Water	05/06/21 10:24	05/12/21 08:00	

Client Sample ID: OW-10
Date Collected: 05/04/21 10:45
Date Received: 05/12/21 08:00

Lab Sample ID: 240-149192-1
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.144	U	0.158	0.158	1.00	0.255	pCi/L	05/18/21 13:46	06/14/21 21:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*84.4*		*40 - 110*	*05/18/21 13:46*	*06/14/21 21:19*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.867**		0.405	0.413	1.00	0.584	pCi/L	05/18/21 14:33	06/11/21 13:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*84.4*		*40 - 110*	*05/18/21 14:33*	*06/11/21 13:57*	*1*
Y Carrier	*87.9*		*40 - 110*	*05/18/21 14:33*	*06/11/21 13:57*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.01**		0.435	0.442	5.00	0.584	pCi/L		06/15/21 21:24	1

Client Sample ID: OW-11
Date Collected: 05/04/21 08:45
Date Received: 05/12/21 08:00

Lab Sample ID: 240-149192-2
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0732	U	0.108	0.108	1.00	0.183	pCi/L	05/18/21 13:46	06/14/21 21:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.2*		*40 - 110*	*05/18/21 13:46*	*06/14/21 21:19*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.0821	U	0.271	0.271	1.00	0.498	pCi/L	05/18/21 14:33	06/11/21 13:59	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.2*		*40 - 110*	*05/18/21 14:33*	*06/11/21 13:59*	*1*
Y Carrier	*82.6*		*40 - 110*	*05/18/21 14:33*	*06/11/21 13:59*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	-0.00890	U	0.292	0.292	5.00	0.498	pCi/L		06/15/21 21:24	1

Client Sample ID: OW-12
Date Collected: 05/04/21 12:05
Date Received: 05/12/21 08:00

Lab Sample ID: 240-149192-3
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.120	U	0.104	0.104	1.00	0.156	pCi/L	05/18/21 13:46	06/14/21 21:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.3*		*40 - 110*	*05/18/21 13:46*	*06/14/21 21:19*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.410	U	0.294	0.297	1.00	0.461	pCi/L	05/18/21 14:33	06/11/21 13:59	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.3*		*40 - 110*	*05/18/21 14:33*	*06/11/21 13:59*	*1*
Y Carrier	*90.1*		*40 - 110*	*05/18/21 14:33*	*06/11/21 13:59*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.530**		0.312	0.315	5.00	0.461	pCi/L		06/15/21 21:24	1

Client Sample ID: DUP-KLI
Date Collected: 05/04/21 00:00
Date Received: 05/12/21 08:00

Lab Sample ID: 240-149192-4
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.141	U	0.114	0.115	1.00	0.170	pCi/L	05/18/21 13:46	06/14/21 21:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.5*		*40 - 110*	*05/18/21 13:46*	*06/14/21 21:20*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.304	U	0.256	0.258	1.00	0.407	pCi/L	05/18/21 14:33	06/11/21 14:16	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.5*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:16*	*1*
Y Carrier	*88.6*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:16*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.445**		0.280	0.282	5.00	0.407	pCi/L		06/15/21 21:24	1

Client Sample ID: EB-01 — Lab Sample ID: 240-149192-5

Date Collected: 05/04/21 12:05 — **Matrix: Water**
Date Received: 05/12/21 08:00

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.0621	U	0.0705	0.0707	1.00	0.177	pCi/L	05/18/21 13:46	06/14/21 21:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.6*		*40 - 110*	*05/18/21 13:46*	*06/14/21 21:20*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0578	U	0.251	0.252	1.00	0.443	pCi/L	05/18/21 14:33	06/11/21 14:16	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.6*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:16*	*1*
Y Carrier	*86.7*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:16*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	-0.00424	U	0.261	0.262	5.00	0.443	pCi/L		06/15/21 21:24	1

Client: TRC Environmental Corporation. Job ID: 240-149192-1
Project/Site: Karn/Weadock CCR Karn Lined Impoundment

Client Sample ID: KLI-SCS
Lab Sample ID: 240-149192-6
Date Collected: 05/06/21 10:24
Matrix: Water
Date Received: 05/12/21 08:00

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0907	U	0.109	0.110	1.00	0.180	pCi/L	05/18/21 13:46	06/14/21 21:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.2*		*40 - 110*	*05/18/21 13:46*	*06/14/21 21:20*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.425	U	0.365	0.368	1.00	0.587	pCi/L	05/18/21 14:33	06/11/21 14:16	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.2*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:16*	*1*
Y Carrier	*86.4*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:16*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.516	U	0.381	0.384	5.00	0.587	pCi/L		06/15/21 21:24	1

Tracer/Carrier Summary

Client: TRC Environmental Corporation. Job ID: 240-149192-1
Project/Site: Karn/Weadock CCR Karn Lined Impoundment

Method: 903.0 - Radium-226 (GFPC)

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

		Percent Yield (Acceptance Limits)
		Ba
Lab Sample ID	Client Sample ID	(40-110)
240-149192-1	OW-10	84.4
240-149192-2	OW-11	86.2
240-149192-3	OW-12	85.3
240-149192-4	DUP-KLI	89.5
240-149192-5	EB-01	85.6
240-149192-6	KLI-SCS	83.2
LCS 160-510304/1-A	Lab Control Sample	82.0
LCSD 160-510304/2-A	Lab Control Sample Dup	87.1
MB 160-510304/22-A	Method Blank	86.8

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

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

		Percent Yield (Acceptance Limits)	
		Ba	Y
Lab Sample ID	Client Sample ID	(40-110)	(40-110)
240-149192-1	OW-10	84.4	87.9
240-149192-2	OW-11	86.2	82.6
240-149192-3	OW-12	85.3	90.1
240-149192-4	DUP-KLI	89.5	88.6
240-149192-5	EB-01	85.6	86.7
240-149192-6	KLI-SCS	83.2	86.4
LCS 160-510305/1-A	Lab Control Sample	82.0	89.3
LCSD 160-510305/2-A	Lab Control Sample Dup	87.1	90.5
MB 160-510305/22-A	Method Blank	86.8	84.9

Tracer/Carrier Legend

Ba = Ba Carrier
Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-510304/22-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 514296 — **Prep Batch: 510304**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.1200	U	0.103	0.104	1.00	0.156	pCi/L	05/18/21 13:46	06/15/21 07:09	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.8*		*40 - 110*	*05/18/21 13:46*	*06/15/21 07:09*	*1*

Lab Sample ID: LCS 160-510304/1-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 514248 — **Prep Batch: 510304**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-226			11.3	10.88		1.21	1.00	0.208	pCi/L	96	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*82.0*		*40 - 110*

Lab Sample ID: LCSD 160-510304/2-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 514248 — **Prep Batch: 510304**

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-226			11.3	11.52		1.25	1.00	0.163	pCi/L	102	75 - 125	0.26	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*87.1*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-510305/22-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 513770 — **Prep Batch: 510305**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.1192	U	0.255	0.256	1.00	0.439	pCi/L	05/18/21 14:33	06/11/21 14:18	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.8*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:18*	*1*
Y Carrier	*84.9*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:18*	*1*

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

Lab Sample ID: LCS 160-510305/1-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 513948 **Prep Batch: 510305**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-228			9.64	9.496		1.16	1.00	0.469	pCi/L	99	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*82.0*		*40 - 110*
Y Carrier	*89.3*		*40 - 110*

Lab Sample ID: LCSD 160-510305/2-A **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 513948 **Prep Batch: 510305**

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-228			9.64	9.100		1.10	1.00	0.397	pCi/L	94	75 - 125	0.18	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*87.1*		*40 - 110*
Y Carrier	*90.5*		*40 - 110*

QC Association Summary

Client: TRC Environmental Corporation. Job ID: 240-149192-1
Project/Site: Karn/Weadock CCR Karn Lined Impoundment

Rad

Prep Batch: 510304

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-149192-1	OW-10	Total/NA	Water	PrecSep STD	
240-149192-2	OW-11	Total/NA	Water	PrecSep STD	
240-149192-3	OW-12	Total/NA	Water	PrecSep STD	
240-149192-4	DUP-KLI	Total/NA	Water	PrecSep STD	
240-149192-5	EB-01	Total/NA	Water	PrecSep STD	
240-149192-6	KLI-SCS	Total/NA	Water	PrecSep STD	
MB 160-510304/22-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-510304/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-510304/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	

Prep Batch: 510305

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-149192-1	OW-10	Total/NA	Water	PrecSep_0	
240-149192-2	OW-11	Total/NA	Water	PrecSep_0	
240-149192-3	OW-12	Total/NA	Water	PrecSep_0	
240-149192-4	DUP-KLI	Total/NA	Water	PrecSep_0	
240-149192-5	EB-01	Total/NA	Water	PrecSep_0	
240-149192-6	KLI-SCS	Total/NA	Water	PrecSep_0	
MB 160-510305/22-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-510305/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-510305/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-149192-1
Project/Site: Karn/Weadock CCR Karn Lined Impoundment

Client Sample ID: OW-10 — Lab Sample ID: 240-149192-1

Date Collected: 05/04/21 10:45 — **Matrix: Water**
Date Received: 05/12/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			510304	05/18/21 13:46	HRT	TAL SL
Total/NA	Analysis	903.0		1	514232	06/14/21 21:19	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513943	06/11/21 13:57	ANW	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Client Sample ID: OW-11 — Lab Sample ID: 240-149192-2

Date Collected: 05/04/21 08:45 — **Matrix: Water**
Date Received: 05/12/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			510304	05/18/21 13:46	HRT	TAL SL
Total/NA	Analysis	903.0		1	514232	06/14/21 21:19	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513784	06/11/21 13:59	ANW	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Client Sample ID: OW-12 — Lab Sample ID: 240-149192-3

Date Collected: 05/04/21 12:05 — **Matrix: Water**
Date Received: 05/12/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			510304	05/18/21 13:46	HRT	TAL SL
Total/NA	Analysis	903.0		1	514232	06/14/21 21:19	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513784	06/11/21 13:59	ANW	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Client Sample ID: DUP-KLI — Lab Sample ID: 240-149192-4

Date Collected: 05/04/21 00:00 — **Matrix: Water**
Date Received: 05/12/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			510304	05/18/21 13:46	HRT	TAL SL
Total/NA	Analysis	903.0		1	514232	06/14/21 21:20	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513770	06/11/21 14:16	SCB	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-149192-1
Project/Site: Karn/Weadock CCR Karn Lined Impoundment

Client Sample ID: EB-01 — Lab Sample ID: 240-149192-5

Date Collected: 05/04/21 12:05 — **Matrix: Water**
Date Received: 05/12/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			510304	05/18/21 13:46	HRT	TAL SL
Total/NA	Analysis	903.0		1	514232	06/14/21 21:20	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513770	06/11/21 14:16	SCB	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Client Sample ID: KLI-SCS — Lab Sample ID: 240-149192-6

Date Collected: 05/06/21 10:24 — **Matrix: Water**
Date Received: 05/12/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			510304	05/18/21 13:46	HRT	TAL SL
Total/NA	Analysis	903.0		1	514232	06/14/21 21:20	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513770	06/11/21 14:16	SCB	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Laboratory References:

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

Accreditation/Certification Summary

Client: TRC Environmental Corporation. Job ID: 240-149192-1
Project/Site: Karn/Weadock CCR Karn Lined Impoundment

Laboratory: Eurofins TestAmerica, 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	05-06-22
ANAB	Dept. of Defense ELAP	L2305	04-06-22
ANAB	Dept. of Energy	L2305.01	04-06-22
ANAB	ISO/IEC 17025	L2305	04-06-22
Arizona	State	AZ0813	12-08-21
California	Los Angeles County Sanitation Districts	10259	06-30-21
California	State	2886	06-30-21
Connecticut	State	PH-0241	03-31-23
Florida	NELAP	E87689	06-30-21
HI - RadChem Recognition	State	n/a	06-30-21
Illinois	NELAP	004553	11-30-21
Iowa	State	373	12-01-22
Kansas	NELAP	E-10236	10-31-21
Kentucky (DW)	State	KY90125	01-01-22
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-21
Louisiana	NELAP	04080	06-30-21
Louisiana (DW)	State	LA011	12-31-21
Maryland	State	310	09-30-21
MI - RadChem Recognition	State	9005	06-30-21
Missouri	State	780	06-30-22
Nevada	State	MO000542020-1	07-31-21
New Jersey	NELAP	MO002	06-30-21
New York	NELAP	11616	04-01-22
North Dakota	State	R-207	06-30-21
NRC	NRC	24-24817-01	12-31-22
Oklahoma	State	9997	08-31-21
Oregon	NELAP	4157	09-01-21
Pennsylvania	NELAP	68-00540	03-01-22
South Carolina	State	85002001	06-30-21
Texas	NELAP	T104704193	07-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	US Federal Programs	P330-17-00028	03-11-23
Utah	NELAP	MO000542019-11	07-31-21
Virginia	NELAP	10310	06-14-22
Washington	State	C592	08-30-21
West Virginia DEP	State	381	10-31-21

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone: 330-497-9396 Fax: 330-497-0772

0.7/08

Chain of Custody Record

MICHIGAN 190

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Client Information	Sampler: J. Krenz	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-82584-29054.1
Client Contact: Jacob Krenz	Phone: 734-395-9804	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:			Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: Δ Yes Δ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD			
Email: JKrenz@trccompanies.com	WO #:			
Project Name: Karn/Weadock CCR Karn Lined Impoundment	Project #: 24024154			
Site:	SSOW#:			

Analysis Requested

240-149192 Chain of Custody

Preservation Codes:

A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
E - NaHSO4
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
M - Hexane
N - None
O - AsNaO2
P - Na2O4S
Q - Na2SO3
R - Na2S2O3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - pH 4-5
Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	D		
OW-10	5/4/21	10:45	G	Water	N	N	D	D		
OW-11	5/4/21	845		Water	N	N	D	D		
OW-12	5/4/21	12:05		Water	N	N	D	D		
DUP-01 KLI	5/4/21	—		Water	N	N	D	D		
EB-01	5/4/21	12:05		Water	N	N	D	D		
KLI-SCS	5/6/21	1024	↓	Water	N	N	X	X		

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

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

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

Special Instructions/QC Requirements:

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

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1	[signature]	5-7-21/1537	TRC	[signature]	5/7/21 1537	ETA
2	[signature] - cold storage	5/7/21 1545	ETA	[signature]	5-12-21 800	ETA
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

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

Ver: 11/01/2020

Eurofins TestAmerica Canton Sample Receipt Form/Narrative **Login # :** _____
Canton Facility

Client TRC Site Name _____ Cooler unpacked by: Matt S

Cooler Received on 5-12-21 Opened on 5-12-21

FedEx: 1st Grd Exp UPS FAS ~~Clipper~~ Client Drop Off TestAmerica Courier Other _____

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

TestAmerica Cooler # 7 Foam Box Client Cooler Box Other _____

Packing material used: ~~Bubble Wrap~~ Foam Plastic Bag None Other _____

COOLANT: ~~Wet Ice~~ Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt ☐ See Multiple Cooler Form
   IR GUN# IR-11 (CF +0.1 °C) Observed Cooler Temp. 0.7 °C Corrected Cooler Temp. 0.8 °C
   IR GUN #IR-12 (CF +0.2°C) Observed Cooler Temp. _____ °C Corrected Cooler Temp. _____ °C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1	(Yes)	No
-Were the seals on the outside of the cooler(s) signed & dated?	(Yes)	No NA
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes	(No)
-Were tamper/custody seals intact and uncompromised?	(Yes)	No NA
3. Shippers' packing slip attached to the cooler(s)?	(Yes)	No
4. Did custody papers accompany the sample(s)?	(Yes)	No
5. Were the custody papers relinquished & signed in the appropriate place?	(Yes)	No
6. Was/were the person(s) who collected the samples clearly identified on the COC?	(Yes)	No
7. Did all bottles arrive in good condition (Unbroken)?	(Yes)	No
8. Could all bottle labels (ID/Date/Time) be reconciled with the COC?	(Yes)	No
9. For each sample, does the COC specify preservatives (Y/N), # of containers (Y/N) and sample type of grab/comp (Y/N)?		
10. Were correct bottle(s) used for the test(s) indicated?	(Yes)	No
11. Sufficient quantity received to perform indicated analyses?	(Yes)	No
12. Are these work share samples and all listed on the COC?	Yes	(No)
If yes, Questions 13-17 have been checked at the originating laboratory.		
13. Were all preserved sample(s) at the correct pH upon receipt?	(Yes)	No NA pH Strip Lot# **HC022887**
14. Were VOAs on the COC?	Yes	(No)
15. Were air bubbles >6 mm in any VOA vials? ● ← Larger than this.	Yes	No (NA)
16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # _____	Yes	(No)
17. Was a LL Hg or Me Hg trip blank present? _____	Yes	(No)

Tests that are not checked for pH by Receiving:
VOAs
Oil and Grease
TOC

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other

Concerning _____

18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES ☐ additional next page | Samples processed by:

_____

_____

_____

_____

19. SAMPLE CONDITION

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

Sample(s) _____ were received in a broken container.

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

20. SAMPLE PRESERVATION

Sample(s) _____ were further preserved in the laboratory.

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

VOA Sample Preservation - Date/Time VOAs Frozen: _____

Login Container Summary Report

Temperature readings: _____

Client Sample ID	Lab ID	Container Type	Container pH	Container Temp	Preservative Added (mls)	Lot #
OW-10	240-149192-A-1	Plastic 1 liter - Nitric Acid	<2			
OW-10	240-149192-B-1	Plastic 1 liter - Nitric Acid	<2			
OW-11	240-149192-A-2	Plastic 1 liter - Nitric Acid	<2			
OW-11	240-149192-B-2	Plastic 1 liter - Nitric Acid	<2			
OW-12	240-149192-A-3	Plastic 1 liter - Nitric Acid	<2			
OW-12	240-149192-B-3	Plastic 1 liter - Nitric Acid	<2			
DUP-KL1	240-149192-A-4	Plastic 1 liter - Nitric Acid	<2			
DUP-KL1	240-149192-B-4	Plastic 1 liter - Nitric Acid	<2			
EB-01	240-149192-A-5	Plastic 1 liter - Nitric Acid	<2			
EB-01	240-149192-B-5	Plastic 1 liter - Nitric Acid	<2			
KLI-SCS	240-149192-A-6	Plastic 1 liter - Nitric Acid	<2			
KLI-SCS	240-149192-B-6	Plastic 1 liter - Nitric Acid	<2			

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

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Client Information (Sub Contract Lab)	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-136577.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin: Michigan	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-149192-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 6/13/2021			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Karn/Weadock CCR Groundwater Monitoring	Project #: 24024154			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_STD Standard Target List	904.0/PrecSep_0 Standard Target List	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
OW-10 (240-149192-1)	5/4/21	10:45 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
OW-11 (240-149192-2)	5/4/21	08:45 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
OW-12 (240-149192-3)	5/4/21	12:05 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-KL1 (240-149192-4)	5/4/21	Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EB-01 (240-149192-5)	5/4/21	12:05 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
KLI-SCS (240-149192-6)	5/4/21	10:24 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.

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

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

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

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
[signature]	5-12-21 1700	ETA	FED EX		
Relinquished by: FED EX	Date/Time:	Company	Received by: [signature]	Date/Time: 5/13/21 0845	Company ETA STL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

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

Ver: 11/01/2020

Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

Job Number: 240-149192-1

Login Number: 149192
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins TestAmerica, St. Louis
List Creation: 05/13/21 11:08 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	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").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Tel: (330)497-9396

Laboratory Job ID: 240-149195-1
Client Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

For:
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Attn: Darby Litz

Kris Brooks

Authorized for release by:
6/17/2021 1:22:47 PM

Kris Brooks, Project Manager II
(330)966-9790
Kris.Brooks@Eurofinset.com

Table of Contents

Definitions/Glossary

Client: TRC Environmental Corporation. Job ID: 240-149195-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Qualifiers

Rad

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

Glossary

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

Case Narrative

Client: TRC Environmental Corporation. Job ID: 240-149195-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Job ID: 240-149195-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

Job Narrative
240-149195-1

Comments
The EPA Method 904.0 Radium-228, EPA Method 903.0 Radium-226, and Ra226_Ra228 Combined Radium 226 and Radium 228 analyses were performed at the Eurofins TestAmerica St. Louis laboratory.

Receipt
The samples were received on 5/12/2021 8:00 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 0.9º C.

RAD
Method 903.0: Radium 226 prep batch 160-510304: Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative. Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date. DEK-MW-15003 (240-149195-1), DEK-MW-18001 (240-149195-2), (LCS 160-510304/1-A), (LCSD 160-510304/2-A) and (MB 160-510304/22-A)

Method 904.0: Radium-228 Batch 510305: Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative. Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date. DEK-MW-15003 (240-149195-1), DEK-MW-18001 (240-149195-2), (LCS 160-510305/1-A), (LCSD 160-510305/2-A) and (MB 160-510305/22-A)

Method PrecSep_0: Ra-228 Batch 160-510305: Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: DEK-MW-15003 (240-149195-1) and DEK-MW-18001 (240-149195-2). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

Method PrecSep_0: Ra-228 Batch 160- 510305: During the in-growth process, the following samples needed to be filtered due to sediment present in the sample: DEK-MW-15003 (240-149195-1). This is an indicator of matrix interference.

Method PrecSep STD: Ra-226 Batch 160-510304: Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: DEK-MW-15003 (240-149195-1) and DEK-MW-18001 (240-149195-2). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

Method PrecSep STD: Ra-226 Batch 160-510304: During the in-growth process, the following samples needed to be filtered due to sediment present in the sample: DEK-MW-15003 (240-149195-1). This is an indicator of matrix interference.

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

Method Summary

Client: TRC Environmental Corporation.
Job ID: 240-149195-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

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

Protocol References:

EPA = US Environmental Protection Agency

None = None

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

Laboratory References:

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

Sample Summary

Client: TRC Environmental Corporation.
Job ID: 240-149195-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
240-149195-1	DEK-MW-15003	Water	05/03/21 12:33	05/12/21 08:00	
240-149195-2	DEK-MW-18001	Water	05/03/21 11:28	05/12/21 08:00	

Client Sample ID: DEK-MW-15003 — Lab Sample ID: 240-149195-1

Date Collected: 05/03/21 12:33 — **Matrix: Water**
Date Received: 05/12/21 08:00

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0790	U	0.100	0.100	1.00	0.166	pCi/L	05/18/21 13:46	06/15/21 07:07	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.3*		*40 - 110*	*05/18/21 13:46*	*06/15/21 07:07*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.0302	U	0.305	0.305	1.00	0.548	pCi/L	05/18/21 14:33	06/11/21 14:17	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.3*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:17*	*1*
Y Carrier	*90.1*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:17*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.0488	U	0.321	0.321	5.00	0.548	pCi/L		06/15/21 21:24	1

Client Sample ID: DEK-MW-18001 — Lab Sample ID: 240-149195-2

Date Collected: 05/03/21 11:28 — **Matrix: Water**
Date Received: 05/12/21 08:00

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.189		0.119	0.120	1.00	0.162	pCi/L	05/18/21 13:46	06/15/21 07:08	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.1*		*40 - 110*	*05/18/21 13:46*	*06/15/21 07:08*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.639		0.388	0.393	1.00	0.596	pCi/L	05/18/21 14:33	06/11/21 14:17	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.1*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:17*	*1*
Y Carrier	*69.9*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:17*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.828		0.406	0.411	5.00	0.596	pCi/L		06/15/21 21:24	1

Tracer/Carrier Summary

Client: TRC Environmental Corporation.
Job ID: 240-149195-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Method: 903.0 - Radium-226 (GFPC)

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

		Percent Yield (Acceptance Limits)
		Ba
Lab Sample ID	Client Sample ID	(40-110)
240-149195-1	DEK-MW-15003	79.3
240-149195-2	DEK-MW-18001	90.1
LCS 160-510304/1-A	Lab Control Sample	82.0
LCSD 160-510304/2-A	Lab Control Sample Dup	87.1
MB 160-510304/22-A	Method Blank	86.8

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

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

		Percent Yield (Acceptance Limits)	
		Ba	Y
Lab Sample ID	Client Sample ID	(40-110)	(40-110)
240-149195-1	DEK-MW-15003	79.3	90.1
240-149195-2	DEK-MW-18001	90.1	69.9
LCS 160-510305/1-A	Lab Control Sample	82.0	89.3
LCSD 160-510305/2-A	Lab Control Sample Dup	87.1	90.5
MB 160-510305/22-A	Method Blank	86.8	84.9

Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-510304/22-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 514296 — **Prep Batch: 510304**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.1200	U	0.103	0.104	1.00	0.156	pCi/L	05/18/21 13:46	06/15/21 07:09	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.8*		*40 - 110*	*05/18/21 13:46*	*06/15/21 07:09*	*1*

Lab Sample ID: LCS 160-510304/1-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 514248 — **Prep Batch: 510304**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-226			11.3	10.88		1.21	1.00	0.208	pCi/L	96	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*82.0*		*40 - 110*

Lab Sample ID: LCSD 160-510304/2-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 514248 — **Prep Batch: 510304**

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-226			11.3	11.52		1.25	1.00	0.163	pCi/L	102	75 - 125	0.26	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*87.1*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-510305/22-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 513770 — **Prep Batch: 510305**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.1192	U	0.255	0.256	1.00	0.439	pCi/L	05/18/21 14:33	06/11/21 14:18	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.8*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:18*	*1*
Y Carrier	*84.9*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:18*	*1*

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

Lab Sample ID: LCS 160-510305/1-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 513948 **Prep Batch: 510305**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-228			9.64	9.496		1.16	1.00	0.469	pCi/L	99	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*82.0*		*40 - 110*
Y Carrier	*89.3*		*40 - 110*

Lab Sample ID: LCSD 160-510305/2-A **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 513948 **Prep Batch: 510305**

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-228			9.64	9.100		1.10	1.00	0.397	pCi/L	94	75 - 125	0.18	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*87.1*		*40 - 110*
Y Carrier	*90.5*		*40 - 110*

QC Association Summary

Client: TRC Environmental Corporation. Job ID: 240-149195-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Rad

Prep Batch: 510304

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-149195-1	DEK-MW-15003	Total/NA	Water	PrecSep STD	
240-149195-2	DEK-MW-18001	Total/NA	Water	PrecSep STD	
MB 160-510304/22-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-510304/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-510304/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	

Prep Batch: 510305

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-149195-1	DEK-MW-15003	Total/NA	Water	PrecSep_0	
240-149195-2	DEK-MW-18001	Total/NA	Water	PrecSep_0	
MB 160-510305/22-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-510305/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-510305/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-149195-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Client Sample ID: DEK-MW-15003 Lab Sample ID: 240-149195-1

Date Collected: 05/03/21 12:33 **Matrix: Water**
Date Received: 05/12/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			510304	05/18/21 13:46	HRT	TAL SL
Total/NA	Analysis	903.0		1	514296	06/15/21 07:07	FLC	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513770	06/11/21 14:17	SCB	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Client Sample ID: DEK-MW-18001 Lab Sample ID: 240-149195-2

Date Collected: 05/03/21 11:28 **Matrix: Water**
Date Received: 05/12/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			510304	05/18/21 13:46	HRT	TAL SL
Total/NA	Analysis	903.0		1	514296	06/15/21 07:08	FLC	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513770	06/11/21 14:17	SCB	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Laboratory References:

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

Accreditation/Certification Summary

Client: TRC Environmental Corporation. Job ID: 240-149195-1
Project/Site: Karn/Weadock CCR DEK Bottom Ash Pond

Laboratory: Eurofins TestAmerica, 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	05-06-22
ANAB	Dept. of Defense ELAP	L2305	04-06-22
ANAB	Dept. of Energy	L2305.01	04-06-22
ANAB	ISO/IEC 17025	L2305	04-06-22
Arizona	State	AZ0813	12-08-21
California	Los Angeles County Sanitation Districts	10259	06-30-21
California	State	2886	06-30-21
Connecticut	State	PH-0241	03-31-23
Florida	NELAP	E87689	06-30-21
HI - RadChem Recognition	State	n/a	06-30-21
Illinois	NELAP	004553	11-30-21
Iowa	State	373	12-01-22
Kansas	NELAP	E-10236	10-31-21
Kentucky (DW)	State	KY90125	01-01-22
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-21
Louisiana	NELAP	04080	06-30-21
Louisiana (DW)	State	LA011	12-31-21
Maryland	State	310	09-30-21
MI - RadChem Recognition	State	9005	06-30-21
Missouri	State	780	06-30-22
Nevada	State	MO000542020-1	07-31-21
New Jersey	NELAP	MO002	06-30-21
New York	NELAP	11616	04-01-22
North Dakota	State	R-207	06-30-21
NRC	NRC	24-24817-01	12-31-22
Oklahoma	State	9997	08-31-21
Oregon	NELAP	4157	09-01-21
Pennsylvania	NELAP	68-00540	03-01-22
South Carolina	State	85002001	06-30-21
Texas	NELAP	T104704193	07-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	US Federal Programs	P330-17-00028	03-11-23
Utah	NELAP	MO000542019-11	07-31-21
Virginia	NELAP	10310	06-14-22
Washington	State	C592	08-30-21
West Virginia DEP	State	381	10-31-21

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone: 330-497-9396 Fax: 330-497-0772

0.8109

Chain of Custody Record

MICHIGAN 190

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Client Information	Sampler: Jake Krenz	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-82583-29053.1
Client Contact: Jacob Krenz	Phone: 734-395-9804	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:			Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: Δ Yes Δ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD			
Email: JKrenz@trccompanies.com	WO #:			
Project Name: Karn/Weadock CCR DEK Bottom Ash Pond & I	Project #: 24024154			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	D		
DEK-MW-15003	5-3-21	1233	G	Water	N	N	X	X		
DEK-MW-18001	5-3-21	1128	G	Water	N	N	X	X		
				Water						

240-149195 Chain of Custody

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

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

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

Special Instructions/QC Requirements:

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

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		5-7-21 1537	TRC		5/7/21	ETA
2	- cold storage	5/7/21 1545	ETA	Cleaver	5/12/21 800	ETA
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

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

Ver: 11/01/2020

6/17/2021

Eurofins TestAmerica Canton Sample Receipt Form/Narrative **Login # : 149145**
Canton Facility

Client Jacob Krenz Site Name _____ Cooler unpacked by: Trent C

Cooler Received on 5/12/21 Opened on 5/12/21

FedEx: 1st Grd Exp UPS FAS (Clipper) Client Drop Off TestAmerica Courier Other _____

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

TestAmerica Cooler # _____ Foam Box Client Cooler Box Other _____

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

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

1. Cooler temperature upon receipt ☐ See Multiple Cooler Form
   IR GUN# IR-11 (CF +0.1 °C) Observed Cooler Temp. 0.8 °C Corrected Cooler Temp. 0.9 °C
   IR GUN #IR-12 (CF +0.2°C) Observed Cooler Temp. _____ °C Corrected Cooler Temp. _____ °C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity _____	(Yes)	No
-Were the seals on the outside of the cooler(s) signed & dated?	(Yes)	No NA
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes	(No)
-Were tamper/custody seals intact and uncompromised?	Yes	(No) NA
3. Shippers' packing slip attached to the cooler(s)?	(Yes)	No
4. Did custody papers accompany the sample(s)?	(Yes)	No
5. Were the custody papers relinquished & signed in the appropriate place?	(Yes)	No
6. Was/were the person(s) who collected the samples clearly identified on the COC?	(Yes)	No
7. Did all bottles arrive in good condition (Unbroken)?	(Yes)	No
8. Could all bottle labels (ID/Date/Time) be reconciled with the COC? TC/5/12	(Yes)	No
9. For each sample, does the COC specify preservatives (Y/N), # of containers (Y/N), and sample type of grab/comp (Y/N)?		
10. Were correct bottle(s) used for the test(s) indicated?	(Yes)	No
11. Sufficient quantity received to perform indicated analyses?	(Yes)	No
12. Are these work share samples and all listed on the COC?	(Yes)	No
If yes, Questions 13-17 have been checked at the originating laboratory.		
13. Were all preserved sample(s) at the correct pH upon receipt?	(Yes)	No NA pH Strip Lot# **HC022887**
14. Were VOAs on the COC?	Yes	No
15. Were air bubbles >6 mm in any VOA vials? ● ⬅ Larger than this.	Yes	No NA
16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # _____	Yes	No
17. Was a LL Hg or Me Hg trip blank present? _____	Yes	No

Tests that are not checked for pH by Receiving:
VOAs
Oil and Grease
TOC

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other

Concerning _____

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

Samples processed by:

19. SAMPLE CONDITION

Sample(s) _____ were received after the recommended holding time had expired.
Sample(s) _____ were received in a broken container.
Sample(s) _____ were received with bubble >6 mm in diameter. (Notify PM)

20. SAMPLE PRESERVATION

Sample(s) _____ were further preserved in the laboratory.
Time preserved: _____ Preservative(s) added/Lot number(s): _____

VOA Sample Preservation - Date/Time VOAs Frozen: _____

WI-NC-099

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-136581.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin: Michigan	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-149195-1
Address: 13715 Rider Trail North,	Due Date Requested: 6/13/2021			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Karn/Weadock CCR Groundwater Monitoring	Project #: 24024154			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_STD Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
DEK-MW-15003 (240-149195-1)	5/3/21	12:33 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DEK-MW-18001 (240-149195-2)	5/3/21	11:28 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.

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

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

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

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
[signature]	5-12-21 1715	ETA	FED EX		
Relinquished by: FED EX	Date/Time:	Company	Received by: [signature]	Date/Time: 5/13/21 0845	Company ETA STL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

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

Ver: 11/01/2020

Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

Job Number: 240-149195-1

Login Number: 149195
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins TestAmerica, St. Louis
List Creation: 05/13/21 11:16 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
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").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Appendix B
Field Notes

TRC

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Compliance
PROJECT NUMBER:	418425.0001.0000
PROJECT MANAGER:	Darby Litz
SITE LOCATION:	2742 Weadock Hwy Essexville, MI 48732
DATES OF FIELDWORK:	5/3/21 TO 5/6/21
PURPOSE OF FIELDWORK:	First semiannual 2021 CCR Sampling event
WORK PERFORMED BY:	Audrey Cook, Jake Krenz, Javier Jasso

Jake Krenz 5-7-21

SIGNED DATE

CHECKED BY DATE

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME: CEC Karn BAP/LI: 2021 GW Comp	DATE: 5/3/21	TIME ARRIVED: 8:00
PROJECT NUMBER: 418425.0001.0000	AUTHOR: Audrey Cook, Jake Krenz,	TIME LEFT: 17:00

WEATHER

TEMPERATURE: 60 °F WIND: S - 10 MPH VISIBILITY: CLEAR

WORK / SAMPLING PERFORMED

- SAMPLED:
  - DEK-MW-15006
  - DEK-MW-15007
  - DEK-MW-15005 ; DUP-BAP ; DUP-DEK-BAP
  - DEK-MW-15004
  - ~~DEK~~-MW-15008

J. Krenz sampled: MW-15002
DEK-MW-18001 (MS/MSD) MW-15016
DEK-MW-15003 MW-15019

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
N/A	N/A

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Batts	CEC	check in/out

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS

5/3/21
SIGNED DATE

5-7-21
CHECKED BY DATE

TRC

GENERAL NOTES

KLE/BAP

PROJECT NAME: CEC ~~Kern LF~~: 2021 GW Compliance	DATE: 5-4-21	TIME ARRIVED: 0800
PROJECT NUMBER: 418425.0000.0000	AUTHOR: S. Kane	TIME LEFT: 1700

WEATHER

TEMPERATURE: 58 °F WIND: 5-10 MPH VISIBILITY: cloudy

WORK / SAMPLING PERFORMED

A. Cook Sampled wells OW-10, OW-11, OW-12
Sampled KLI-PCS and SW-Ditch

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
rental meter failure	S. Kane to Lansing to pick up replacement

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Batts	CEC	check in/out

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
purge water	NM	purged to ground

5-7-21

SIGNED DATE CHECKED BY DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC Karn LF: 2021 GW Compliand	DATE: 5-6-21	TIME ARRIVED: 0700
PROJECT NUMBER:	418425.0000.0000	AUTHOR: J. Krenz	TIME LEFT: 1230

WEATHER

TEMPERATURE: 60 °F WIND: 0-5 MPH VISIBILITY: clear

WORK / SAMPLING PERFORMED

Sampled KLI-SCS

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
N/A	N/A

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Batts	CEC	check in/out

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
purge water	Nm	purged to KLI

8-7-21

SIGNED DATE CHECKED BY DATE

TRC

EQUIPMENT SUMMARY

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW	SAMPLER NAME:	Audrey Cook, Jake Krenz, Javier Jasso
PROJECT NO.:	418425.0001.0000		

WATER LEVEL MEASUREMENTS COLLECTED WITH:

NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)
HERON DIPPER-T	TRC A2

PRODUCT LEVEL MEASUREMENTS COLLECTED WITH:

NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)
NA	NA

DEPTH TO BOTTOM OF WELL MEASUREMENTS COLLECTED WITH:

NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)
HERON DIPPER-T	TRC A2

PURGING METHOD

NAME AND MODEL OF PUMP OR TYPE OF BAILER	SERIAL NUMBER (IF APPLICABLE)
PERISTALTIC PUMP	TRC A2

SAMPLING METHOD

NAME AND MODEL OF PUMP OR TYPE OF BAILER	SERIAL NUMBER (IF APPLICABLE)
PERISTALTIC PUMP	TRC A2
GEOTECH DISPOSABLE FILTER	0.45 MICRON
NAME AND MODEL OF FILTERATION DEVICE	FILTER TYPE AND SIZE
DEDICATED POLY TUBING	☑ LOW-FLOW SAMPLING EVENT
TUBING TYPE	

PURGE WATER DISPOSAL METHOD

☑ GROUND ☐ DRUM ☐ POTW ☐ POLYTANK ☐ OTHER _____

DECONTAMINATION AND FIELD BLANK WATER SOURCE

POTABLE WATER SOURCE	DI WATER SOURCE
STORE BOUGHT	LABORATORY PROVIDED
SIGNED 5-1-21 DATE	CHECKED BY DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Compliance	MODEL: YSI PRO DSS / YSI PRO PLUS	SAMPLER: AC, JJ, JK
PROJECT NO.:	418425.0000.0000	SERIAL #: Ann Arbor Rental	DATE: 5/3/21

PH CALIBRATION CHECK

pH 7 (LOT #): OGK445 (EXP. DATE): NOV/22 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): OGF127 (EXP. DATE): JUN/22 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
7.04 / 7.04	4.00 / 4.00	☒ WITHIN RANGE	0840
/	/	☐ WITHIN RANGE	
7.05 / 7.05	4.00 / 4.00	☒ WITHIN RANGE	0902
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): OGA943 (EXP. DATE): JUN/21 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1167 / 1167	14.0	☒ WITHIN RANGE	~~0900~~ 0845
/		☐ WITHIN RANGE	
1167 / 1167	14.7	☒ WITHIN RANGE	0907
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 19F100017 (EXP. DATE): 6-4-2024 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
240.6 / 240.6	17.6	☒ WITHIN RANGE	0852
/		☐ WITHIN RANGE	
243.8 / 243.8	15.9	☒ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
10.35 / 10.35	15.4	☒ WITHIN RANGE	0855
/		☐ WITHIN RANGE	
9.60 / 9.60	15.0	☒ WITHIN RANGE	0916
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): 18293474 (EXP. DATE): 4/22 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
10.71 / 10.0	/	☒ WITHIN RANGE	0855
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

☐ AUTOCAL SOLUTION (LOT #): (EXP. DATE):	☑ STANDARD SOLUTION (S) LIST LOT NUMBERS AND EXPIRATION DATES UNDER CALIBRATION CHECK
CALIBRATED PARAMETERS	CALIBRATION RANGES [1]
☐ pH	pH: +/- 0.2 S.U.
☐ COND	COND: +/- 1% OF CAL. STANDARD
☐ ORP	ORP: +/- 25 mV
☐ D.O.	D.O.: VARIES
☐ TURB	TURB: +/- 5% OF CAL. STANDARD
☐ _____	[1] CALIBRATION RANGES ARE SPECIFIC TO THE MODEL OF THE WATER QUALITY METER
☐ _____	

NOTES

Second readings are YSI PRO DSS rental calibration notes.

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

SIGNED [signature] DATE 5-7-21

CHECKED BY DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Compliance	MODEL: YSI Pro DSS	SAMPLER: (AC) JJ, JK
PROJECT NO.:	418425.0000.0000	SERIAL #: Ann Arbor	DATE: 5-4-21

PH CALIBRATION CHECK

pH 7 (LOT #): 0GK445 (EXP. DATE): NOV/22 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 0GF127 (EXP. DATE): JUN/22 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
7.04 / 7.04	4.00 / 4.00	☒ WITHIN RANGE	0722
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 0GD943 (EXP. DATE): JUN/21 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1167 / 1167	15.0	☒ WITHIN RANGE	0712
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 19F100017 (EXP. DATE): 6-4-2024 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
246.0 / 246.0	13.5	☒ WITHIN RANGE	0727
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
9.60 / 9.60	15.0	☒ WITHIN RANGE	0729
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): 18293474 (EXP. DATE): 4/22 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
10.17 / 10.0	/	☒ WITHIN RANGE	0729
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

☐ AUTOCAL SOLUTION (LOT #): (EXP. DATE):	☑ STANDARD SOLUTION (S) LIST LOT NUMBERS AND EXPIRATION DATES UNDER CALIBRATION CHECK
CALIBRATED PARAMETERS	CALIBRATION RANGES (1)
☐ pH	pH: +/- 0.2 S.U.
☐ COND	COND: +/- 1% OF CAL. STANDARD
☐ ORP	ORP: +/- 25 mV
☐ D.O.	D.O.: VARIES
☐ TURB	TURB: +/- 5% OF CAL. STANDARD
☐ _____	(1) CALIBRATION RANGES ARE SPECIFIC TO THE MODEL OF THE WATER QUALITY METER
☐ _____	

NOTES

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

Jack Jay 5-7-21

SIGNED DATE

CHECKED BY DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Compliance	MODEL:	YSI Pro Plus	SAMPLER:	AC, (JK), JJ
PROJECT NO.:	418425.0001.0000	SERIAL #:	~~TRC A2~~ Rental	DATE:	5-6-21

PH CALIBRATION CHECK

pH 7 (LOT #): 06K445 (EXP. DATE) Nov/22	pH 4 / 10 (LOT #): (EXP. DATE):	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
7.04 / 7.04	4.00 / 4.00	☒ WITHIN RANGE	0630
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 06D943 (EXP. DATE): Jun/21	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING / STANDARD			
1413 / 1417	25.0	☐ WITHIN RANGE	0627
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): (EXP. DATE):	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING / STANDARD			
247.0 / 247.0	13.1	☒ WITHIN RANGE	0639
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING /SATURATED AIR			
10.35 / 10.35	15.4	☒ WITHIN RANGE	0642
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): 1293474 (EXP. DATE): 4/22	(LOT #): (EXP. DATE):	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
10.09 / 10.0	/	☒ WITHIN RANGE	0725
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

☐ AUTOCAL SOLUTION (LOT #): (EXP. DATE):	☑ STANDARD SOLUTION (S) LIST LOT NUMBERS AND EXPIRATION DATES UNDER CALIBRATION CHECK
CALIBRATED PARAMETERS	CALIBRATION RANGES [1]
☐ pH	pH: +/- 0.2 S.U.
☐ COND	COND: +/- 1% OF CAL. STANDARD
☐ ORP	ORP: +/- 25 mV
☐ D.O.	D.O.: VARIES
☐ TURB	TURB: +/- 5% OF CAL. STANDARD
☐ ________	[1] CALIBRATION RANGES ARE SPECIFIC TO THE MODEL OF THE WATER QUALITY METER
☐ ________	

NOTES

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

[signature] 5-7-21
SIGNED DATE

CHECKED BY DATE

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Compliance	DATE:	5-3-21
PROJECT NUMBER:	418425.0001.0000	AUTHOR:	Audrey Cook, Jake Krenz, Jay

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
DE Karn Bottom Ash Pond						
DEK-MW-15002	0932	TOC	6.75	15.70		
DEK-MW-15004	1255	TOC	27.75	41.75		
DEK-MW-15005	0925	TOC	8.78	22.30		
DEK-MW-15006	0928	TOC	8.28	21.49		
DE Karn Bottom Ash Pond and Lined Impoundment						
DEK-MW-18001						
DEK-MW-15003	1301	TOC	15.40	NM		
Karn Lined Impoundment						
OW-10	0945	TOC	6.75	17.90		
OW-11	1305	TOC	21.35	25.44		
OW-12	0936	TOC	17.10	23.42		
Background						
MW-15002	0901	TOC	6.56	16.90		
MW-15008	0831	TOC	4.13	17.42		
MW-15016	0854	TOC	4.38	8.05		
MW-15019	0845	TOC	4.85	16.86		

ALL WATER LEVELS MUST INCLUDE REFERENCE POINT AND TAPE CORRECTION FACTOR (E.G., 1.1 + 0.00 T/PVC).

SIGNED 5-11-21 DATE

CHECKED DATE

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn ~~LF 2021 GW Comp~~ BAP/LF	PREPARED		CHECKED	
PROJECT NUMBER:	418425.~~0000~~0001	BY: AC, JJ (JK)	DATE: 5/3/21	BY:	DATE:

SAMPLE ID: DEK-MW-18001 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1002	DATE: 5/3/21	SAMPLE	TIME: 1128	DATE: 5-3-21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 8.45 T/ PVC

DEPTH TO BOTTOM: 19.65 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 17 ☒ LITERS ☐ GALLONS

COLOR: clear ODOR: none

TURBIDITY ~~☒ NONE~~ JK ☒ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

PH: 7.30 SU CONDUCTIVITY: 558 umhos/cm

ORP: -64.3 mV DO: 1.72 mg/L

TURBIDITY: 2.37 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 10.6 °C OTHER:

COLOR: clear ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☒ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1003	200	7.35	695	173.5	3.28	25.2	10.8	8.54	INITIAL
1008	200	7.47	584	137.2	2.26	16.3	10.1	8.54	1
1013	200	7.34	566	107.5	2.00	14.1	10.4	8.54	2
1018	200	7.34	563	87.0	1.91	9.58	10.4	8.54	3
1023	200	7.32	563	81.2	1.89	11.5	10.4	8.54	4
1028	200	7.37	561	61.9	1.83	8.19	10.4	8.54	5
1033	200	7.30	562	42.4	1.80	6.56	10.5	8.54	6
1038	200	7.31	562	28.5	1.78	7.09	10.6	8.54	7
1043	200	7.28	562	15.6	1.77	4.13	10.7	8.54	8
1048	200	7.28	560	2.4	1.76	4.28	10.5	8.54	9

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
6	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
3	125mL	Plastic	B	☐ Y ☒ N					☐ Y ☐ N
3	125mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	250mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
2	1L	Plastic	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	5-4-21	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5-7-21

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME: CEC Karn LF: 2021 GW Compl	PREPARED		CHECKED	
PROJECT NUMBER: 418425.0000.0000	BY: AC, JJ, JK	DATE: 5/3/21	BY:	DATE:

SAMPLE ID: DEK-MW-18001

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1053	200	7.28	559	-11.2	1.75	2.88	10.6	8.54	10
1058	200	7.27	561	-23.0	1.74	2.61	10.7	8.54	11
1103	200	7.28	560	-35.0	1.74	2.82	10.6	8.54	12
1108	200	7.27	560	-45.0	1.74	2.57	10.7	8.54	13
1113	200	7.26	559	-47.8	1.74	2.59	10.6	8.54	14
1118	200	7.29	559	-55.6	1.73	2.43	10.6	8.54	15
1123	200	7.30	558	-59.2	1.73	2.51	10.6	8.54	16
1128	200	7.30	558	-64.3	1.72	2.37	10.6	8.54	17

SIGNATURE: [signature]

DATE SIGNED: 5-7-21

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: (AC) JK, JJ	DATE: 5/3/21	BY: SK	DATE: 5-7-21

SAMPLE ID: DEK-MW-15002 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 12:18	DATE: 5/3/21	SAMPLE	TIME: 13:08	DATE: 5/3/21
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.38 SU	CONDUCTIVITY: 1023 umhos/cm	
			ORP: -181.4 mV	DO: 0.09 mg/L	
DEPTH TO WATER: 6.80 T/ PVC			TURBIDITY: 10.32 NTU		
DEPTH TO BOTTOM: 15.78 T/ PVC			☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 9.9 °C	OTHER:	
VOLUME REMOVED: 9 ☒ LITERS ☐ GALLONS			COLOR: CLEAR	ODOR: NONE	
COLOR: CLEAR	ODOR: NONE		FILTRATE (0.45 um) ☒ YES ☐ NO		
TURBIDITY			FILTRATE COLOR: clear	FILTRATE ODOR: none	
☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD ☐ DUP-		
DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER			COMMENTS: FILTER USED ON DISSOLVED METALS		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
12:18	200	7.44	1130	-70.0	0.66	32.5	9.8	7.02	INITIAL
12:23	200	7.34	1153	-137.8	0.12	23.0	9.9	7.04	1L
12:28	200	7.36	1147	-155.1	0.07	14.5	9.9	7.04	2L
12:33	200	7.37	1112	-157.7	0.07	12.9	9.9	7.04	3L
12:38	200	7.37	1100	-162.8	0.07	12.45	9.9	7.04	4L
12:43	200	7.37	1092	-166.4	0.08	11.68	9.9	7.04	5L
12:48	200	7.37	1084	-170.5	0.08	10.21	9.9	7.04	6L
12:53	200	7.37	1060	-177.1	0.06	10.62	9.9	7.04	7L
12:58	200	7.37	1050	-179.5	0.06	10.90	9.9	7.04	8L
13:03	200	7.37	1031	-180.4	0.08	10.29	9.9	7.04	9L

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	P	B	☐ Y ☒ N	1	125mL	P	B	☒ Y ☐ N
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P	B	☐ Y ☒ N					☐ Y ☐ N
1	125	P	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P	A	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	5-5-21	AIRBILL NUMBER:	~
COC NUMBER:	~	SIGNATURE:		DATE SIGNED:	

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Co	PREPARED			CHECKED		
PROJECT NUMBER:	418425.0001.0000	BY:	AC, JK, JJ	DATE: 5/3/21	BY: JK	DATE: 5-7-21	

SAMPLE ID: DEK-MW-15002

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
13:08	200	7.38	1023	-121.4	0.09	10.32	9.9	7.64	10L
13:15									

SIGNATURE: [signature] DATE SIGNED: 5/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Comp	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0000.0000	BY: AC, JJ, (JK)	DATE: 5-3-21	BY:	DATE:

SAMPLE ID: DEK-MW-15003 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1215	DATE: 5-3-21	SAMPLE	TIME: 1233	DATE: 5-3-21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 16.40 T/ PVC

DEPTH TO BOTTOM: NM T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 1.5 ☒ LITERS ☐ GALLONS

COLOR: clear ODOR: none

TURBIDITY: ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

PH: 8.02 SU CONDUCTIVITY: 340.4 umhos/cm

ORP: 13.0 mV DO: 1.88 mg/L

TURBIDITY: 4.63 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 14.9 °C OTHER:

COLOR: clear ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: — FILTRATE ODOR: —

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1218	100	8.23	346.0	31.0	2.51	6.08	15.2	17.36	INITIAL
1223	100	8.07	339.7	19.9	2.11	4.64	14.9	17.61	.5
1228	100	8.03	339.5	16.6	2.02	4.57	14.9	17.70	1.0
1233	100	8.02	340.4	13.0	1.88	4.63	14.9	17.75	1.5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	B	☐ Y ☒ N					☐ Y ☐ N
1	250mL	↓	A	☐ Y ☒ N					☐ Y ☐ N
2	1L	Plastic	A	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	5-4-21	AIRBILL NUMBER:	—
COC NUMBER:	—	SIGNATURE:		DATE SIGNED:	5-7-21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: AC, JK, JJ	DATE: 5/3/21	BY: JK	DATE: 5-7-21

SAMPLE ID: DEK-MW-15064 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 13:50	DATE: 5/3/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 27.73 T/ PVC

DEPTH TO BOTTOM: 42.0 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 4L ☐ LITERS ☐ GALLONS

COLOR: CLEAR ODOR: NONE

TURBIDITY

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 14:10	DATE: 5/3/21

PH: 7.54 SU CONDUCTIVITY: 632 umhos/cm

ORP: -174.6 mV DO: 0.20 mg/L

TURBIDITY: 7.80 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 14.8 °C OTHER:

COLOR: CLEAR ODOR: NONE

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
13:50	200	7.65	633	-129.2	0.64	7.74	14.5	27.93	INITIAL
13:55	200	7.58	629	-162.7	0.29	7.70	14.5	28.02	1L
14:01	200	7.55	631	-172.6	0.25	6.58	14.7	28.02	2L
14:05	200	7.52	631	-171.8	0.31	8.01	14.8	28.05	3L
14:10	200	7.54	632	-174.6	0.20	7.80	14.9	28.07	4L

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	P	B	☐ Y ☒ N	~~1~~	~~1Pint~~	~~P~~	~~B~~	~~☒ Y ☐ N~~
2	60ML	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125ML	P	A	☐ Y ☒ N					☐ Y ☐ N
1	125 ML	P	B	☐ Y ☒ N					☐ Y ☐ N
1	250ML	P	A	☐ Y ☒ N					☐ Y ☐ N

A.L

SHIPPING METHOD:	Fedex	DATE SHIPPED:	5-5-21	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: AC, JK, JJ	DATE: 5/3/21	BY: JK	DATE: 5-7-21

SAMPLE ID: DEK-MW-15005 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 10:55	DATE: 5/3/21	SAMPLE	TIME: 11:35	DATE: 5/3/21
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.61 SU	CONDUCTIVITY: 629 umhos/cm	
			ORP: -199.7 mV	DO: 0.07 mg/L	
DEPTH TO WATER: 8.74 T/ PVC			TURBIDITY: 3.68 NTU		
DEPTH TO BOTTOM: 22.36 T/ PVC			☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 10.6 °C	OTHER:	
VOLUME REMOVED: 8L ☒ LITERS ☐ GALLONS			COLOR: CLEAR	ODOR: NONE	
COLOR: CLEAR	ODOR: NONE		FILTRATE (0.45 um) ☐ YES ☒ NO		
TURBIDITY ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY			FILTRATE COLOR:	FILTRATE ODOR:	
			QC SAMPLE: ☐ MS/MSD ☒ DUP- DEK-BAP; DUP-0		
DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER			COMMENTS: [illegible]; FB-DEK-BAP DUP-4A.L (LEADING)		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
10:55	200	7.68	637	-97.2	0.34	7.41	10.5	8.92	INITIAL
11:00	200	7.59	631	-152.3	0.17	6.48	10.7	8.93	1L
11:05	200	7.60	631	-159.7	0.11	4.89	10.6	8.93	2L
11:10	200	7.61	630	-165.1	0.10	4.55	10.6	8.93	3L
11:15	200	7.62	628	-174.9	0.07	4.80	10.6	8.93	4L
11:20	200	7.63	622	-182.4	0.08	6.18	10.7	8.94	5L
11:25	200	7.62	616	-194.8	0.06	8.29	10.6	8.94	6L
11:30	200	7.62	613	-202.6	0.08	4.01	10.6	8.94	7L
11:35	200	7.61	629	-199.7	0.07	3.68	10.6	8.94	8L

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	1L	P	B	☐ Y ☒ N					☐ Y ☐ N
4	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
2	125mL	P	B	☐ Y ☒ N					☐ Y ☐ N
2	125mL	P	A	☐ Y ☒ N					☐ Y ☐ N
2	250mL	P	A	☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	FedEx	DATE SHIPPED:	5-5-21	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: AC, JK, JJ	DATE: 5/3/21	BY: JK	DATE: 5-7-21

SAMPLE ID: DEK-MW-15006 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 9:45	DATE: 5/3/21	SAMPLE	TIME: 10:25	DATE: 5/3/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 8.25 T/ PVC

DEPTH TO BOTTOM: 21.54 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 7 ☒ LITERS ☐ GALLONS

COLOR: NONE ODOR: NONE

TURBIDITY

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD ☒ GROUND ☐ DRUM ☐ OTHER

PH: 7.53 SU CONDUCTIVITY: 1140 umhos/cm

ORP: -152.6 mV DO: 0.09 mg/L

TURBIDITY: 5.30 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 10.7 °C OTHER:

COLOR: CLEAR ODOR: NONE

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
9:50	200	7.35	1151	58.6	0.45	6.24	10.7	8.32	INITIAL
9:55	↓	7.39	1139	-37.3	0.19	5.81	10.7	8.39	1L
10:00		7.44	1138	-81.2	0.14	8.56	10.6	8.39	2L
10:05		7.47	1139	-119.2	0.12	7.72	10.7	8.40	3L
10:10		7.49	1141	-128.4	0.13	6.44	10.6	8.40	4L
10:15		7.50	1137	-145.6	0.10	8.15	10.8	8.40	5L
10:20		7.52	1140	-152.0	0.16	8.46	10.6	8.40	6L
10:25	↓	7.53	1140	-152.6	0.09	5.30	10.7	8.40	7L

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	P	B	☐ Y ☒ N					☐ Y ☐ N
2	60mL	VOA	A	☐ Y ☐ N					☐ Y ☐ N
1	125mL	P	B	☐ Y ☒ N					☐ Y ☐ N
1	125mL	P	A	☐ Y ☐ N					☐ Y ☐ N
1	250mL	P	A	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	5-5-21	AIRBILL NUMBER:	—
COC NUMBER:	—	SIGNATURE:		DATE SIGNED:	

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: AC, JK, JJ	DATE: 5/4/21	BY: SK	DATE: 5-7-21

SAMPLE ID: OW-10 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 9:25	DATE: 5/4/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 6.70 T/ PVC

DEPTH TO BOTTOM: 19.00 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 16 ☒ LITERS ☐ GALLONS

COLOR: CLEAR ODOR: NONE

TURBIDITY

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 10:45	DATE: 5/4/21

PH: 7.07 SU CONDUCTIVITY: 617 umhos/cm

ORP: -61.8 mV DO: 1.68 mg/L

TURBIDITY: 9.76 NTU

☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 10.5 °C OTHER:

COLOR: CLEAR ODOR: NONE

FILTRATE (0.45 um) ☐ YES ☐ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
9:25	200	7.30	611	132.2	2.99	35.7	10.2	6.88	INITIAL
9:30	200	7.12	613	122.4	1.92	43.4	10.2	7.01	1L
9:35	200	7.03	618	88.4	1.84	40.3	10.5	7.04	2L
9:40	200	7.02	621	68.4	1.79	28.0	10.5	7.06	3L
9:45	200	7.00	621	53.3	1.76	22.9	10.5	7.10	4L
9:50	200	6.98	623	40.7	1.75	20.7	10.6	7.12	5L
9:55	201	6.99	624	23.4	1.73	17.7	10.6	7.13	6L
10:00	200	7.01	624	7.8	1.72	15.9	10.7	7.15	7L
10:05	200	7.00	624	-2.0	1.71	17.8	10.7	7.17	8L
10:10	200	7.03	623	-12.4	1.76	13.8	10.7	7.20	9L

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	P	B	☐ Y ☒ N					☐ Y ☐ N
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	P	B	☐ Y ☒ N					☐ Y ☐ N
1	125mL	P	A	☐ Y ☒ N					☐ Y ☐ N
1	250mL	P	A	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	FedEx	DATE SHIPPED:	5-5-21	AIRBILL NUMBER:	—
COC NUMBER:	—	SIGNATURE:		DATE SIGNED:	

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Co	PREPARED			CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: AC, JK, JJ	DATE: 5/4/21		BY: SK	DATE: 5-7-21

SAMPLE ID: OW-10

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
10:15	200	7.05	622	-23.9	1.70	12.91	10.7	7.15	10L
10:20	200	7.04	621	-33.4	1.70	11.98	10.6	7.15	11L
10:25	200	7.06	620	-41.7	1.69	11.53	10.6	7.18	12L
10:30	200	7.07	618	-48.8	1.69	9.89	10.6	7.19	13L
10:35	200	7.07	618	-54.1	1.69	9.97	10.6	7.19	14L
10:40	200	7.07	619	-59.1	1.69	9.13	10.6	7.20	15L
10:45	200	7.07	617	-61.8	1.68	9.76	10.5	7.20	16L

SIGNATURE: [signature]

DATE SIGNED: 5/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: AC, JK, JJ	DATE: 5/4/21	BY: SK	DATE: 5-7-21

SAMPLE ID: OW-11 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 7:50	DATE: 5/4/21	SAMPLE	TIME: 8:45	DATE: 5/4/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 21.50 T/ PVC

DEPTH TO BOTTOM: 25.79 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: ☐ LITERS ☐ GALLONS

COLOR: CLEAR ODOR: NONE

TURBIDITY ☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

PH: 9.21 SU | CONDUCTIVITY: 312.7 umhos/cm

ORP: 111.5 mV | DO: 1.81 mg/L

TURBIDITY: 8.70 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 11.5 °C | OTHER:

COLOR: CLEAR | ODOR: NONE

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: | FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
7:50	200	9.32	327.1	168.4	7.87	13.14	11.4	21.98	INITIAL
7:55	200	9.16	309.9	142.8	6.60	11.14	11.3	22.05	1L
8:00	200	9.37	307.3	129.3	5.42	11.46	11.4	22.43	2L
8:05	200	9.37	307.2	123.7	3.66	11.06	11.3	22.77	3L
8:10	200	9.19	309.6	119.9	2.14	12	11.4	22.83	3.5L
8:15	100	9.23	311.0	117.7	2.09	12.6	11.4	22.89	4.0L
8:20	100	9.21	311.6	117.1	1.94	12.07	11.4	22.90	4.5L
8:25	100	9.21	311.6	115.8	2.44	8.79	11.5	22.91	5.0L
8:30	100	9.21	311.6	114.8	4.49	6.06	11.5	22.93	5.5L
8:35	100	9.21	312.2	112.9	1.90	8.96	11.5	22.94	6.0L

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	P	B	☐ Y ☒ N					☐ Y ☐ N
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	P	B	☐ Y ☒ N					☐ Y ☐ N
1	125mL	P	A	☐ Y ☒ N					☐ Y ☐ N
1	250mL	P	A	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	5-5-21	AIRBILL NUMBER:	~~~~
COC NUMBER:	~~~~	SIGNATURE:		DATE SIGNED:	

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Co	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: AC, JK, JJ	DATE: 5/4/21	BY: JK	DATE: 5-7-21

SAMPLE ID: OW-11

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
8:40	100	9.20	312.6	111.9	1.84	8.84	11.5	22.95	6.5 L
8:45	106	9.21	312.7	111.5	1.81	8.70	11.5	22.95	7.0 L

SIGNATURE: [signature]

DATE SIGNED: 5/4/21

TRC WATER SAMPLE LOG

PROJECT NAME: CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER: 418425.0001.0000	BY: AC, JK, JJ	DATE: 5/4/21	BY: JK	DATE: 5-7-21

SAMPLE ID: OW-12 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 11:25	DATE: 5/4/21	SAMPLE	TIME: 12:05	DATE: 5/4/21
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.19 SU	CONDUCTIVITY: 559 umhos/cm	
			ORP: -85.8 mV	DO: 1.65 mg/L	
DEPTH TO WATER: 17.11 T/ PVC			TURBIDITY: 7.53 NTU		
DEPTH TO BOTTOM: 23.50 T/ PVC			☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 12.6 °C	OTHER:	
VOLUME REMOVED: 8 ☒ LITERS ☐ GALLONS			COLOR: CLEAR	ODOR: NONE	
COLOR: ORANGE	ODOR: NONE		FILTRATE (0.45 um) ☐ YES ☒ NO		
TURBIDITY			FILTRATE COLOR:	FILTRATE ODOR:	
☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD ☒ DUP- 12L1		
DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER			COMMENTS: FIELD BLANK HERE		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
11:25	200	7.20	574	1.1	2.06	39.1	12.7	17.20	INITIAL
11:30	200	7.10	570	-36.6	1.92	27.3	12.7	17.20	1L
11:35	200	7.12	570	-50.0	1.66	13.5	12.6	17.22	2L
11:40	200	7.15	570	-58.7	1.66	12.0	12.6	17.23	3L
11:45	200	7.16	565	-68.9	1.64	10.39	12.5	17.23	4L
11:50	200	7.18	564	-75.2	1.62	10.97	12.6	17.24	5L
11:55	200	7.19	562	-81.1	1.67	8.64	12.6	17.25	6L
12:00	200	7.19	563	-85.0	1.64	6.65	12.5	17.25	7L
12:05	200	7.19	559	-85.8	1.65	7.53	12.6	17.25	8L

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	1L	P	B	☐ Y ☒ N					☐ Y ☐ N
4	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
2	125mL	P	B	☐ Y ☒ N					☐ Y ☐ N
2	125mL	P	A	☐ Y ☒ N					☐ Y ☐ N
2	250mL	P	A	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD: Fedex	DATE SHIPPED: 5-5-21	AIRBILL NUMBER: —
COC NUMBER: —	SIGNATURE:	DATE SIGNED:

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Comp	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0000.0000	BY: AC, JJ, JK	DATE:	BY:	DATE:

SAMPLE ID:	KLI - PCS	WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☒ OTHER	N/A
WELL MATERIAL:	☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL	☒ OTHER	N/A
SAMPLE TYPE:	☑ GW ☐ WW ☒ SW ☐ DI ☐ LEACHATE	☐ OTHER	

PURGING	TIME:	DATE:	SAMPLE	TIME: 1144	DATE: 5/4/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.31 SU	CONDUCTIVITY: 570	umhos/cm
			ORP: 129.1 mV	DO: 6.38	mg/L
DEPTH TO WATER:	T/ PVC		TURBIDITY: 11.5 NTU		
DEPTH TO BOTTOM	T/ PVC		☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA	☐ LITERS ☐ GALLONS		TEMPERATURE: 18.4 °C	OTHER:	
VOLUME REMOVED:	☐ LITERS ☐ GALLONS		COLOR: Clear	ODOR: none	
COLOR:	ODOR:		FILTRATE (0.45 um) ☐ YES	☒ NO	
TURBIDITY			FILTRATE COLOR: —	FILTRATE ODOR: —	
☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD	☐ DUP-	
DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER			COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
									INITIAL
		Surface water collected just							
		East of SCS Sump							

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	Plastic	B	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	A	☐ Y ☒ N					☐ Y ☐ N
1	250mL	↓	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	5-6-21	AIRBILL NUMBER:	—
COC NUMBER:	—	SIGNATURE:	[signature]	DATE SIGNED:	5-7-21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Karn LF: 2021 GW Comp	PREPARED		CHECKED	
PROJECT NUMBER: 418425.0000.0000	BY: AC, JJ, JK	DATE: 5-4-21	BY:	DATE:

SAMPLE ID: SW - Ditch | WELL DIAMETER: ~~☑ 2"~~ ☐ 4" ☐ 6" ☒ OTHER N/A

WELL MATERIAL: ~~☑ PVC~~ ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☒ OTHER N/A

SAMPLE TYPE: (JK) ~~☑ GW~~ ☐ WW ☒ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME:	DATE:

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: ~~T/ PVC~~

DEPTH TO BOTTOM: ~~T/ PVC~~

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: ☐ LITERS ☐ GALLONS

COLOR: ODOR:

TURBIDITY
☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1205	DATE: 5-4-21

PH: 8.33 SU | CONDUCTIVITY: 566 umhos/cm

ORP: 80.8 mV | DO: 5.62 mg/L

TURBIDITY: 6.84 NTU

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 21.2 °C | OTHER:

COLOR: clear | ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: | FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
									INITIAL
		LAT:				LONG:			
		43.6474452°N				83.8374828°W			

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	B	☐ Y ☒ N					☐ Y ☐ N
1	250mL	↓	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: Fedex	DATE SHIPPED: 5-6-21	AIRBILL NUMBER:
COC NUMBER:	SIGNATURE:	DATE SIGNED: 5-7-21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Karn LF: 2021 GW Comp	PREPARED		CHECKED	
PROJECT NUMBER: 418425.0000.0000	BY: AC, JJ, (K)	DATE: 5-6-21	BY:	DATE:

SAMPLE ID: Karn Influent	WELL DIAMETER: ~~☑ 2"~~ ☐ 4" ☐ 6" ☒ OTHER	N/A		
WELL MATERIAL: ~~☑ PVC~~ ☐ SS ☐ IRON ☐ GALVANIZED STEEL	☒ OTHER	N/A		
SAMPLE TYPE: ~~☑ GW~~ ☐ WW ☐ SW ☐ DI ☐ LEACHATE	☒ OTHER	Influent		

PURGING	TIME:	DATE:	SAMPLE	TIME: 1009	DATE: 5-6-21
PURGE METHOD: ~~☑ PUMP~~ ~~PERISTALTIC PUMP~~			PH: 7.33 SU	CONDUCTIVITY: 904.0 umhos/cm	
☒ ~~BAILER~~ Sample port			ORP: -171.2 mV	DO: 3.79 mg/L	
DEPTH TO WATER: NA T/ PVC			TURBIDITY: 65.2 NTU		
DEPTH TO BOTTOM: NA T/ PVC			☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 9.9 °C	OTHER:	
VOLUME REMOVED: NA ☐ LITERS ☐ GALLONS			COLOR: clear w/ iron bacteria	ODOR: none	
COLOR: clear w/ iron bacteria ODOR: none			FILTRATE (0.45 um) ☐ YES ☒ NO		
TURBIDITY			FILTRATE COLOR: —	FILTRATE ODOR: —	
☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD ☐ DUP-		
DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER			COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
									INITIAL
				N/A					

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED	PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - ____								
NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	Plastic	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: Fedex	DATE SHIPPED: 5-6-21	AIRBILL NUMBER: —			
COC NUMBER: —	SIGNATURE: [signature]	DATE SIGNED: 5-7-21			

TRC WATER SAMPLE LOG

PROJECT NAME: CEC ~~Kern LF~~ Kern BAP/LI 2021 GW Comp	PREPARED		CHECKED	
PROJECT NUMBER: 418425.0000.0000	BY: AC, JJ, JK	DATE: 5-6-21	BY:	DATE:

SAMPLE ID: KLI SCS — WELL DIAMETER: ☒ ~~2"~~ ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☒ ~~PVC~~ ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME:	DATE:

PURGE METHOD: ☑ PUMP ~~PERISTALTIC PUMP~~ Dedicated pump ☐ BAILER

DEPTH TO WATER: NA T/ PVC

DEPTH TO BOTTOM: NA T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: ☐ LITERS ☐ GALLONS

COLOR: ODOR:

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1024	DATE: 5-6-21

PH: 7.46 SU — CONDUCTIVITY: 1436 umhos/cm

ORP: 53.9 mV — DO: 3.19 mg/L

TURBIDITY: 4.89 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 12.5 °C — OTHER:

COLOR: clear — ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: — FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
									INITIAL

NA

NOTE: **STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:**

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	Plastic	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: Fedex	DATE SHIPPED: 5-6-21	AIRBILL NUMBER: —
COC NUMBER: —	SIGNATURE:	DATE SIGNED: 5-7-21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Karn LF: 2021 GW Comp	PREPARED		CHECKED	
PROJECT NUMBER: 418425.0000.0000	BY: AC, JJ, JK	DATE: 5-3-21	BY:	DATE:

SAMPLE ID: MW-15002 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1328	DATE: 5-3-21	SAMPLE	TIME: 1400	DATE: 5-3-21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 6.50 T/ PVC

DEPTH TO BOTTOM: 16.90 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 6 ☒ LITERS ☐ GALLONS

COLOR: clear ODOR: none

TURBIDITY ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

PH: 6.51 SU | CONDUCTIVITY: 6236 umhos/cm

ORP: -53.1 mV | DO: 1.67 mg/L

TURBIDITY: 4.44 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 10.4 °C | OTHER:

COLOR: clear | ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: | FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☒ DUP- Background

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1330	200	6.11	9540	21.7	2.43	5.04	10.6	6.67	INITIAL
1335	200	6.20	9731	9.0	1.44	3.86	10.5	6.72	1
1340	200	6.27	9007	-25.8	1.80	2.71	10.4	6.74	2
1345	200	6.46	6605	-44.6	1.72	4.41	10.4	6.76	3
1350	200	6.50	6138	-48.8	1.71	4.06	10.3	6.77	4
1355	200	6.51	6126	-51.3	1.69	4.43	10.3	6.77	5
1400	200	6.51	6236	-53.1	1.67	4.44	10.4	6.77	6

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
2	125mL	plastic	A	☐ Y ☒ N					☐ Y ☐ N
2	125mL	↓	B	☐ Y ☒ N					☐ Y ☐ N
2	250mL		A	☐ Y ☒ N					☐ Y ☐ N
4	1L		B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD: Fedex	DATE SHIPPED: 5-4-21	AIRBILL NUMBER:
COC NUMBER:	SIGNATURE:	DATE SIGNED: 5-7-21

REVISED 04/2019

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: AC, JK, JJ	DATE: 5/3/21	BY: SK	DATE: 5-7-21

SAMPLE ID: ~~DEEP~~ MW-15008 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: ~~5/3/21~~ 15:11	DATE: 5/3/21
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER		
DEPTH TO WATER: 4.11 T/ PVC		
DEPTH TO BOTTOM: 17.50 T/ PVC		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS		
VOLUME REMOVED: 9L ☐ LITERS ☐ GALLONS		
COLOR: BROWN	ODOR: NONE	
TURBIDITY ☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY		
DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER		

SAMPLE	TIME: 15:56	DATE: 5/7/21
PH: 6.84 SU	CONDUCTIVITY: ~~225.3~~ umhos/cm	
ORP: ~~467~~ -225.3 mV	DO: 0.24 mg/L	967
TURBIDITY: 5.38 NTU		
☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
TEMPERATURE: 9.0 °C	OTHER:	
COLOR: NONE	ODOR: NONE	
FILTRATE (0.45 um) ☐ YES ☒ NO		
FILTRATE COLOR:	FILTRATE ODOR:	
QC SAMPLE: ☐ MS/MSD ☐ DUP-		
COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
15:11	200	6.81	1065	-159.9	0.80	10.42	9.0	4.18	INITIAL
15:16	200	6.77	1054	-184.8	0.37	7.07	9.0	4.20	1L
15:21	200	6.78	1034	-246.5	0.20	5.69	9.0	4.20	2L
15:26	200	6.81	1014	-277.1	0.13	7.74	9.0	4.22	3L
15:31	200	6.82	1000	-288.3	0.11	4.85	9.0	4.22	4L
15:36	200	6.83	981	-292.5	0.16	3.41	9.0	4.22	5L
15:41	200	6.83	979	-279.1	0.19	3.54	9.0	4.22	6L
15:46	200	6.84	972	-228.8	0.25	4.54	9.0	4.22	7L
15:51	200	6.84	956	-223.8	0.24	5.99	9.0	4.22	8L
15:56	200	6.84	967	-225.3	0.24	5.38	9.0	4.22	9L

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	P	B	☐ Y ☒ N					☐ Y ☐ N
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	P	B	☐ Y ☒ N					☐ Y ☐ N
1	125mL	P	A	☐ Y ☒ N					☐ Y ☐ N
1	250mL	P	A	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD: FedEx	DATE SHIPPED: 5-5-21	AIRBILL NUMBER: —
COC NUMBER: —	SIGNATURE:	DATE SIGNED:

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Comp	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0000.0000	BY: AC, JJ, (JK)?	DATE: 5-3-21	BY:	DATE:

SAMPLE ID: MW-15016 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1441	DATE: 5-3-21	SAMPLE	TIME: ~~1609~~ 1509 (SK)	DATE: 5-3-21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 4.18 T/ PVC

DEPTH TO BOTTOM: 7.92 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 5 ☒ LITERS ☐ GALLONS

COLOR: clear ODOR: none

TURBIDITY

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

PH: 7.24 SU | CONDUCTIVITY: 991 umhos/cm

ORP: -10.4 mV | DO: 1.74 mg/L

TURBIDITY: 3.14 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 10.2 °C | OTHER:

COLOR: clear | ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: | FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1444	200	7.69	1009	3.0	3.52	8.62	10.9	4.45	INITIAL
1449	200	7.31	941	-3.4	1.92	8.01	10.4	4.50	1
1454	200	7.26	950	-4.9	1.84	7.32	10.3	4.51	2
1459 ~~1559~~	200	7.25	967	-6.9	1.80	3.96	10.1	4.52	3
(JK) 1504 ~~1604~~	200	7.23	985	-8.6	1.77	2.77	10.1	4.52	4
1509 ~~1609~~	200	7.24	991	-10.4	1.74	3.14	10.2	4.52	5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	B	☐ Y ☒ N					☐ Y ☐ N
1	~~500mL~~ (JK) ~~125mL~~ 250mL		A	☐ Y ☒ N					☐ Y ☐ N
2	1L	↓	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	FedEx	DATE SHIPPED:	5-4-21	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5-7-21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Comp	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0000.0000	BY: AC, JJ (JK)	DATE: 5-3-21	BY:	DATE:

SAMPLE ID: MW-1S019 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1542	DATE: 5-3-21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 4.89 T/ PVC

DEPTH TO BOTTOM: 16.88 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: ____ ☐ LITERS ☐ GALLONS

COLOR: Clear ODOR: none

TURBIDITY

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1603	DATE: 5-3-21

PH: 6.80 SU CONDUCTIVITY: 1398 umhos/cm

ORP: -69.2 mV DO: 1.79 mg/L

TURBIDITY: 3.40 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 8.6 °C OTHER: ____

COLOR: clear ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: ____ FILTRATE ODOR: ____

QC SAMPLE: ☐ MS/MSD ☐ DUP- ____

COMMENTS: FB-Background Collected

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1543	200	7.00	1430	-17.8	7.98	3.42	9.5	5.00	INITIAL
1548	200	6.91	1406	-54.0	1.97	2.66	8.8	5.00	1
1553	200	6.86	1404	-63.4	1.86	2.10	8.7	5.00	2
1558	200	6.82	1400	-67.3	1.82	2.42	8.6	5.00	3
1603	200	6.80	1398	-69.2	1.79	3.40	8.6	5.00	4

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - ____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N	1	125mL	Plastic	A	☐ Y ☒ N
1	125mL	Plastic	A	☐ Y ☒ N	1	125mL	↓	B	☐ Y ☒ N
1	125mL	↓	B	☐ Y ☒ N	2	1L	↓	B	☐ Y ☒ N
1	250mL ~~500mL~~	↓	A	☐ Y ☒ N					☐ Y ☐ N
2	1L	↓	B	☐ Y ☒ N		Field Blank			☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	5-4-21	AIRBILL NUMBER:	____
COC NUMBER:	____	SIGNATURE:		DATE SIGNED:	5-7-21

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251 • FAX (517) 788-2533

SAMPLING SITE	PROJECT NUMBER	ANALYSIS REQUESTED	Page 1 of 1
DEK & JCW Background- 2021 Q2 RCRA	**21-0525**		SEND REPORT TO CDBatts
SAMPLING TEAM: TRC	DATE SHIPPED: 5-4-21	SITE SKETCHED ATTACHED? CIRCLE ONE YES NO	HD Register, TRC
			PHONE

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity					REMARKS
21-0525-01	5-3-21	1400	GW	MW-15002		3	x	x	x	x					
-02	5-3-21	1556	GW	MW-15008		3	x	x	x	x					
-03	5-3-21	1509	GW	MW-15016		3	x	x	x	x					
-04	5-3-21	1603	GW	MW-15019		3	x	x	x	x					
-05	5-3-21	—	GW	DUP-Background		3	x	x	x	x					
-06	5-3-21	1603	W	FB- Background		1	x	x							

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	COMMENTS
[signature]	5-4-21 1630	Fedex	0.3-1.6°C 015402
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	
Fed Ex	5.5.21 1100	[signature] Hansen	ORIGINAL TO LAB COPY TO CUSTOMER

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251 • FAX (517) 788-2533

SAMPLING SITE	PROJECT NUMBER
DEK Bottom Ash Pond & LI – 2021 Q2	21-0529
SAMPLING TEAM: TRC	DATE SHIPPED: 5-4-21
SITE SKETCHED ATTACHED? CIRCLE ONE: YES NO	

ANALYSIS REQUESTED

Page 1 of 1

SEND REPORT TO: CDBatts

HD Register, TRC

PHONE

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity					REMARKS
21-0529-01	5-3-21	1233	GW	DEK-MW-15003		5	X	X	X	X					
-02	5-3-21	1128	GW	DEK-MW-18001		5	X	X	X	X					
-03	5-3-21	1128	GW	DEK-MW-18001 MS		4	X	X		X					
-04	5-3-21	1128	GW	DEK-MW-18001 MSD		4	X	X		X					

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
	5-4-21 / 1630	Fedex
Fed Ex	5-5-21 1100	

COMMENTS: 0.3-1.6°C
015402

ORIGINAL TO LAB COPY TO CUSTOMER

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251 • FAX (517) 788-2533

SAMPLING SITE: **DEK Lined Impoundment – 2021 Q2**

PROJECT NUMBER: **21-0530**

SAMPLING TEAM: DRC

DATE SHIPPED:

SITE SKETCHED ATTACHED? CIRCLE ONE: YES NO

ANALYSIS REQUESTED

Page 1 of 1

SEND REPORT TO: CDBatts

HD Register, TRC

PHONE

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity					REMARKS
21-0530-01	5/4/21	10:45	GW	OW-10		5	x	x	x	x					
-02	5/4/21	8:45	GW	OW-11		5	x	x	x	x					
-03	5/4/21	12:05	GW	OW-12		5	x	x	x	x					
-04	5/6/21	10:24	GW	KLI-SCS		5	x	x	x	x					
-05	5/4/21	11:44	GW	KLI-PCS		5	x	x	x	x					
-06	5/4/21	12:05	GW	SW-DITCH		5	x	x	x	x					
-07	5/4/21	—	GW	DUP-KLI		5	x	x	x	x					
-08	5/4/21	12:05	W	EB-KLI		1	x								
-09	5/4/21	12:05	W	FB-KLI		1	x								

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
[signature]	5-7-21 1151	[signature]
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

COMMENTS: 2.0 - 5.0°C
015402
6.4.21

ORIGINAL TO LAB COPY TO CUSTOMER

Appendix C
Data Quality Reviews

Laboratory Data Quality Review
Groundwater Monitoring Event May 2021
DE Karn Bottom Ash Pond and Lined Impoundment

Groundwater samples were collected by TRC for the May 2021 sampling event. Samples were analyzed for total metals, anions, total dissolved solids, and alkalinity by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 21-0529.

During the May 2021 sampling event, a groundwater sample was collected from each of the following wells:

- DEK-MW-15003
- DEK-MW-18001

Each sample was analyzed for one or more of 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
Alkalinity	SM 2320B

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. 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, TDS, and alkalinity 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, and additional Part 115 constituents 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, and alkalinity. The recoveries were within the acceptance limits. Relative percent differences (RPDs) were not provided by the laboratory and therefore were not evaluated; further, 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 a sample from this data set.

Laboratory Data Quality Review
Groundwater Monitoring Event May 2021
DE Karn Lined Impoundment

Groundwater, water, and surface water samples were collected by TRC for the May 2021 sampling event. Samples were analyzed for total metals, anions, total dissolved solids, and alkalinity by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group 21-0530.

During the May 2021 sampling event, a groundwater sample was collected from each of the following wells:

- OW-10
- OW-11
- OW-12

During the May 2021 sampling event, the following water/surface water samples were collected:

- KLI-SCS
- KLI-PCS
- SW-DITCH

Each sample was analyzed for one or more of 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
Alkalinity	SM 2320B

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, TDS, and alkalinity 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, and additional Part 115 constituents will be utilized for the purposes of the detection monitoring program.
- Data are usable for the purposes of the detection monitoring program.
- When the data are evaluated through a detection or monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- One field blank (FB-KLI) and one equipment blank (EB-KLI) sample were collected. Total metals were not detected in these blanks.
- MS and MSD analyses were not performed on a sample from this data set.
- The field duplicate pair samples were DUP-KLI and OW-12; relative percent differences (RPDs) between the parent and duplicate sample were within the QC limits.
- Laboratory duplicate analyses were not performed on a sample from this data set.

Laboratory Data Quality Review
Groundwater Monitoring Event May 2021
DE Karn Bottom Ash Pond/Lined Impoundment

Groundwater samples were collected by TRC for the May 2021 sampling event. Samples were analyzed for radium; the radium analyses were subcontracted by Eurofins-TestAmerica in Canton, Ohio to Eurofins-TestAmerica in St. Louis, Missouri. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 240-149195-1.

During the May 2021 sampling event, a groundwater sample was collected from each of the following wells:

- DEK-MW-15003
- DEK-MW-18001

Each sample was analyzed for the following constituents:

Analyte Group	Method
Radium (Radium-226, Radium-228, Combined Radium)	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. 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;

- Percent recoveries for carriers for radiochemistry only. Carriers are used to assess the chemical yield for the preparation and/or instrument efficiency;
- 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 Appendix IV analyses 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

- A method blank was analyzed with each analytical batch for radium; target analytes were not detected in the method blank samples.
- An equipment blank was not collected in this data set.
- A field blank was not collected in this data set.
- The LCS and LCSD recoveries and relative percent differences (RPDs) were within QC limits.
- MS and MSD analyses were not performed on a sample from this data set.
- A field duplicate pair was not collected in this data set.
- Laboratory duplicate analyses were not performed on a sample from this data set.
- Carrier recoveries, where applicable, were within 40-110%.

Laboratory Data Quality Review
Groundwater Monitoring Event May 2021
CEC DE Karn Lined Impoundment

Groundwater samples were collected by TRC for the May 2021 sampling event. Samples were analyzed for radium; the radium analyses were subcontracted by Eurofins-TestAmerica in Canton, Ohio to Eurofins-TestAmerica in St. Louis, Missouri. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 240-149192-1.

During the May 2021 sampling event, a groundwater sample was collected from each of the following wells:

- OW-10
- OW-11
- OW-12
- KLI-SCS

Each sample was analyzed for the following constituents:

Analyte Group	Method
Radium (Radium-226, Radium-228, Combined Radium)	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. 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;
- Percent recoveries for carriers for radiochemistry only. Carriers are used to assess the chemical yield for the preparation and/or instrument efficiency;
- 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 Appendix IV analyses 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

- A method blank was analyzed with each analytical batch for radium. Target analytes were not detected in the method blanks.
- One equipment blank (EB-01) was collected. Target analytes were not detected in the equipment blank sample.
- A field blank was not collected in this data set.
- The LCS/LCSD recoveries and relative percent differences (RPDs) of the radium analyses were within QC limits.
- MS and MSD analyses were not performed on a sample from this data set.
- The field duplicate pair samples were DUP-KLI and OW-12; RPDs between the parent and duplicate sample were within the QC limits.
- Laboratory duplicate analyses were not performed on a sample from this data set.
- Carrier recoveries, where applicable, were within 40-110%.

Appendix D
Statistical Analysis

Appendix D
Statistical Summary for DE Karn Lined Impoundment
Second Quarter 2021
Data from August 2019 to May 2021

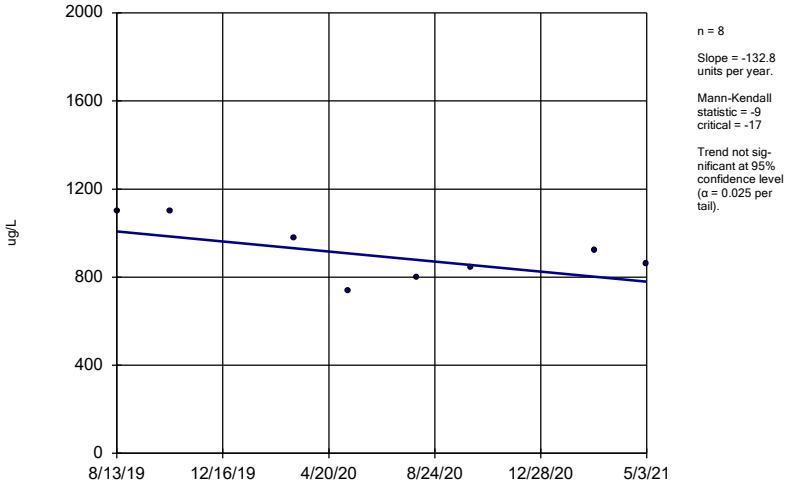
Karn Lined Impoundment Wells						
PARAMETER	**Range, Test, or Limit**	**DEK-MW-15003**	**DEK-MW-18001**	**OW-10**	**OW-11**	**OW-12**
Boron	Trend	O	↓*	O	↑	O
Calcium	Trend	↓	↓*	↑	↓	↓*
Chloride	Trend	O	↓*	O	O	O
Fluoride	Trend	O*	O	O*	O	O*
Iron	Trend	↓	O	O	O	O
pH	Trend	O	O	O	↑	O
Sulfate	Trend	O	↑	O	O	↓*
Total Dissolved Solids	Trend	↓	O	O	↓	↓*

Notes:

O* = Non-detect
O = No trend
↑ = Upward trend, continuous
↑* = Upward trend, new
↑ = Upward trend, confirmed
↓ = Downward trend, continuous
↓* = Downward trend, new

Boron, Total

DEK-MW-15003



n = 8

Slope = -132.8 units per year.

Mann-Kendall statistic = -9 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

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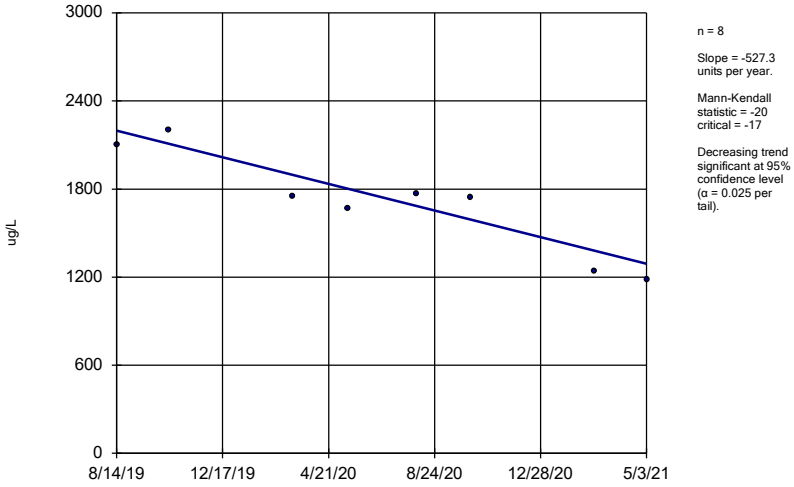
Boron, Total

DEK-MW-18001



n = 8

Slope = -527.3 units per year.

Mann-Kendall statistic = -20 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

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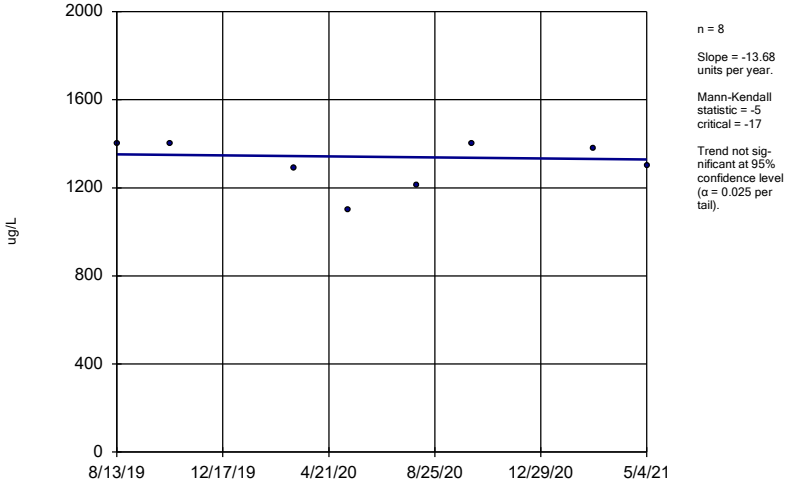
Boron, Total

OW-10



n = 8

Slope = -13.68 units per year.

Mann-Kendall statistic = -5 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

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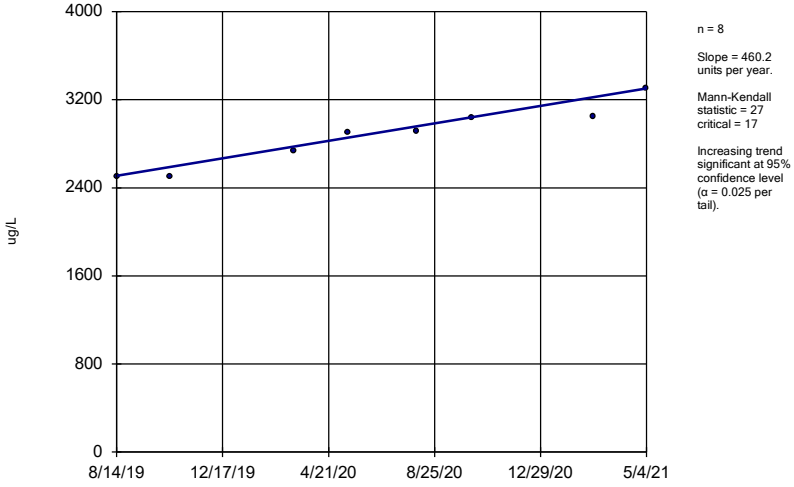
Boron, Total

OW-11



n = 8

Slope = 460.2 units per year.

Mann-Kendall statistic = 27 critical = 17

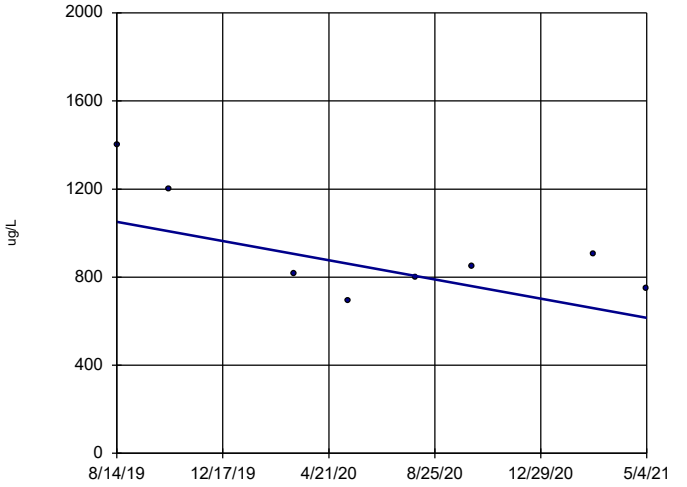
Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Boron, Total

OW-12



n = 8

Slope = -252.3 units per year.

Mann-Kendall statistic = -10
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

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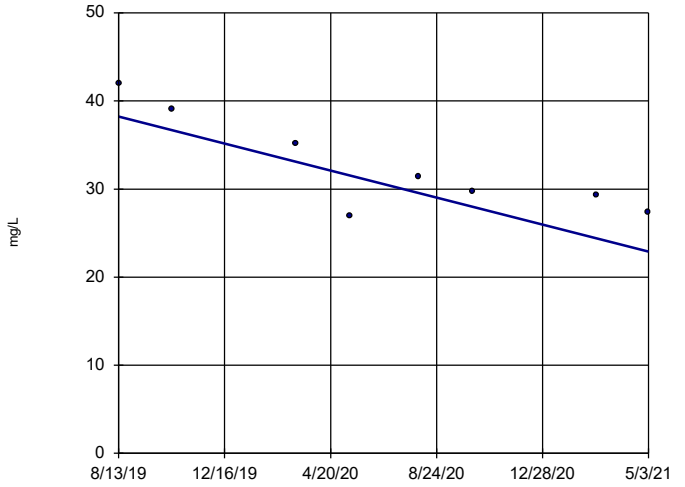
Calcium, Total

DEK-MW-15003



n = 8

Slope = -8.893 units per year.

Mann-Kendall statistic = -20
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

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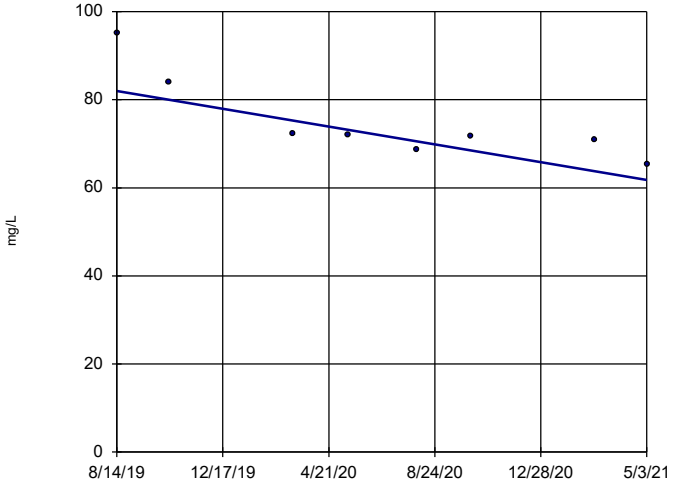
Calcium, Total

DEK-MW-18001



n = 8

Slope = -11.74 units per year.

Mann-Kendall statistic = -24
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

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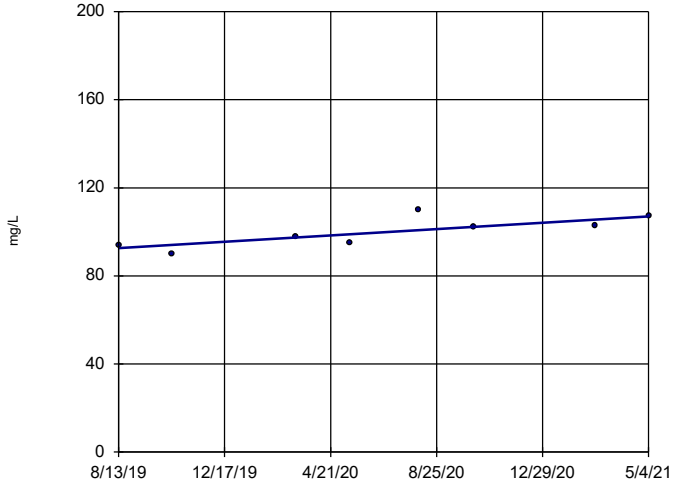
Calcium, Total

OW-10



n = 8

Slope = 8.312 units per year.

Mann-Kendall statistic = 18
critical = 17

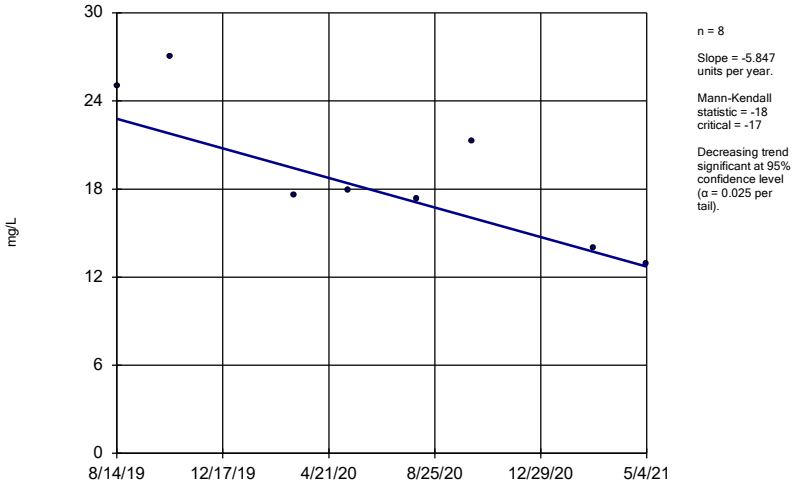
Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Calcium, Total

OW-11



n = 8

Slope = -5.847 units per year.

Mann-Kendall statistic = -18
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

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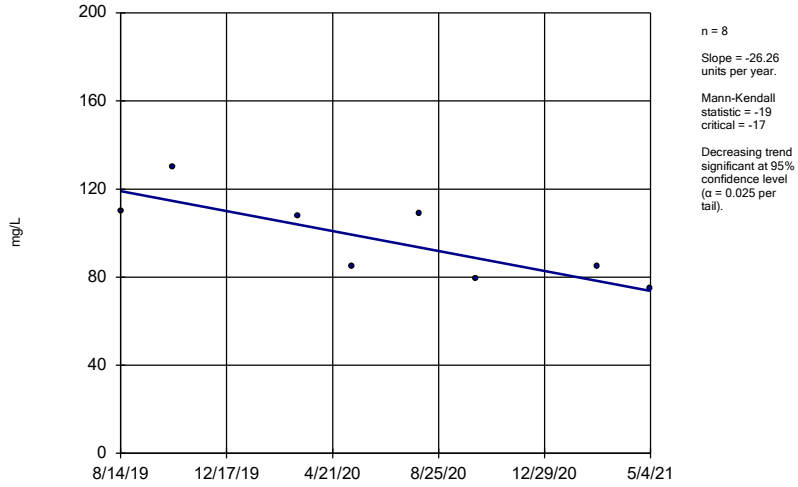
Calcium, Total

OW-12



n = 8

Slope = -26.26 units per year.

Mann-Kendall statistic = -19
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

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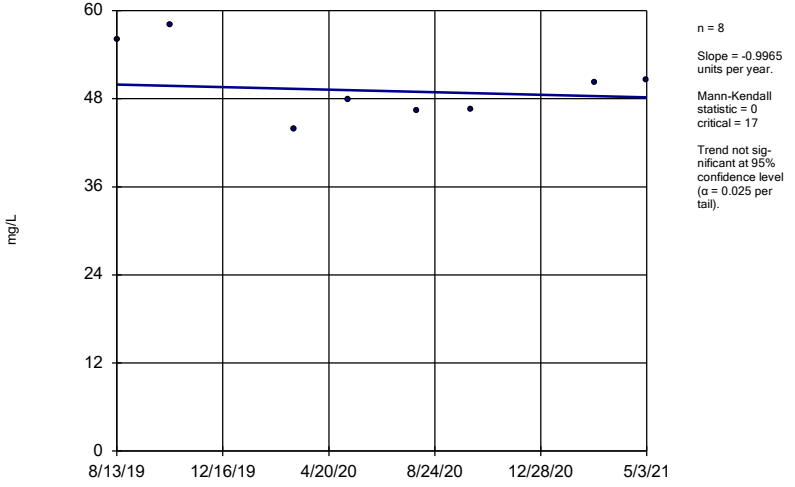
Chloride

DEK-MW-15003



n = 8

Slope = -0.9965 units per year.

Mann-Kendall statistic = 0
critical = 17

Trend not sig-nificant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

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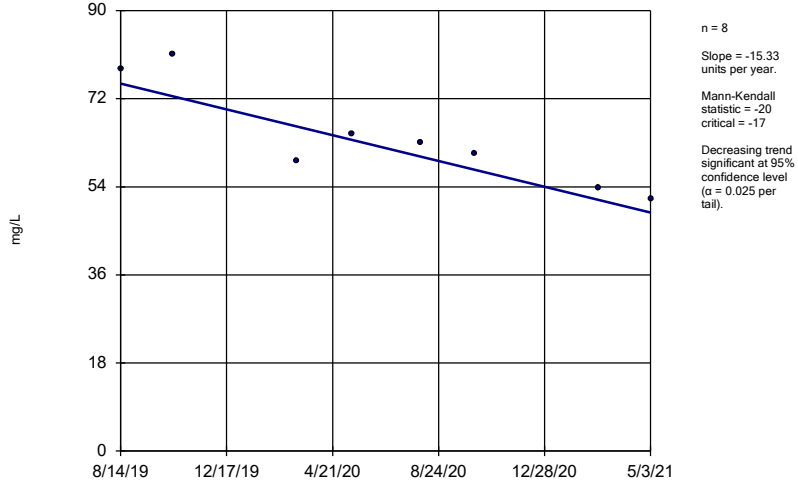
Chloride

DEK-MW-18001



n = 8

Slope = -15.33 units per year.

Mann-Kendall statistic = -20
critical = -17

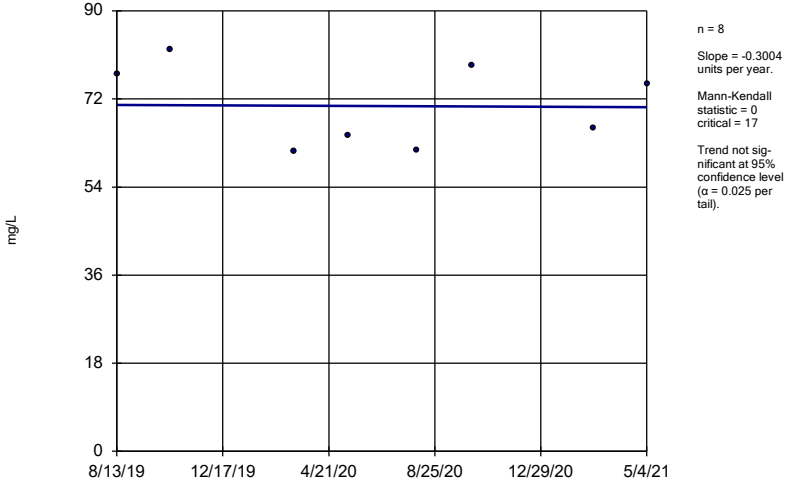
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Chloride

OW-10



n = 8

Slope = -0.3004 units per year.

Mann-Kendall statistic = 0
critical = 17

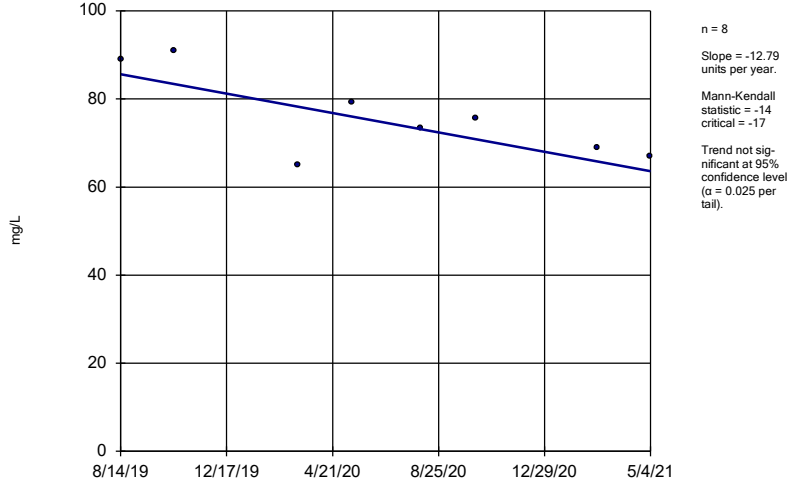
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Chloride

OW-11



n = 8

Slope = -12.79 units per year.

Mann-Kendall statistic = -14
critical = -17

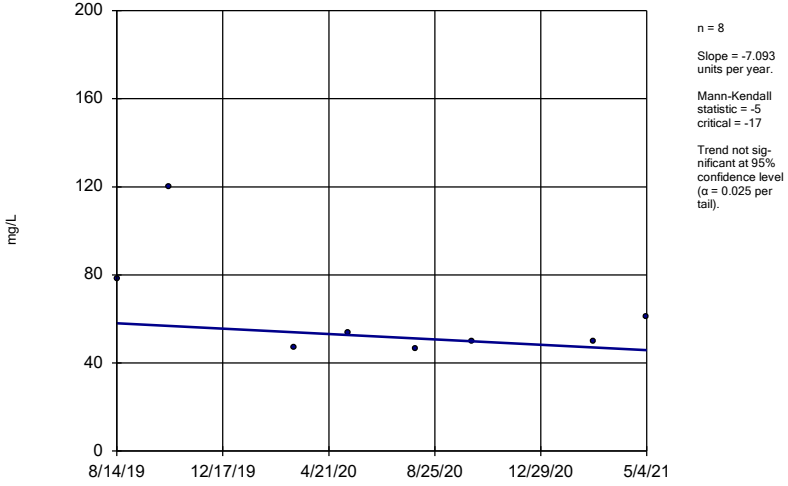
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Chloride

OW-12



n = 8

Slope = -7.093 units per year.

Mann-Kendall statistic = -5
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

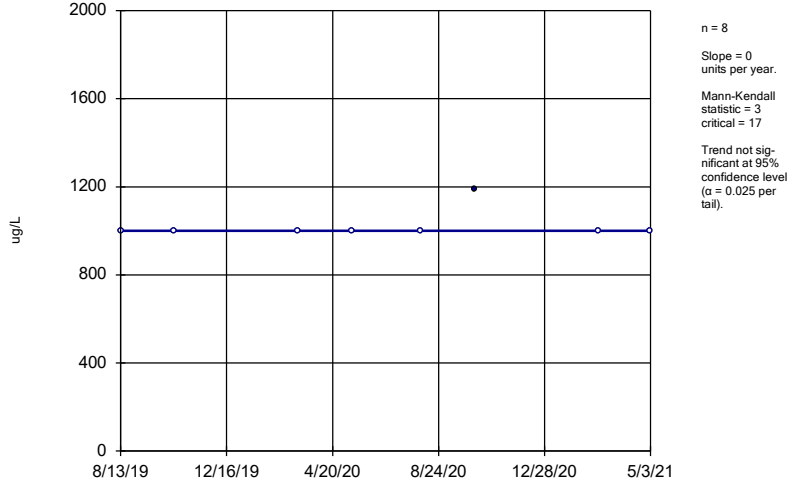
Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Hollow symbols indicate censored values.

Fluoride

DEK-MW-15003



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 3
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:46 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

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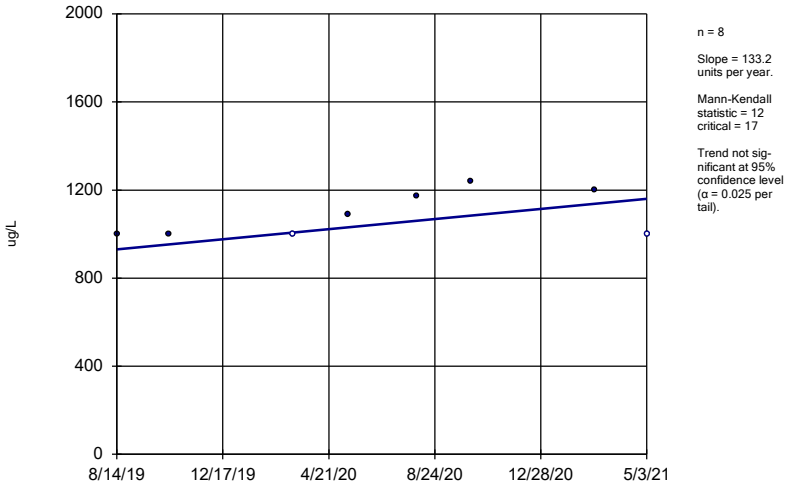
Hollow symbols indicate censored values.

Fluoride

DEK-MW-18001



n = 8

Slope = 133.2 units per year.

Mann-Kendall statistic = 12
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

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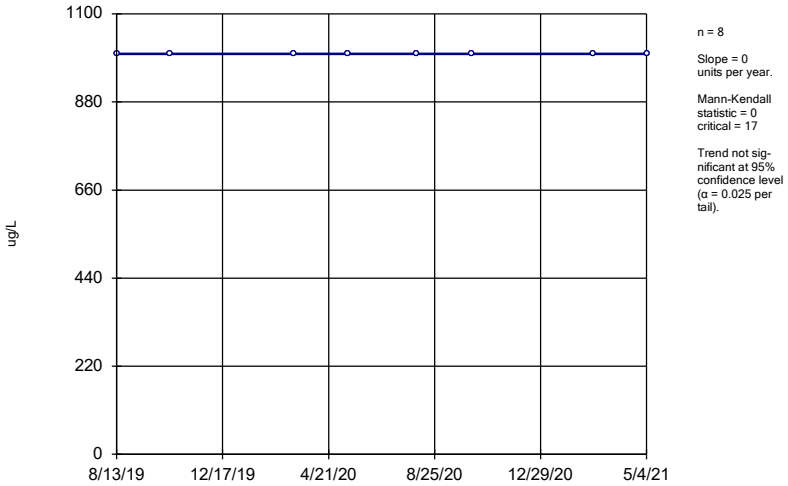
Hollow symbols indicate censored values.

Fluoride

OW-10



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

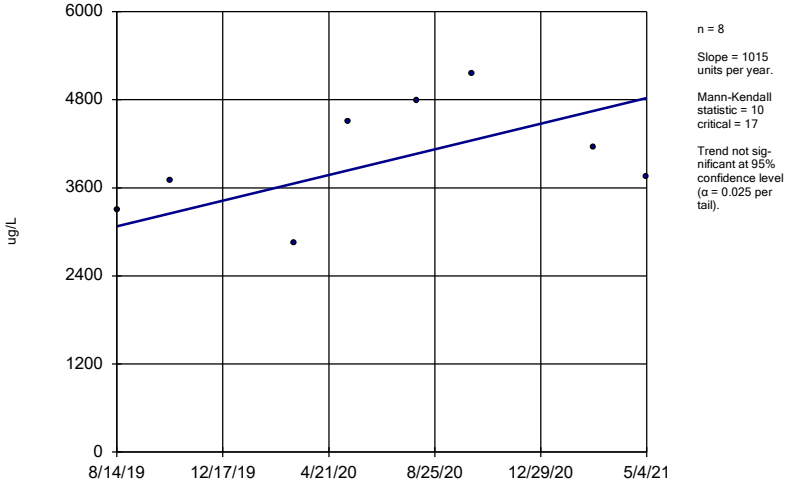
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Fluoride

OW-11



n = 8

Slope = 1015 units per year.

Mann-Kendall statistic = 10
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

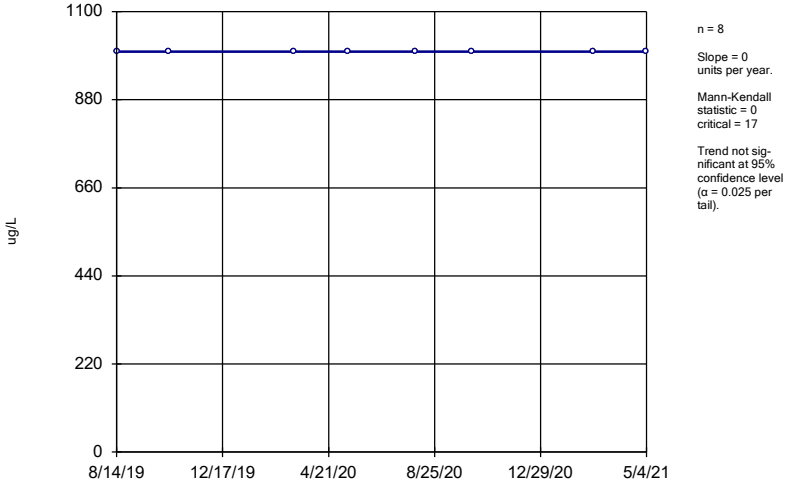
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

OW-12



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0
critical = 17

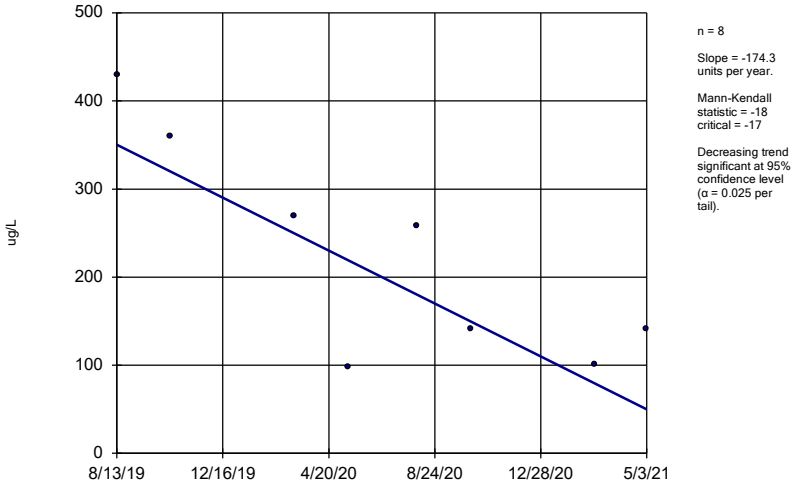
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Iron, Total

DEK-MW-15003



n = 8

Slope = -174.3 units per year.

Mann-Kendall statistic = -18
critical = -17

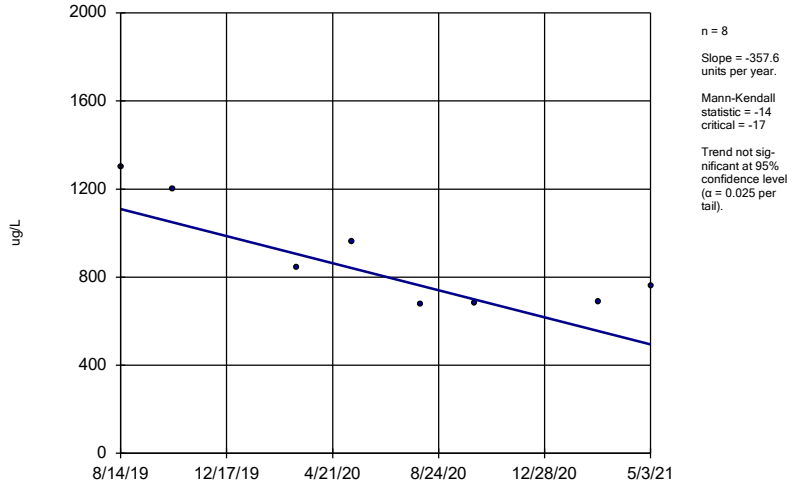
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Iron, Total

DEK-MW-18001



n = 8

Slope = -357.6 units per year.

Mann-Kendall statistic = -14
critical = -17

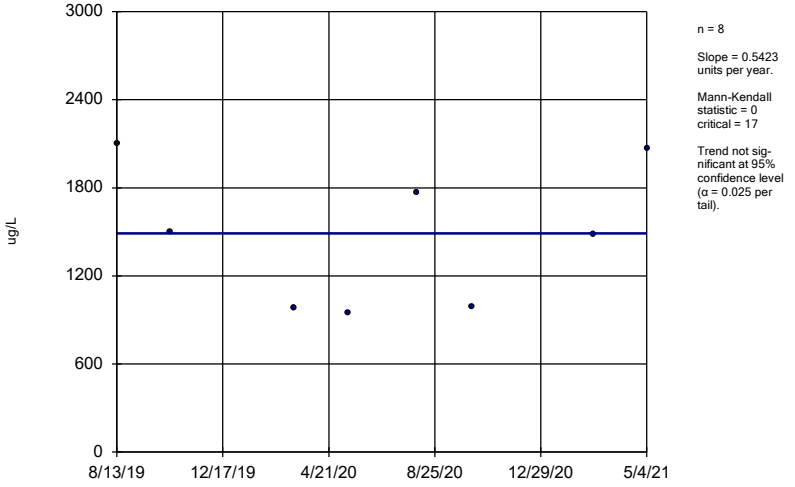
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Iron, Total

OW-10



n = 8

Slope = 0.5423 units per year.

Mann-Kendall statistic = 0
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

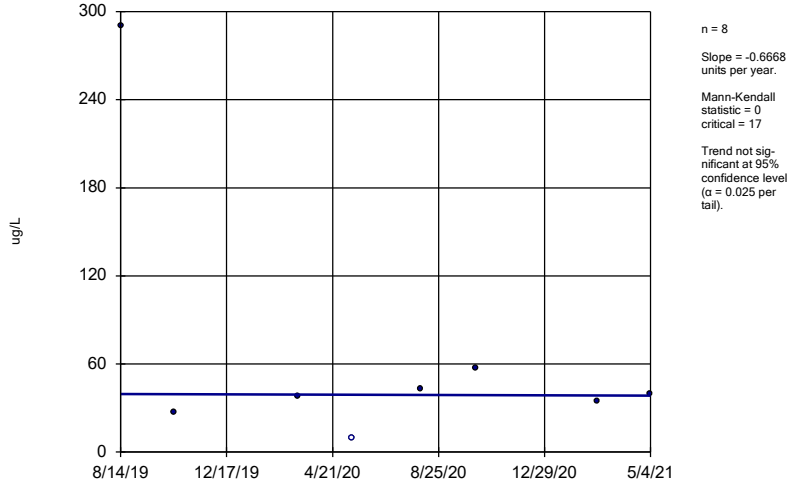
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Hollow symbols indicate censored values.

Iron, Total

OW-11



n = 8

Slope = -0.6668 units per year.

Mann-Kendall statistic = 0
critical = 17

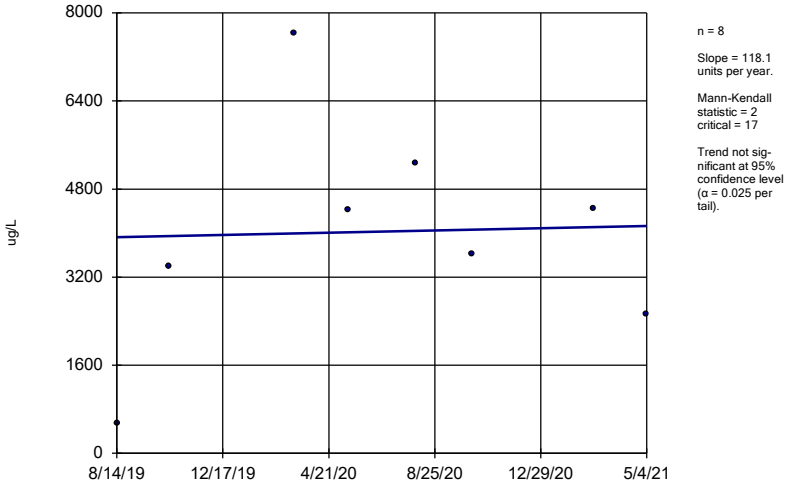
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Iron, Total

OW-12



n = 8

Slope = 118.1 units per year.

Mann-Kendall statistic = 2 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

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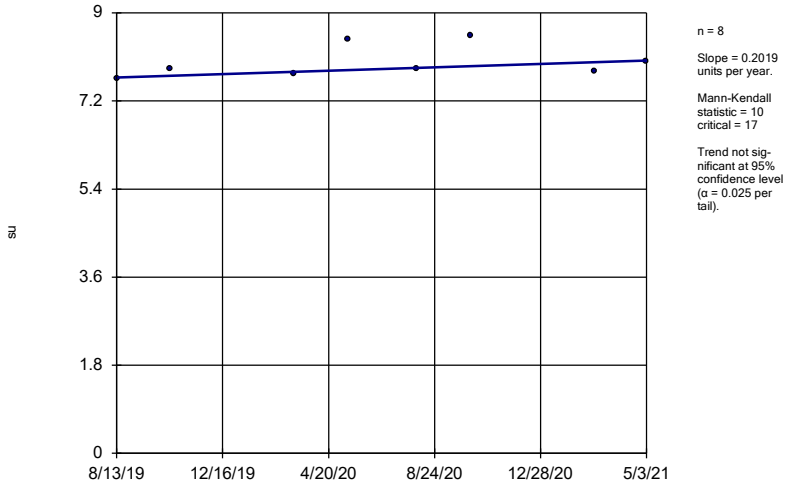
pH, Field

DEK-MW-15003



n = 8

Slope = 0.2019 units per year.

Mann-Kendall statistic = 10 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

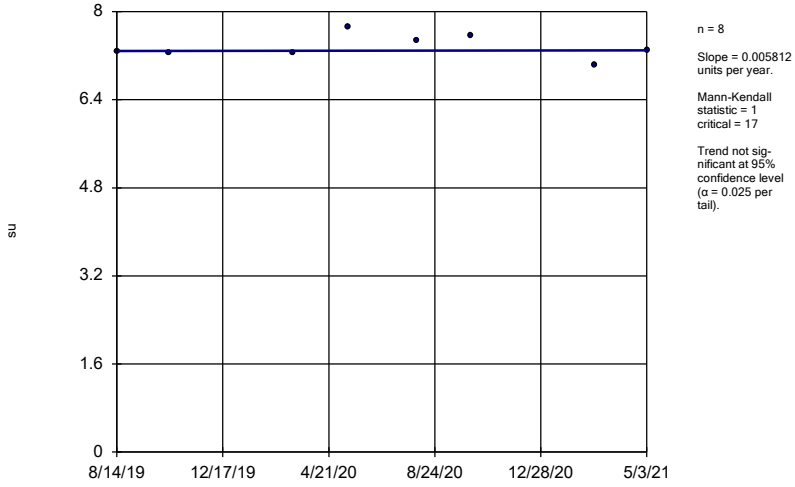
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

pH, Field

DEK-MW-18001



n = 8

Slope = 0.005812 units per year.

Mann-Kendall statistic = 1 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

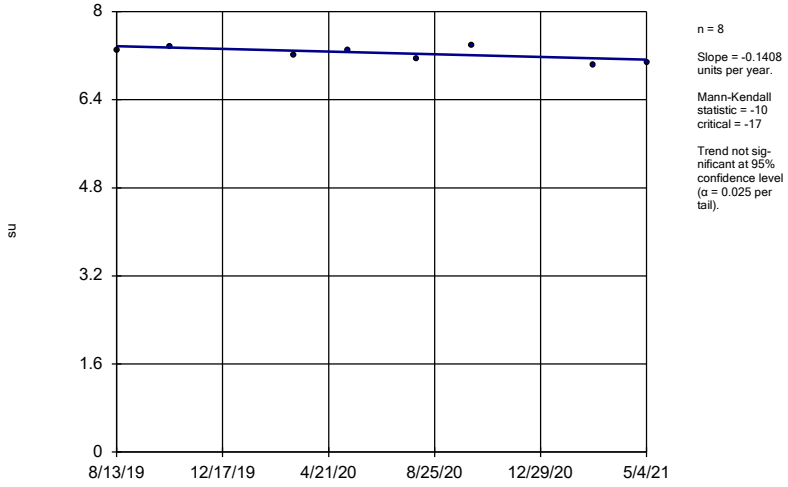
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

pH, Field

OW-10



n = 8

Slope = -0.1408 units per year.

Mann-Kendall statistic = -10 critical = -17

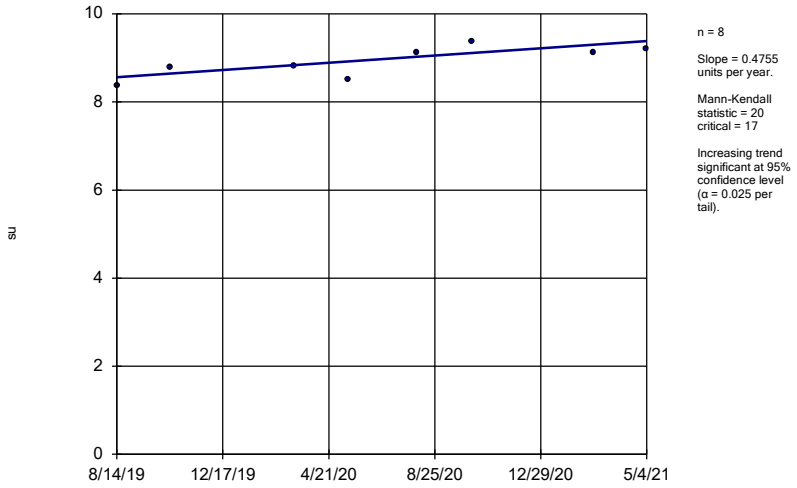
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

pH, Field

OW-11



n = 8

Slope = 0.4755 units per year.

Mann-Kendall statistic = 20
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

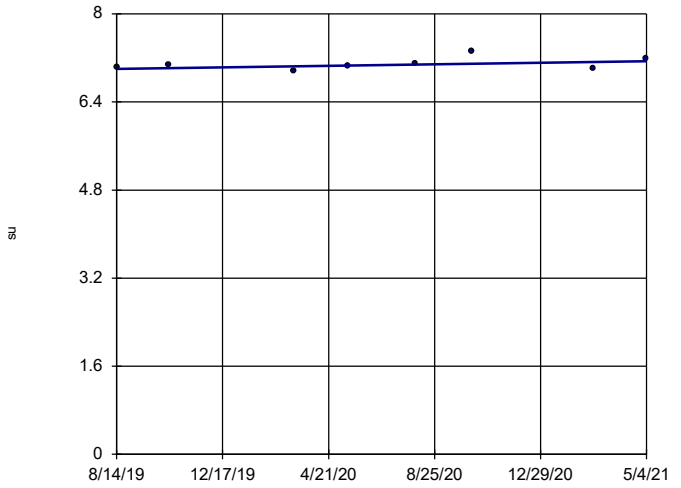
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

pH, Field

OW-12



n = 8

Slope = 0.07893 units per year.

Mann-Kendall statistic = 10
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

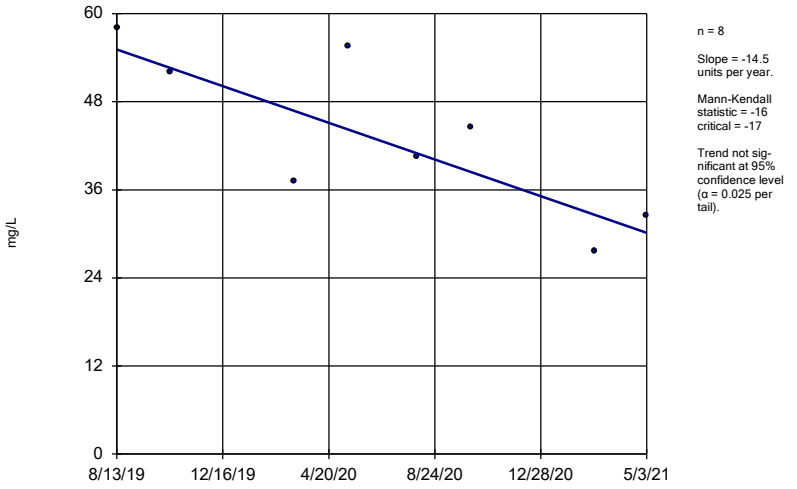
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Sulfate

DEK-MW-15003



n = 8

Slope = -14.5 units per year.

Mann-Kendall statistic = -16
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

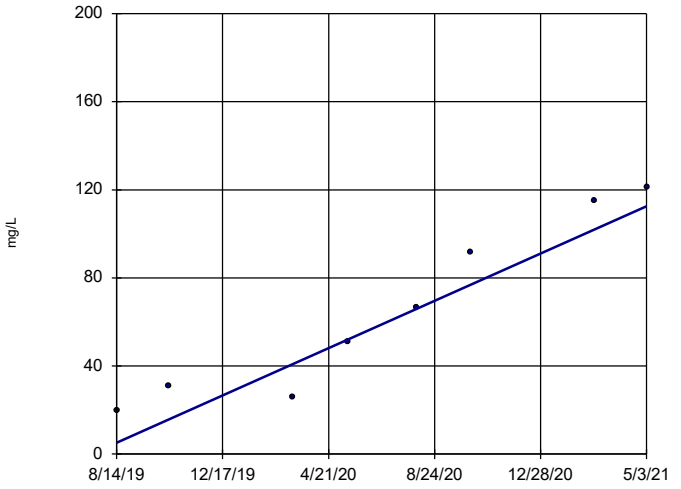
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Sulfate

DEK-MW-18001



n = 8

Slope = 62.45 units per year.

Mann-Kendall statistic = 26
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

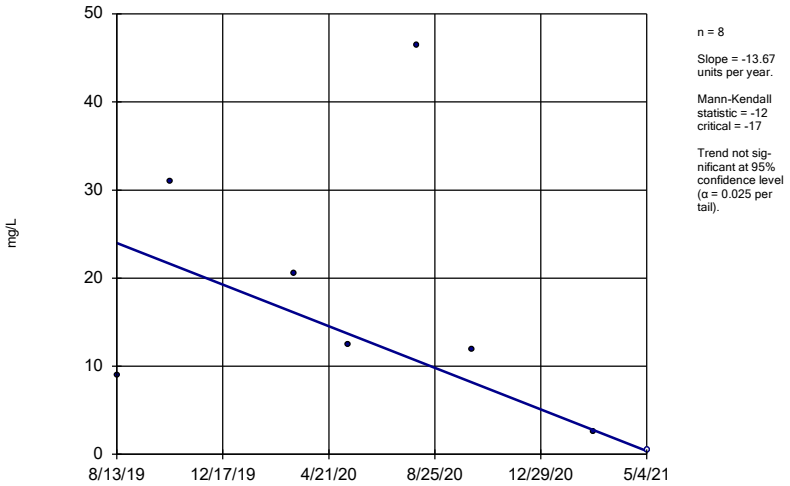
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Hollow symbols indicate censored values.

Sulfate

OW-10



n = 8

Slope = -13.67 units per year.

Mann-Kendall statistic = -12
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

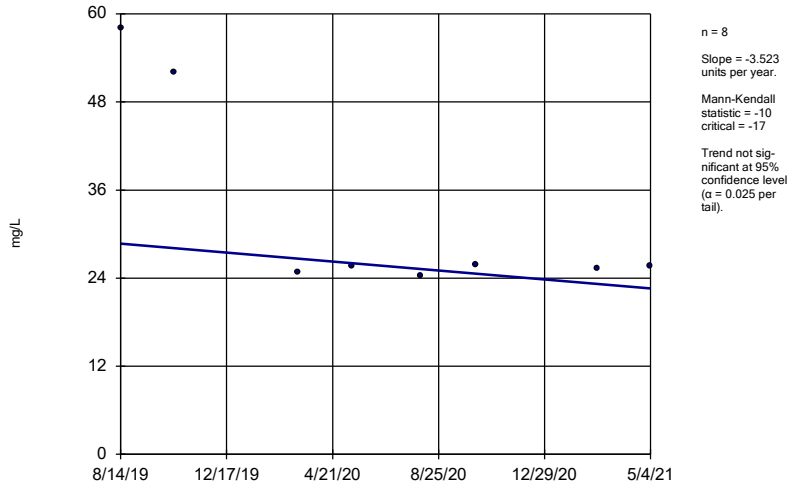
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Sulfate

OW-11



n = 8

Slope = -3.523 units per year.

Mann-Kendall statistic = -10
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

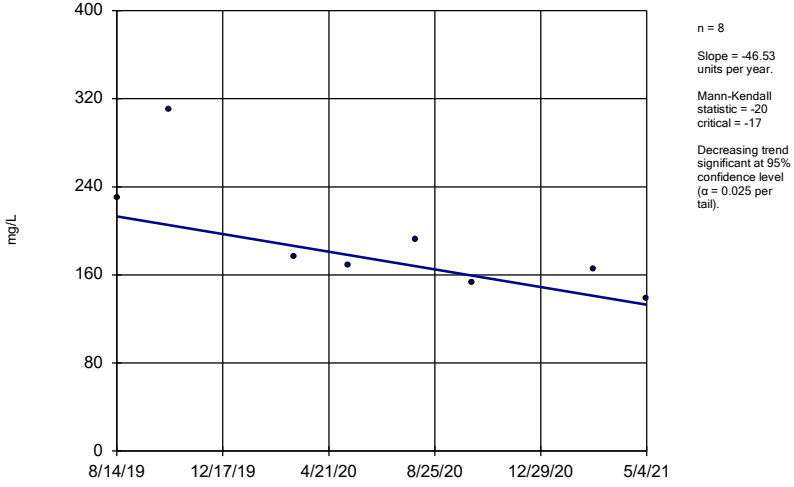
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Sulfate

OW-12



n = 8

Slope = -46.53 units per year.

Mann-Kendall statistic = -20
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

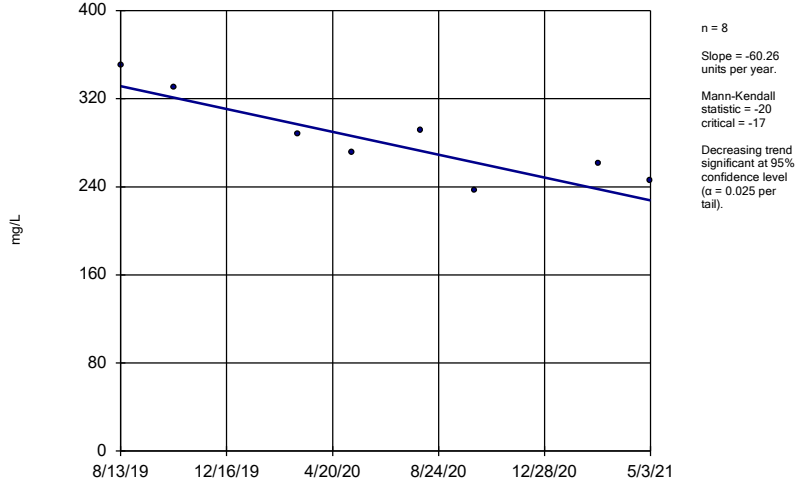
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

DEK-MW-15003



n = 8

Slope = -60.26 units per year.

Mann-Kendall statistic = -20
critical = -17

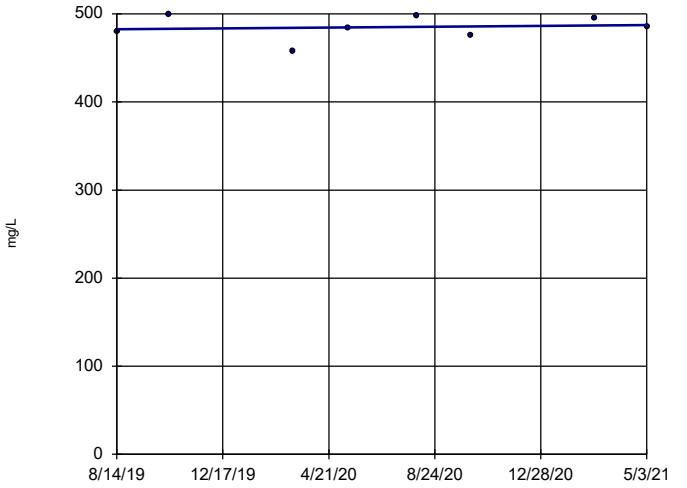
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Total Dissolved Solids

DEK-MW-18001



n = 8

Slope = 2.775 units per year.

Mann-Kendall statistic = 2 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

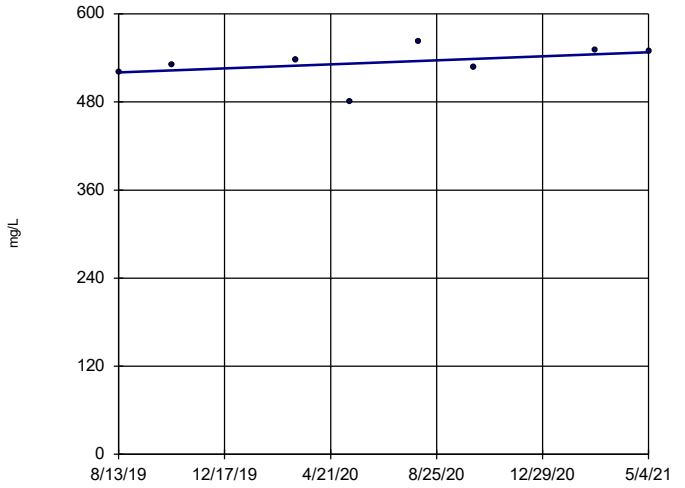
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

OW-10



n = 8

Slope = 16 units per year.

Mann-Kendall statistic = 10 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

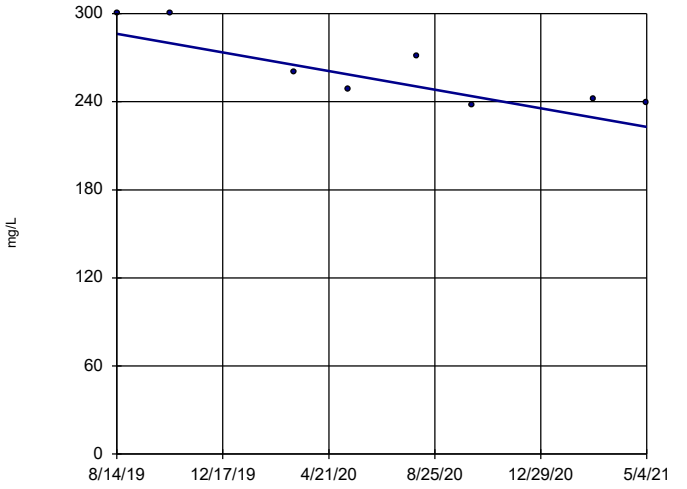
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

OW-11



n = 8

Slope = -36.76 units per year.

Mann-Kendall statistic = -19 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

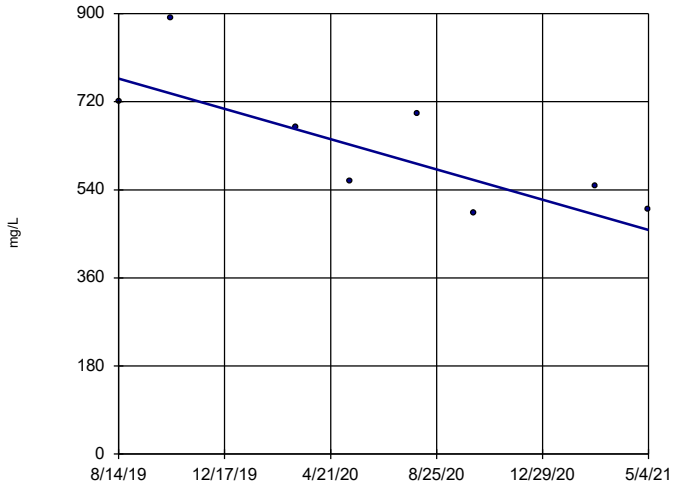
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

OW-12



n = 8

Slope = -179.5 units per year.

Mann-Kendall statistic = -18 critical = -17

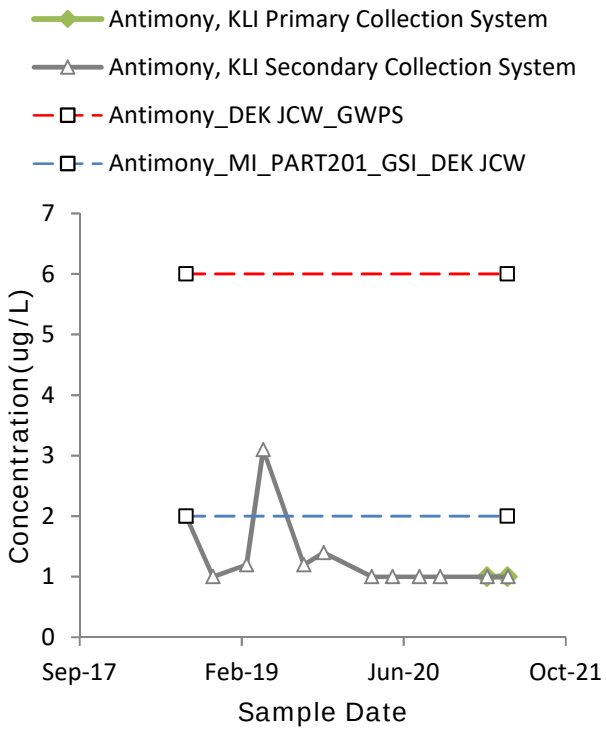
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

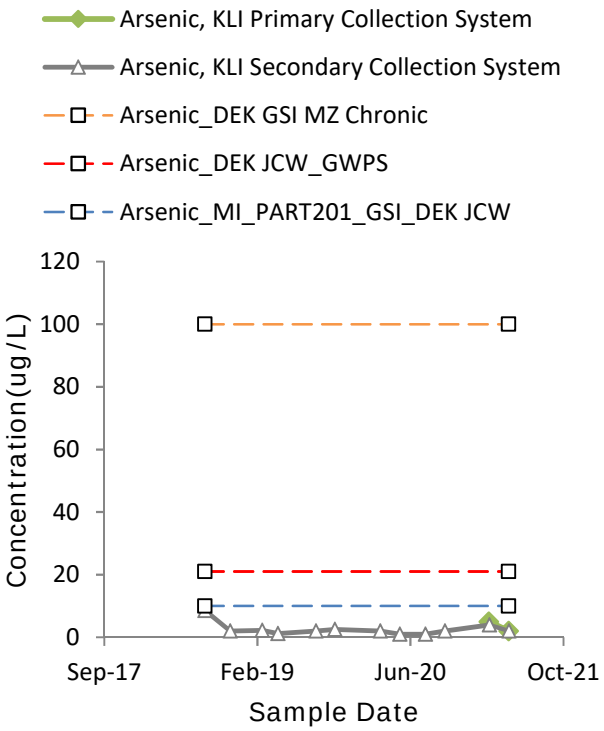
Sen's Slope Estimator Analysis Run 6/14/2021 9:47 AM

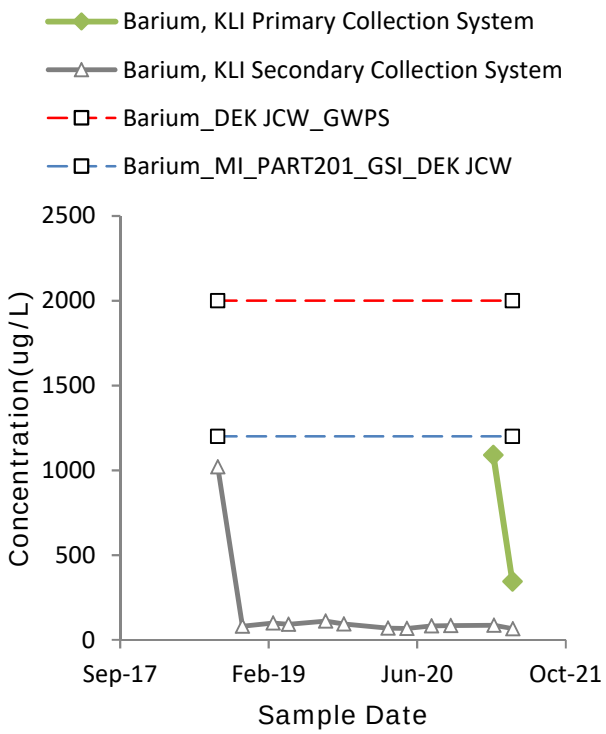
Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q2

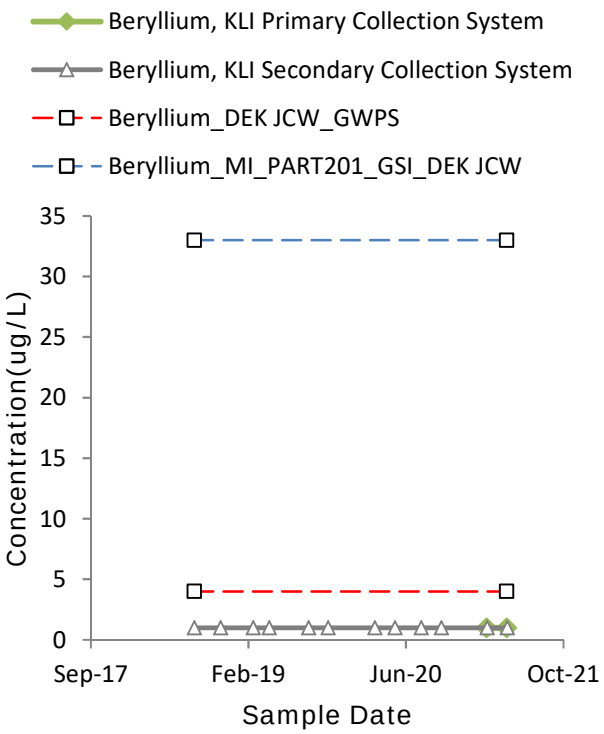
Appendix E
Secondary Leachate Collection System Monitoring

Water Quality Time Series

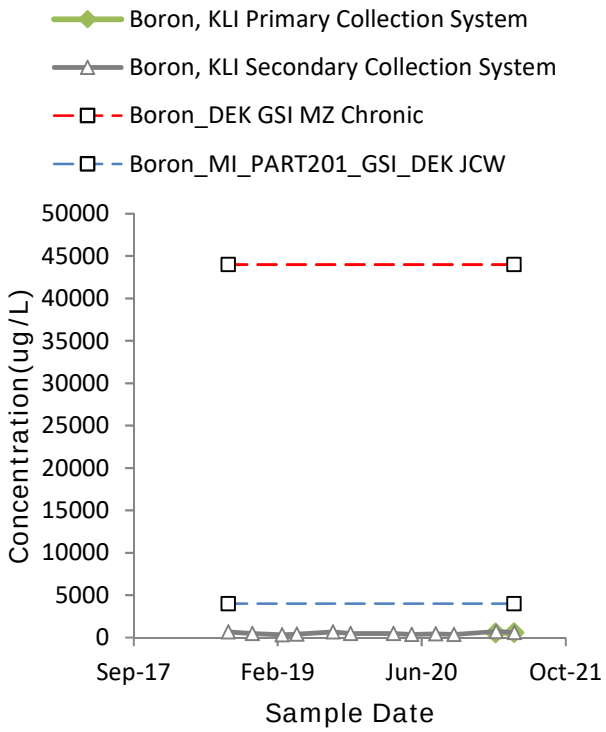


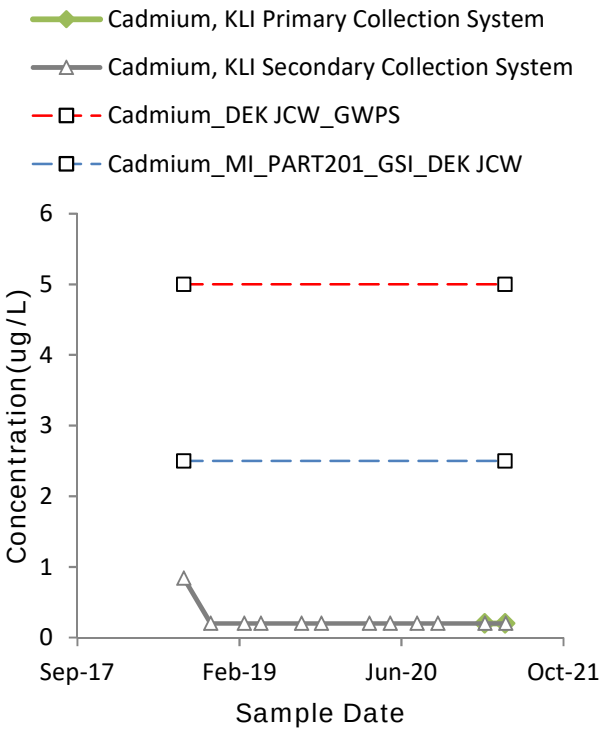


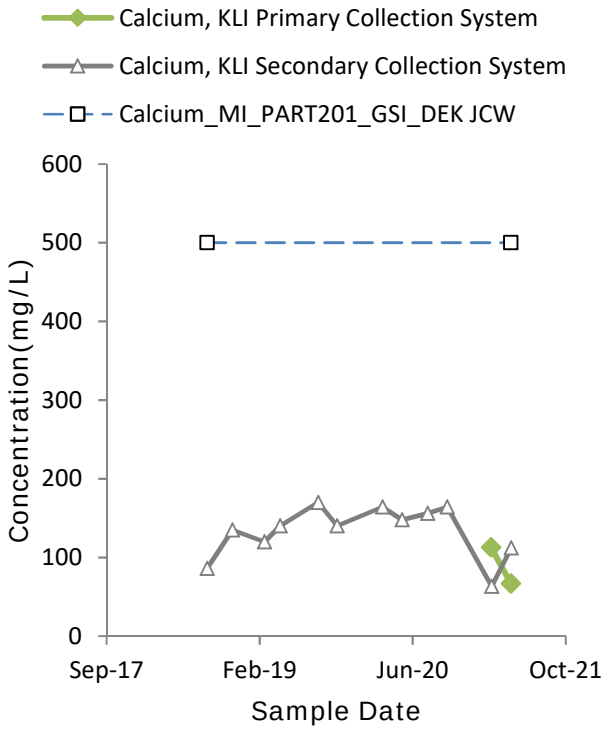


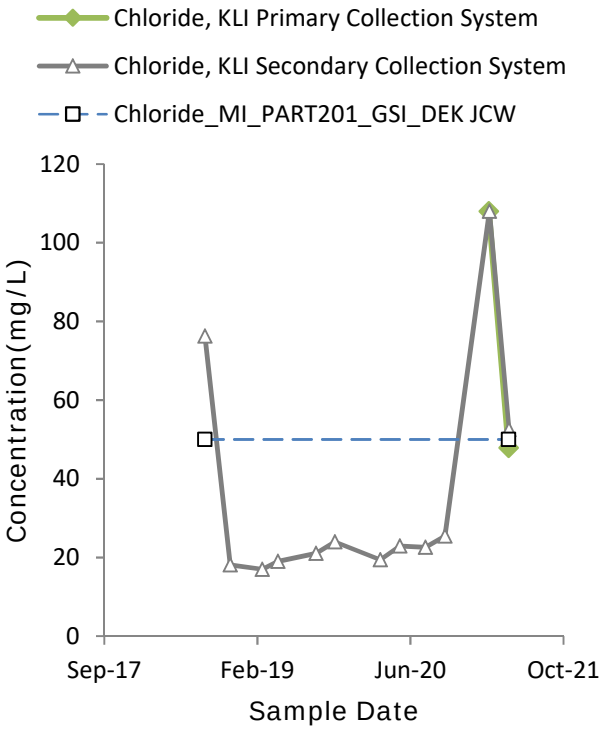


Water Quality Time Series

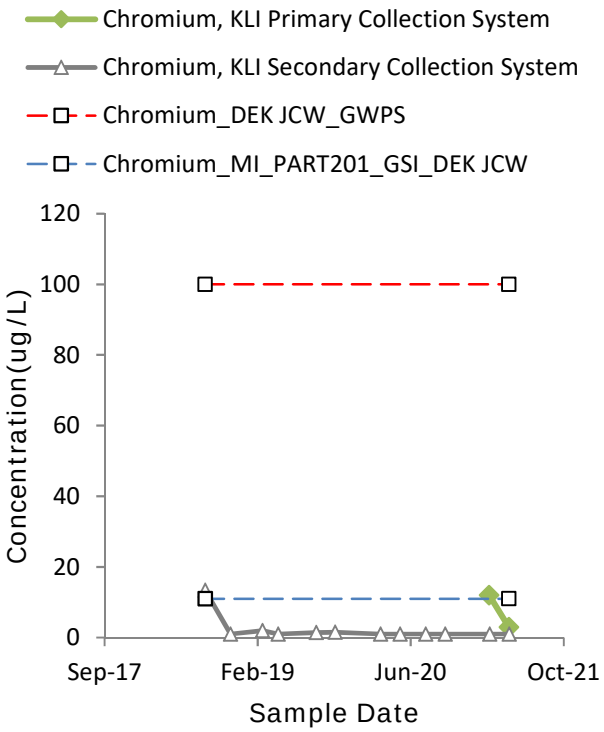


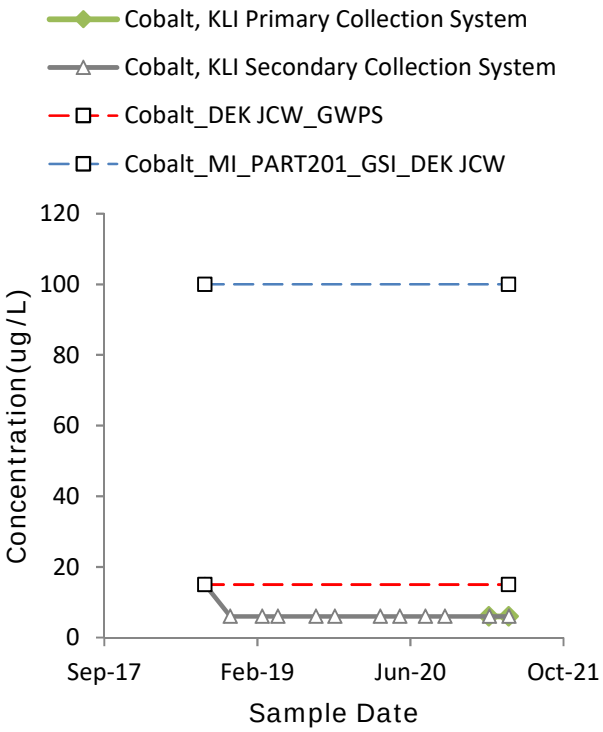


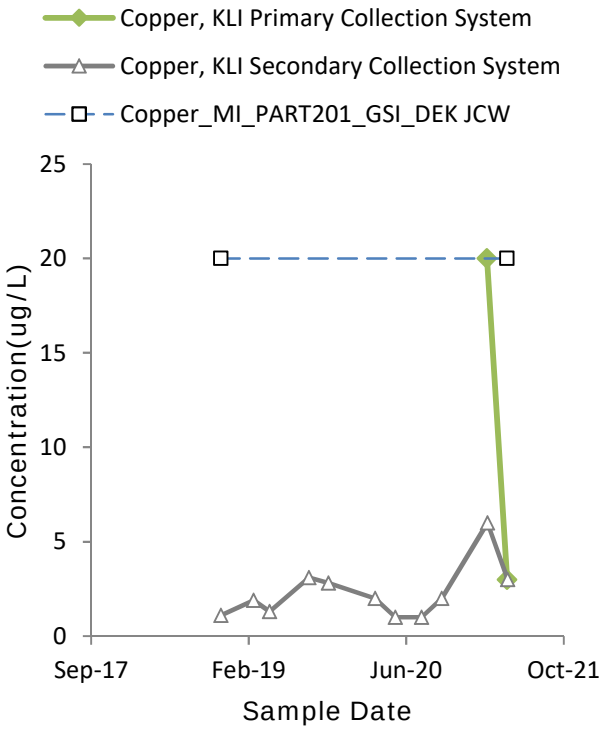


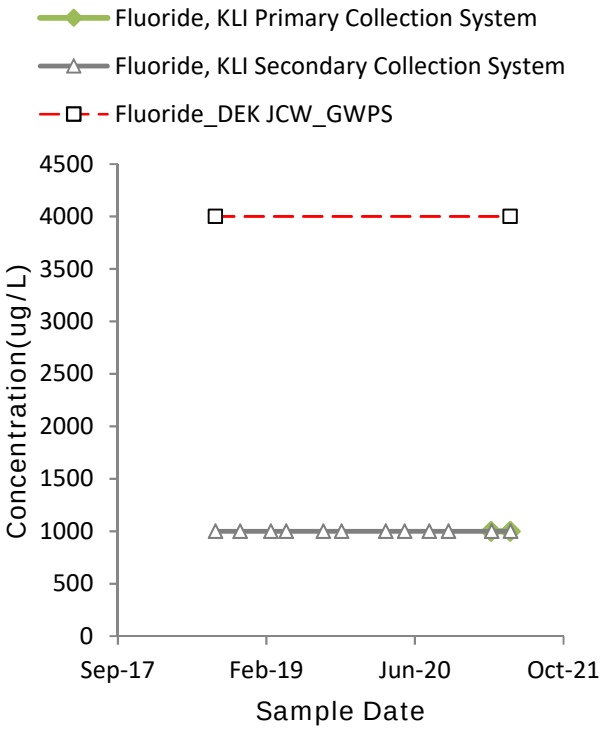


Water Quality Time Series

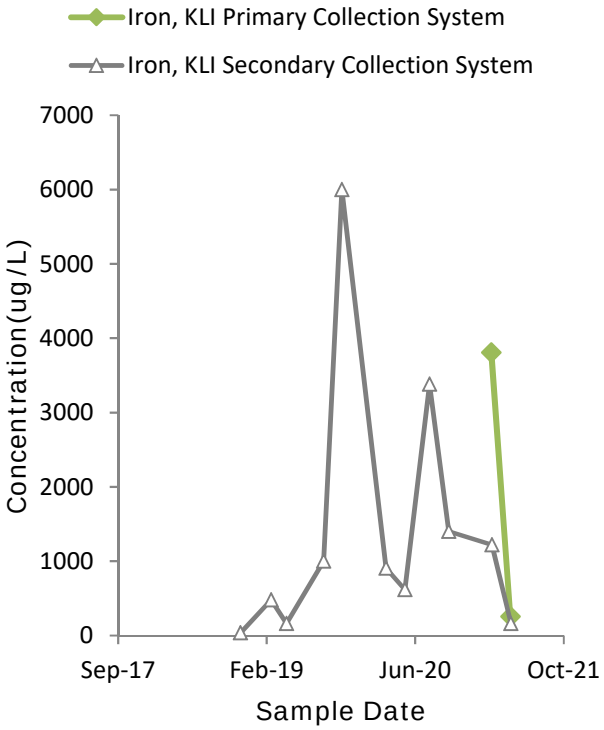


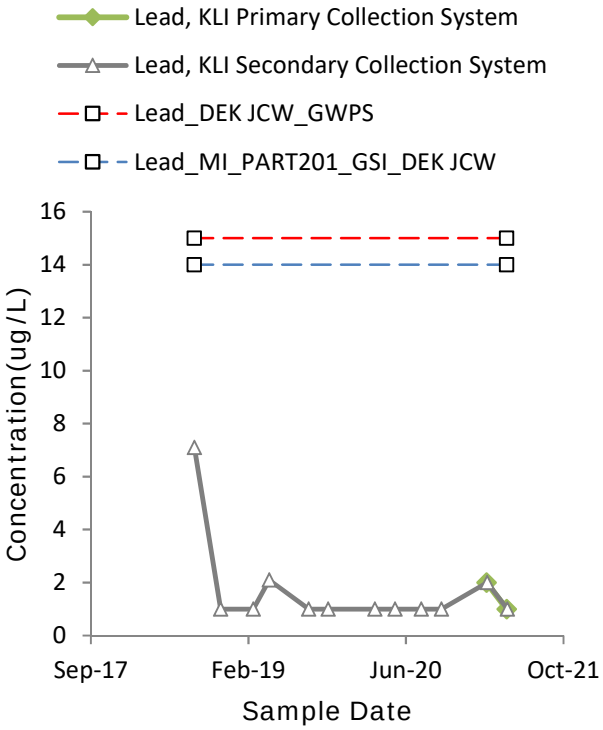


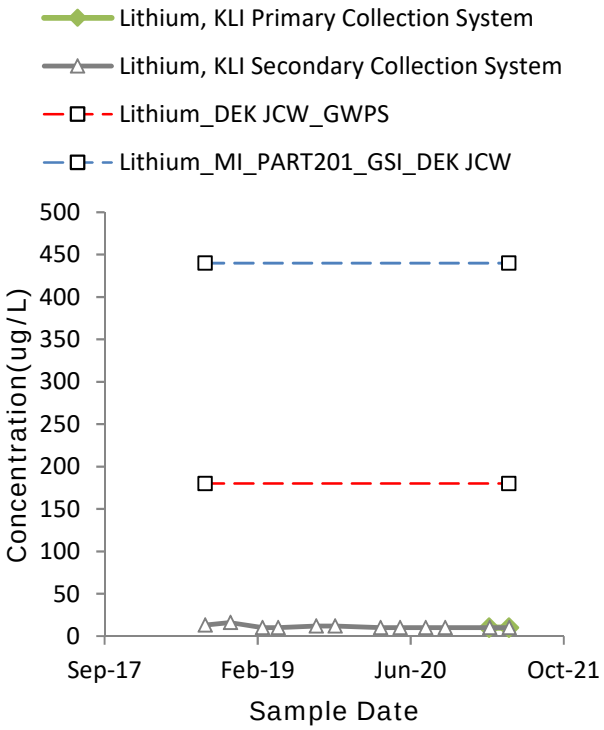


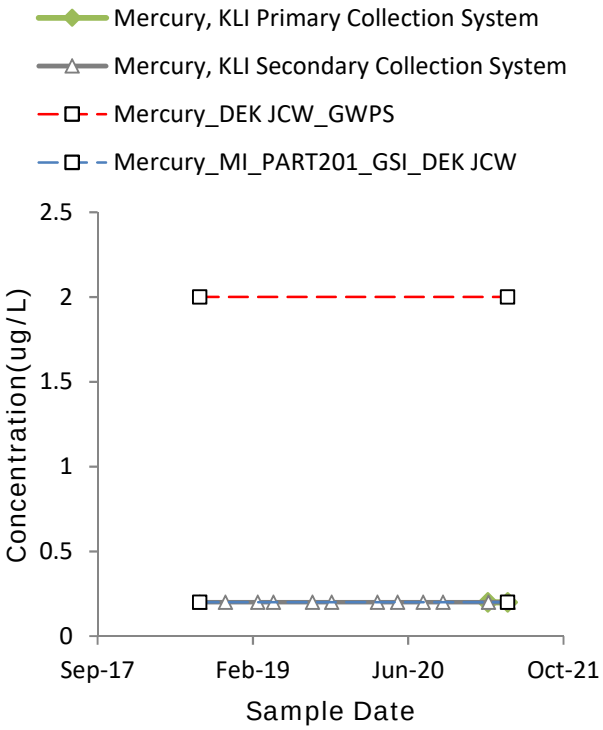


Water Quality Time Series

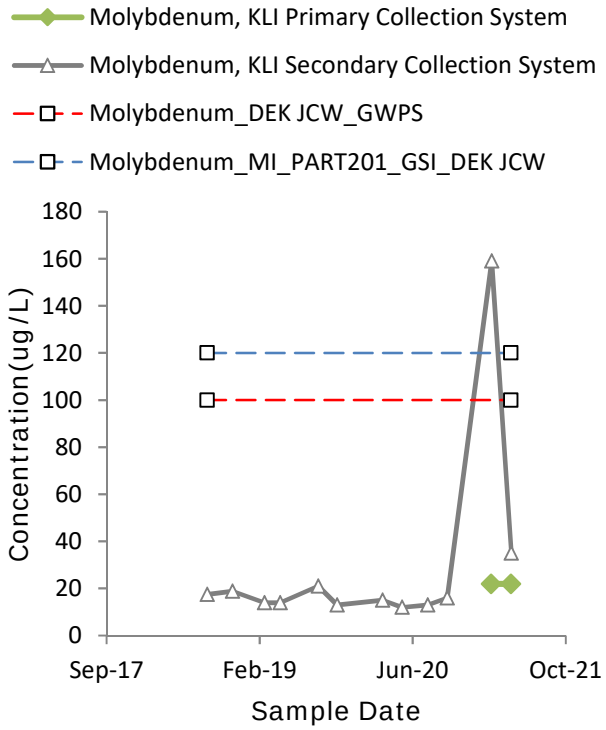


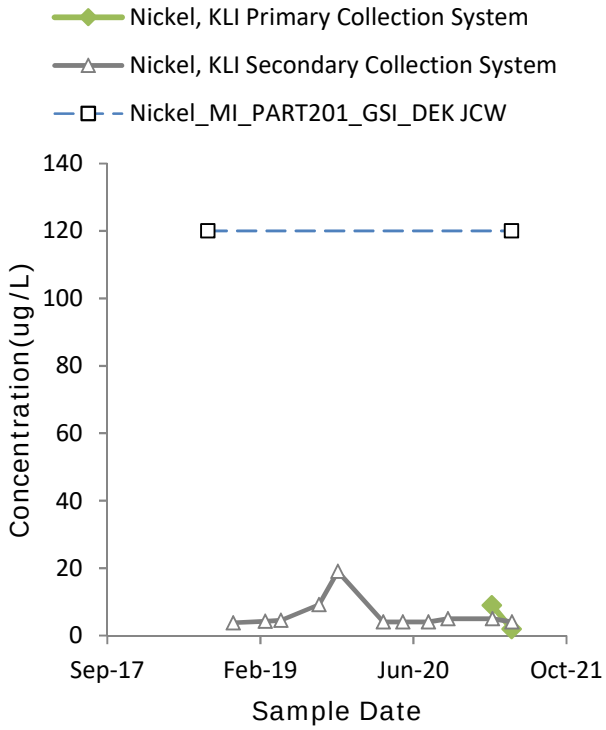


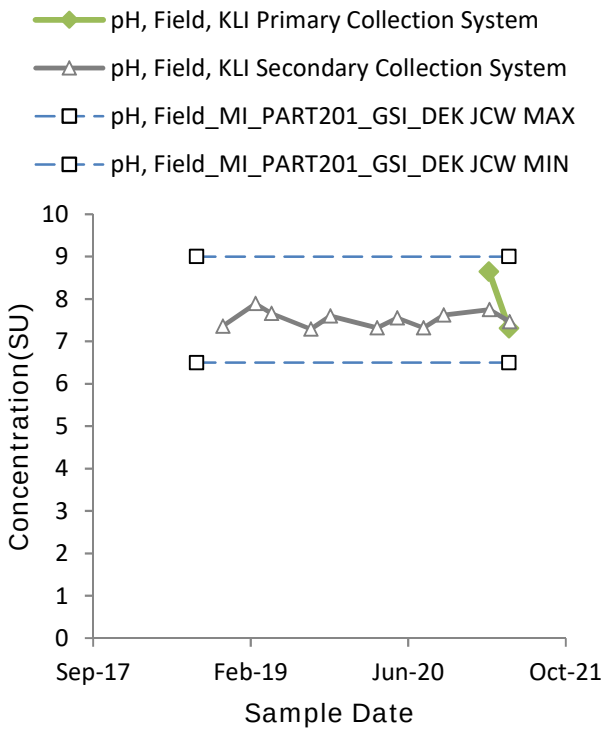


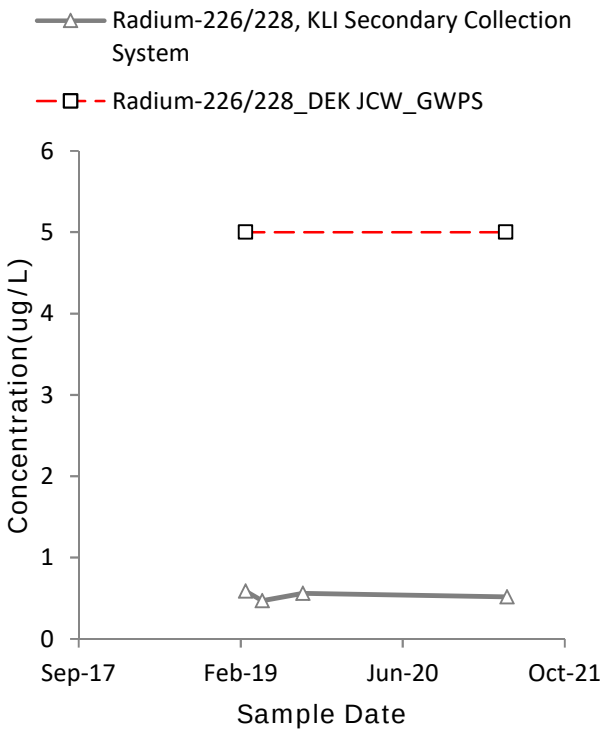


Water Quality Time Series

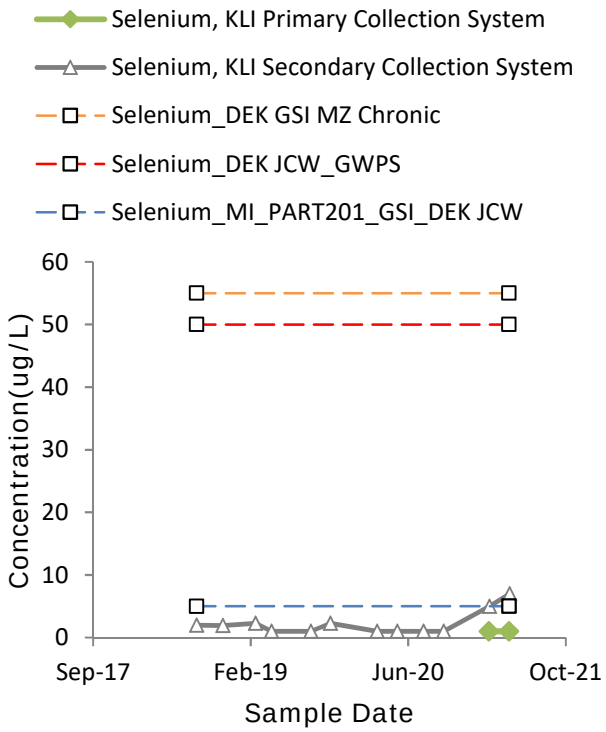


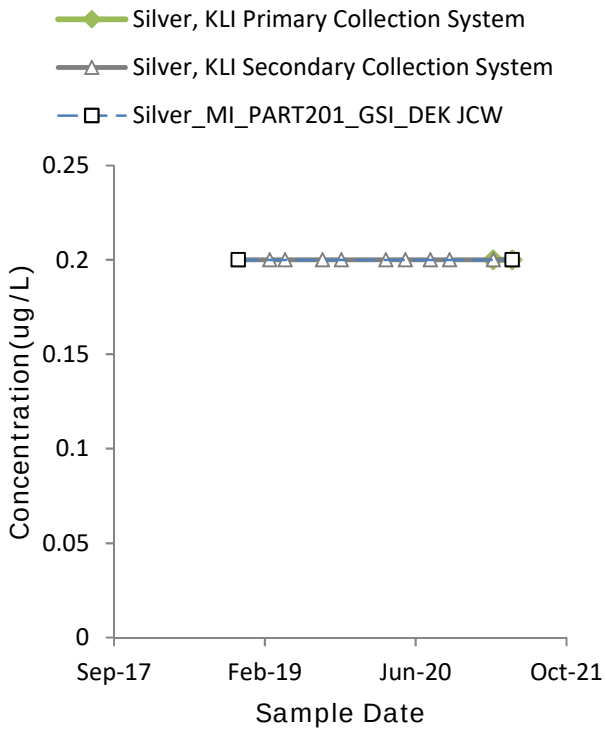


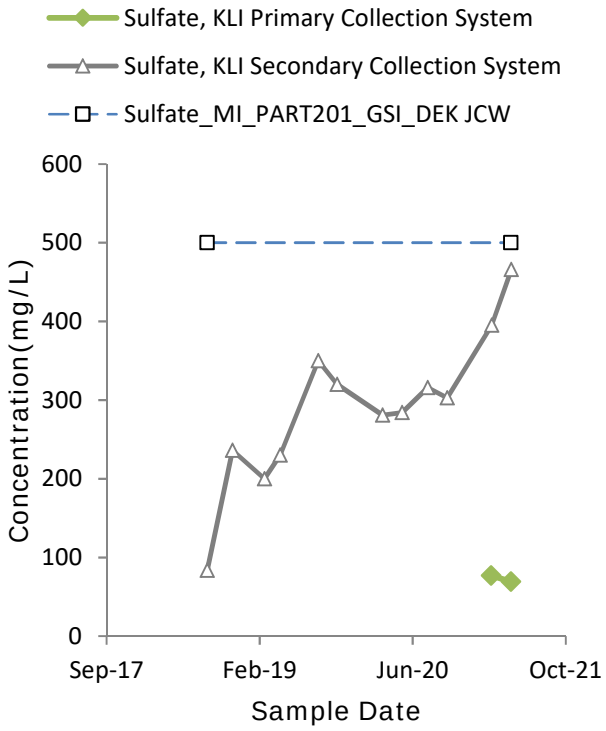


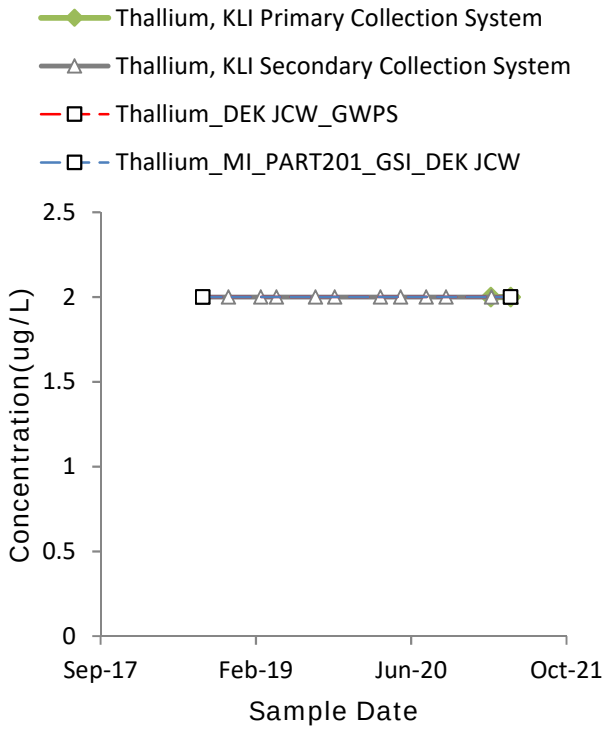


Water Quality Time Series

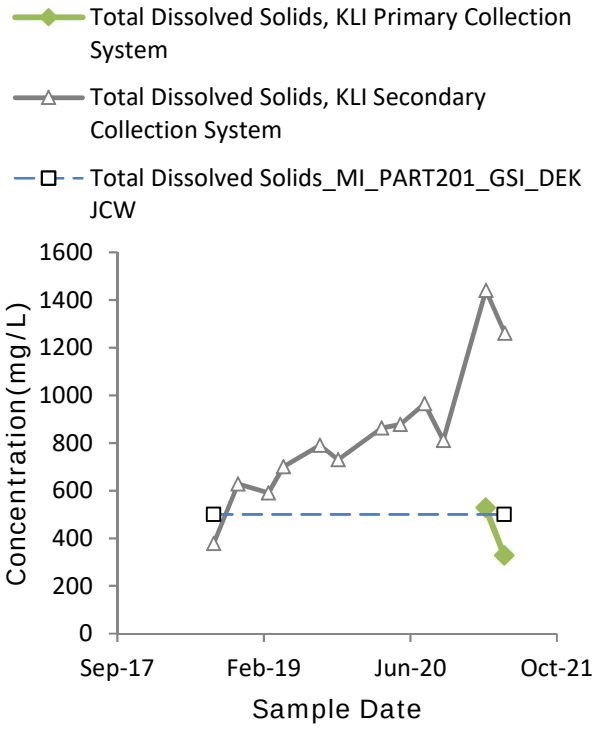


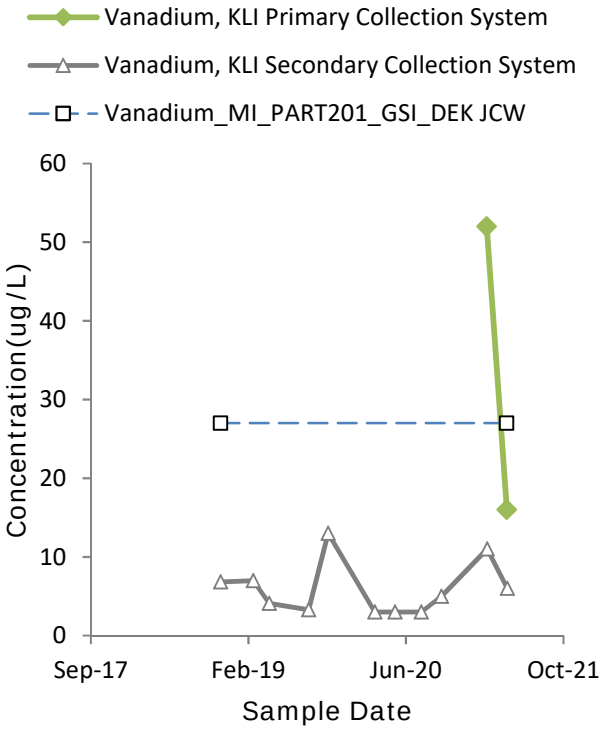


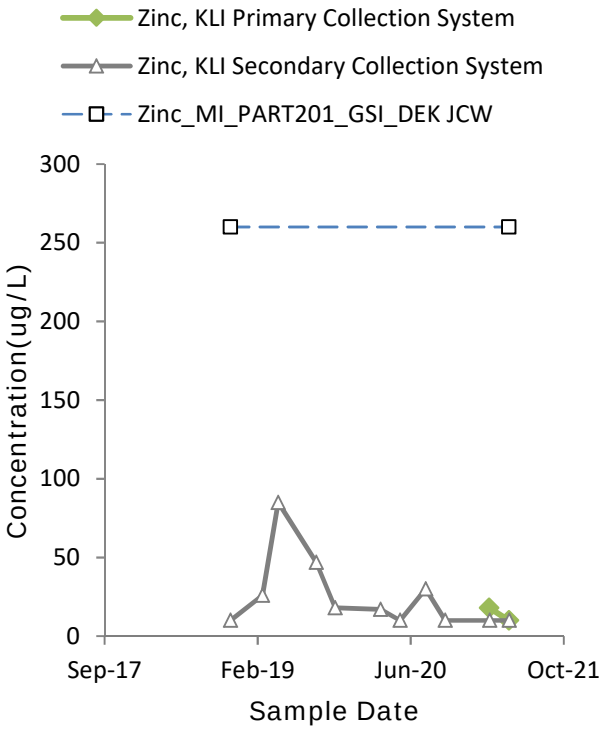




Water Quality Time Series







Appendix F
Alternate Source Demonstration

Consumers Energy
Count on Us®

A CMS Energy Company

Date: July 30, 2021

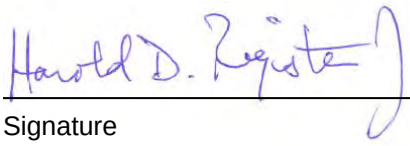
To: Operating Record

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

RE: Alternate Source Demonstration Professional Engineer Certification, §257.94(e)2
DE Karn Lined Impoundment CCR Unit

Professional Engineer Certification Statement [40 CFR 257.94(e)2]

I hereby certify that the alternative source demonstration presented within this Second Quarter 2021 Hydrogeological Monitoring Report for the DE Karn Lined Impoundment CCR unit has been prepared to meet the requirements of Title 40 CFR §257.94(e) 2 of the Federal CCR Rule. This document is accurate and has been prepared in accordance with good engineering practices, including the consideration of applicable industry standards, and with the requirements of Title 40 CFR §257.94(e) 2.



Signature

July 30, 2021
Date of Certification

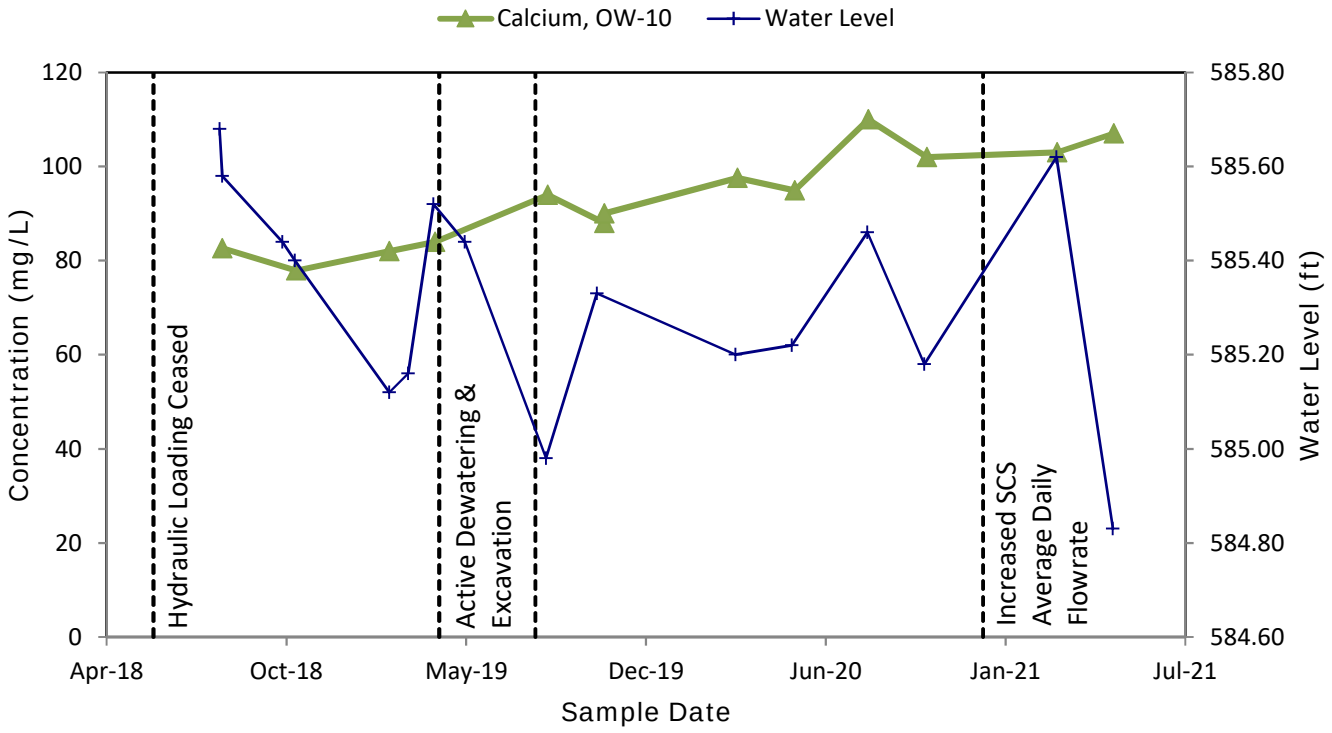
Harold D. Register, Jr., P.E.
Name

6201056266
Professional Engineer Certification Number

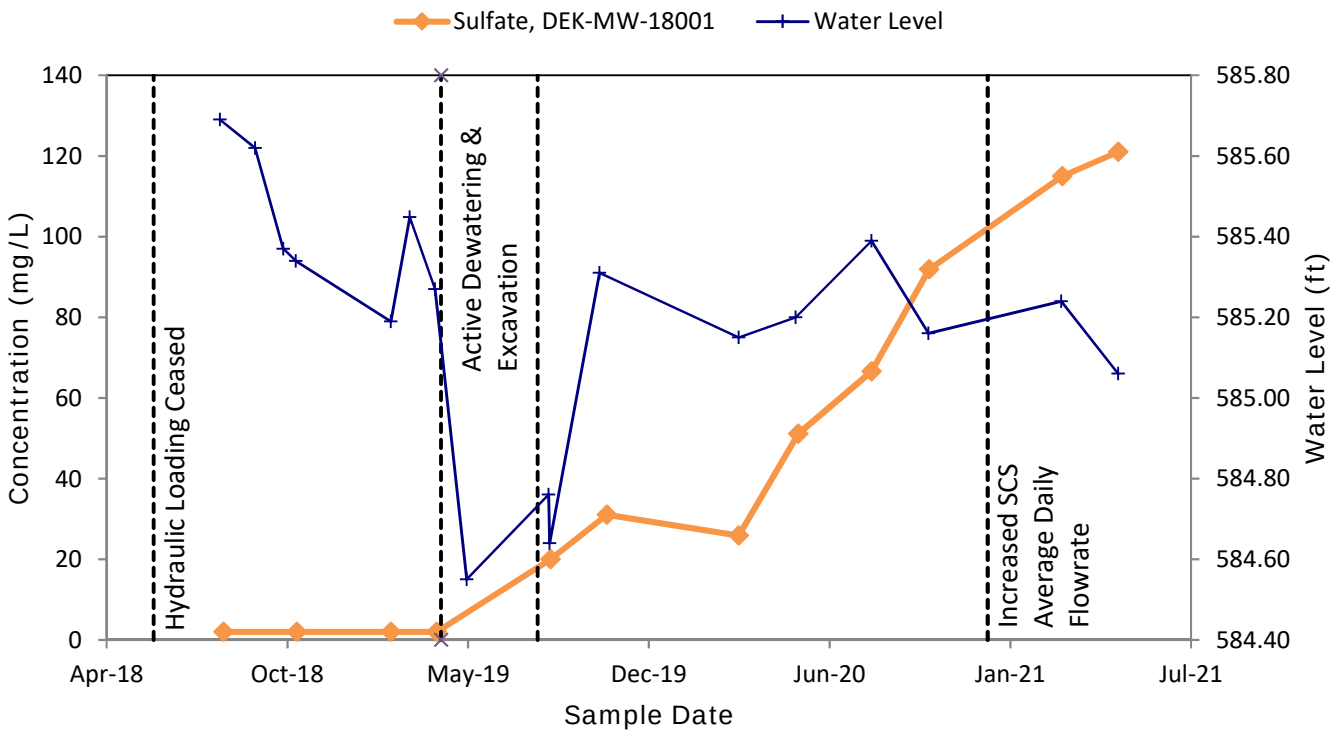
References

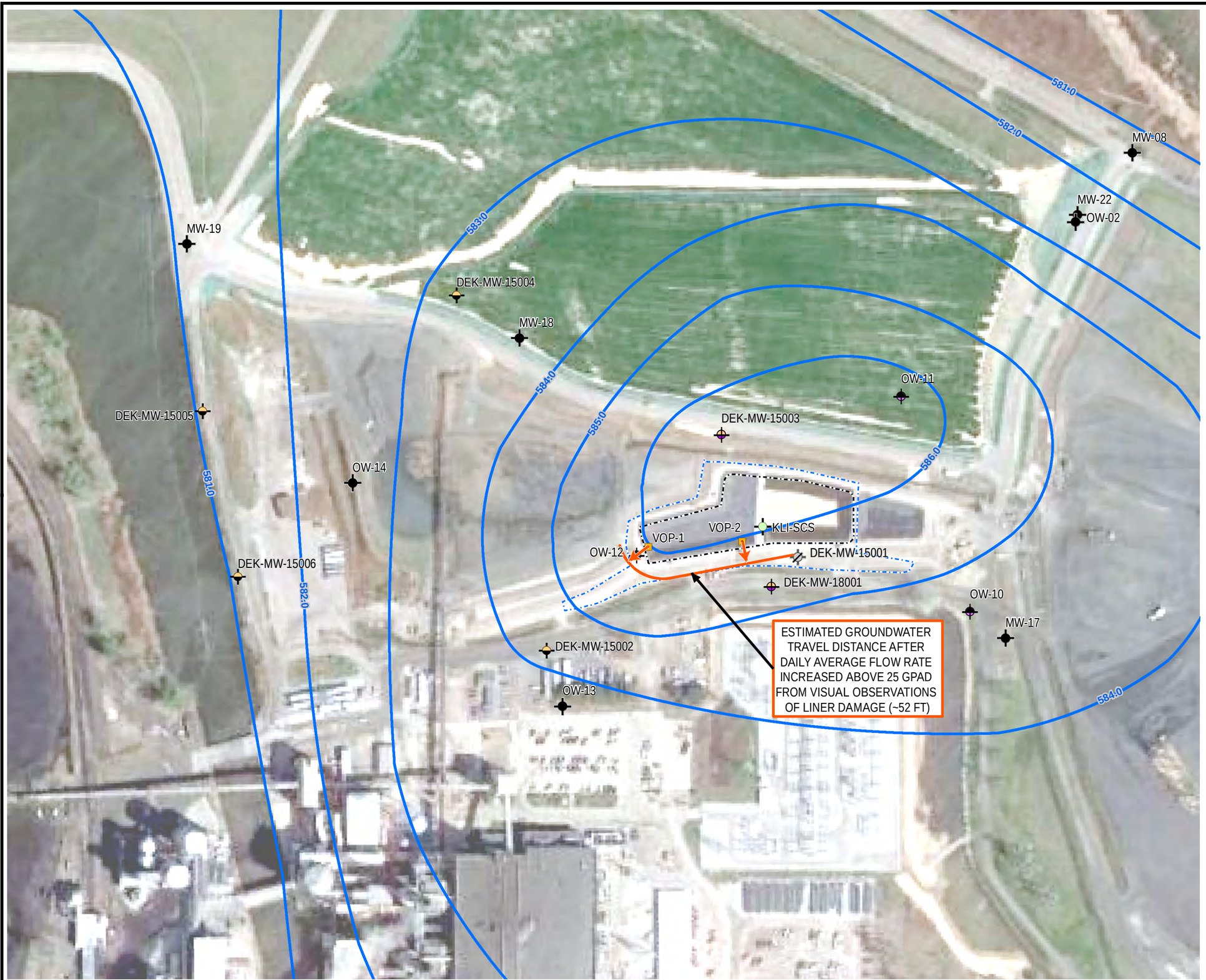
TRC (July 2021). *Second Quarter 2021 Hydrogeological Monitoring Report, DE Karn Lined Impoundment CCR Unit, Essexville, Michigan*

Calcium at OW-10



Sulfate at DEK-MW-18001





LEGEND

- DEK BOTTOM ASH POND MONITORING WELL
- DECOMMISSIONED WELL
- BOTTOM ASH POND & LINED IMPOUNDMENT MONITORING WELL
- DEK LINED IMPOUNDMENT MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- SECONDARY CONTAINMENT SUMP (KLI-SCS)
- VISUAL OBSERVATION POINT
- GROUNDWATER ELEVATION CONTOUR MAY 2021 (2' INTERVAL, DASHED WHERE INFERRED)
- ESTIMATED GROUNDWATER TRAVEL DISTANCE AFTER DAILY AVERAGE FLOW RATE INCREASED ABOVE 25 GPAD FROM VISUAL OBSERVATIONS OF LINER DAMAGE (~52 FT)
- LINED IMPOUNDMENT (COVENANT BOUNDARY)
- EXTENT OF GEOSYNTHETICS

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. WELL LOCATIONS SURVEYED BY ROWE PROFESSIONAL SERVICES COMPANY ON 11/4/2015.
3. SECONDARY CONTAINMENT SUMP LOCATION BASED ON DRAWINGS 695-1278-120-REV-A.DWG DATED 11/27/19, PROVIDED BY CONSUMERS ENERGY.

N

0 200 400 Feet

1 " = 200 '
1:2,400

PROJECT:

CONSUMERS ENERGY COMPANY
DE KARN POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:

LEACHATE TRAVEL DISTANCE

DRAWN BY:	A. ADAIR	PROJ NO.:	367388-001
CHECKED BY:	D. LITZ		
APPROVED BY:	D. LITZ		
DATE:	JULY 2021		

FIGURE 1

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080

FILE NO.: 418426-301-001.mxd

Plot Date: 7/28/2021, 11:47:23 AM by AADAIR -- LAYOUT: ANSI B (11"x17")
Path: S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_2697671_DEKARN\2021_MXDs\2021_002_MAY\418426-301-001.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

October 28, 2021 *VIA email: BabcockL4@michigan.gov*

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

SUBJECT: DE KARN LINED IMPOUNDMENT LICENSE REQUIREMENTS – GROUNDWATER QUALITY MONITORING RESULTS FOR THIRD QUARTER 2021

Dear Ms. Babcock,

Attached you will find the above-referenced compliance monitoring report for the DE Karn Lined Impoundment (Report) to satisfy quarterly groundwater monitoring requirements during the active life of the coal ash impoundment. The monitoring event was conducted and the report was prepared by TRC under the direction of Consumers Energy Environmental Services. The report includes the items listed in Appendix A (Solid Waste Monitoring Submittal Components) of the May 15, 2015 Michigan Department of Environmental Quality - Office of Waste Management and Radiological Protection communication prescribing the format for solid waste disposal facility monitoring submittals.

This report was prepared in conformance with the *Karn Lined Impoundment Hydrogeological Monitoring Plan,* dated November 2020 ("HMP") that was approved by the MDEQ on November 13, 2020 and incorporated, by reference, in Solid Waste Disposal Area Operating License No. 9629 issued on December 10, 2020. Should you have any questions regarding this submittal, please contact the undersigned at (517) 788-2982.

Sincerely,

Harold D. Register, Jr., P.E.
Principal Engineer
Landfill Operations Compliance
Phone: (517) 788-2982
Email: harold.registerjr@cmsenergy.com

cc: Mr. Phil Roycraft, EGLE Saginaw Bay District Office (via email ROYCRAFTP@michigan.gov)
Mr. Gary Schwerin, EGLE Saginaw Bay District Office (via email SchwerinG@michigan.gov)
Mr. Caleb Batts, Consumers Energy (via email Caleb.Batts@cmsenergy.com)

Encl: Karn Lined Impoundment – 3Q2021 Groundwater Monitoring Report
Karn Lined Impoundment – 3Q2021 Laboratory Analysis Data Spreadsheet

Third Quarter 2021 Hydrogeological Monitoring Report

DE Karn Lined Impoundment CCR Unit

Essexville, Michigan

October 2021

Prepared For:

Consumers Energy
1945 W. Parnall Road
Jackson, MI 49201

Prepared By:

TRC
1540 Eisenhower Place
Ann Arbor, Michigan 48108

Darby Litz
Project Manager/Hydrogeologist

Graham Crockford, C.P.G.
Program Manager

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APPENDICES

1.0 Introduction

Pursuant to the Federal CCR Rule[1], Consumers Energy initiated a detection monitoring program for the Karn Lined Impoundment that went into service on June 7, 2018. After establishing the groundwater monitoring system and detection monitoring project pursuant to the requirements and schedule of §257.90 - §257.94, the State of Michigan enacted Public Act No. 640 of 2018 (PA 640) on December 28, 2018 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 amendments to the solid waste statute amended state groundwater monitoring requirements for coal ash impoundments; therefore, Consumers Energy submitted the *Karn Lined Impoundment Hydrogeological Monitoring Plan* (HMP) to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to comply with the requirements of Part 115, Rule 299.4905, and the CCR Rule. The HMP was approved by the EGLE on November 13, 2020 and incorporated, by reference, in Solid Waste Disposal Area Operating License No. 9629 issued on December 10, 2020.

1.1 Statement of Adherence to Approved Hydrogeological Monitoring Plan

This Third Quarter 2021 Karn Lined Impoundment Hydrogeological Monitoring Report (Report) has been prepared by TRC on behalf of Consumers Energy to satisfy quarterly groundwater monitoring requirements during the active life of the coal ash impoundment. This Report was prepared in accordance with the items listed in Appendix A (Solid Waste Monitoring Submittal Components) of the May 15, 2015 Michigan Department of Environmental Quality (MDEQ) – Office of Waste Management and Radiological Protection, now the EGLE Materials Management Division (MMD), communication prescribing the format for solid waste disposal facility monitoring submittals as published in OWMRP-115-29, *Format for Solid Waste Disposal Facility Monitoring Submittals*, dated July 5, 2013. All references herein to the EGLE are inclusive of the MDEQ. Information contained in this report was prepared in adherence to the facility's approved HMP that was approved by the EGLE on November 13, 2020. This HMP is compliant with the requirements set forth in Public Act No. 640 of 2018 (PA 640) to amend the Natural Resources and Environmental Protection Act (NREPA), also known as Part 115 of PA 451 of 1994, as amended (Part 115) (a.k.a., Michigan Part 115 Solid Waste Management).

1.2 Program Summary

This Report provides results and summarizes the monitoring activities completed in the Third Quarter 2021 at the Karn Lined Impoundment located at 2742 Weadock Highway in Essexville, Michigan (Figure 1). Groundwater in the vicinity of the Karn Lined Impoundment has been documented to be affected by the management of CCR prior to the construction of the unit (January 2019, TRC). Given that the constituents associated with CCR currently managed at the Karn Lined Impoundment are indistinguishable from the constituents already present in groundwater from past operation of the former Karn Bottom Ash Pond, the compliance monitoring program for the Karn Lined Impoundment consists of two parts to evaluate if there are new releases from the unit:

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

1. Monitoring of secondary collection system flow rates and water quality to detect leaks in the liner; and
2. Groundwater monitoring to determine if there are potential new releases from the Karn Lined Impoundment.

Based on sampling results for the third quarter 2021, the Karn Lined Impoundment remains in detection monitoring in accordance with the HMP.

1.3 Site Overview

The Karn Lined Impoundment is located within the DE Karn Power Plant site (Site) located north of the former 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 former Karn Bottom Ash Pond that was closed by removal and the Karn Landfill that was certified closed and now in post-closure care.

1.4 Geology/Hydrogeology

The majority of the Karn Lined Impoundment area is comprised of surficial CCR and sand fill, as described in the HMP. 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, was generally encountered at 80 to 90 ft bgs.

The Site is bound by several surface water features (Figures 1 and 2): 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 Lined Impoundment, the shallow groundwater flow is generally radial, with a potentiometric high point near the unlined ditch north of the Karn Lined Impoundment and near DEK-MW-15003, flowing outward toward the surrounding surface water bodies.

2.0 Second Collection System Monitoring

Consumers Energy initiated secondary collection system flow monitoring to comply with the EGLE-approved HMP in December 2020. The SCS serves as a leak detection system and the SCS flow rate data is used to demonstrate compliance with Part 115. Consumers Energy continues to comply with the requirements for unmonitorable units under Rule 437 of the Part 115 Rules.

The Average Daily Flow Rate for the period from December 10, 2020 – January 6, 2021 was calculated as 137.0 gallons per acre per day (GPAD), which exceeded the Response Action Flow Rate of 25 GPAD. Although this calculated flow rate does not constitute the average flow rate for the previous three months per the definition of average daily flow rate under Part 115, Consumers provided a proactive notification and a preliminary written assessment of the flow rate exceedances to the EGLE January 15, 2021 and January 22, 2021, respectively. The use of secondary collection system flow rates as a leak detection system was successful. Increased flow rates triggered investigations by Consumers Energy that quickly identified deficiencies in the liner system and prompted actions to address the damaged liner. Following repairs to the liner, Consumers Energy continues to monitor improvements in the secondary collection system for improvements in the Daily Average Flow Rate. The Average Daily Flow Rate for September 2021 was calculated as 72.6 gallons per acre per day (GPAD), which exceeded the Response Action Flow Rate of 25 GPAD, as documented in the Consumers Energy Notification of Secondary Flow Rates, DE Karn Lined Impoundment (Type III Coal Ash Impoundment) WDS #392503 (Consumers Energy, October 7, 2021).

In response to the exceedance of the SCS Response Action Flow Rate), samples were collected from the surface water of the primary collection system (KLI-PCS) and from the secondary leachate collection system sump (KLI-SCS) in July 2021 to compare leachate chemistry to groundwater chemistry. The samples were analyzed for the following constituents:

- Primary Indicator Parameters: Section 11511a(3)(c) - Detection Monitoring Constituents
- Alternative Indicator Parameters: Section 11519b(2) - Assessment Monitoring Constituents
- Optional Analyses in support of Piper or Stiff diagrams

The KLI-PCS and KLI-SCS data were evaluated for comparison to groundwater quality and water chemistry and to also assess potential of hazard and mobility of constituents. A series of time-series plots are included in Appendix E to illustrate water quality data changes over time for the secondary collection system from the start of operation in June 2018 to present. This analysis demonstrates that each monitored constituent is generally present at concentrations less than the Groundwater Protection Standard (GWPS) established under 40 CFR 257.95(h) or generic groundwater surface water interface (GSI) criteria adopted by the Department pursuant to Section 20120a, with the exception of total dissolved solids and chloride. A few notable observations:

- **Arsenic is higher in groundwater than the secondary collection system:** Arsenic was detected in both the primary and secondary collection systems at 5 ug/L and 2 ug/L, respectively, in July 2021. In contrast, the arsenic concentration observed in OW-12, the monitoring well located closest to the damaged liner areas, is 86 ug/L, which is consistent

with concentrations observed in August 2020, before the liner damage occurred. Arsenic present in groundwater does not appear to be a result of a release from the unit.

- **Vanadium is detected in the primary and secondary collection system and not in groundwater**: Vanadium was present in the primary collection system sample at 52 ug/L in March 2021, 16 ug/L in May 2021, and 25 ug/L in July 2021, which are higher than the vanadium concentration in the secondary collection system (11 ug/L in March and July and 6 ug/L in May). Vanadium was not detected in the well nearest the observed liner damage OW-12 (<2 ug/L).
- **Secondary Collection System chemistry has not appreciably changed:** The time series plots in Attachment A show relatively stable trends in chemistry for samples collected from the primary collection system, with the exception of TDS and sulfate. These also are the only two constituents in the secondary collection system sample were present above relevant criteria (i.e. GSI criteria) this event. In both cases the concentration in the primary collection system leachate is significantly lower in concentration suggesting that the elevated TDS and sulfate is not likely from the primary collection system leachate. The TDS and sulfate concentrations in the secondary collection system are also more closely linked to water coming through the system from the intake water than as a byproduct of the commingled ash and other waste products.

Water quality data collected for Third Quarter 2021 are included in the attached laboratory reports (Appendix A). Groundwater chemistry is discussed in Section 4.1. Groundwater conditions will continue to be monitored. Using the secondary collection system flow rates as a leak detection system was successful. The leak was identified in the fourth quarter of 2020, actions were promptly taken to address the leak. In January 2021, liner damage was noted in two areas denoted as Visual Observation Point No. 1 (VOP 1) and Visual Observation Point No. 2 (VOP 2). VOP 2 was repaired on March 10, 2021 and VOP 1 was repaired on May 24, 2021 as documented by Golder Associates Inc. Consumers Energy submitted the repair certification reports to the EGLE on May 25, 2021 and June 29, 2021, respectively. The results of the mitigation efforts continue to be monitored.

Consumers Energy continues to monitor the secondary collection system flow rates, record flow rates and head level on the secondary liner in the operating record and evaluate flow rate trends on a weekly basis. Written notifications of flow rates in the secondary collection system will be provided monthly and evaluations of the chemical characteristics of liquid in the secondary collection system will be reported quarterly. In addition, Consumers Energy continues to provide quarterly updates on remedial actions performed on the leachate collection system through the quarterly groundwater monitoring report required by the HMP.

3.0 Groundwater Monitoring

3.1 Monitoring Well Network

In accordance with §257.91, Consumers Energy developed a groundwater monitoring system for the Karn Lined Impoundment prior to the initial receipt of waste in the CCR unit (TRC, 2018c). Given the radial groundwater flow direction and constituents associated with CCR currently managed at the Karn Lined Impoundment are indistinguishable from the constituents already present in groundwater from past operation of the Karn Bottom Ash Pond, the groundwater monitoring system design incorporates an *intrawell statistical approach* for detection monitoring as described in the HMP and in accordance with the "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance" (USEPA, 2009): Five monitoring wells that are screened in the uppermost saturated unit were selected for the Karn Lined Impoundment HMP detection monitoring (DEK-MW-15003, DEK-MW-18001, OW-10, OW-11, and OW-12). Monitoring well locations are shown on Figure 2.

3.2 May 2021 Detection Monitoring Event

In accordance with the HMP, TRC conducted the third quarter 2021 monitoring event for the Karn Lined Impoundment on July 26 through 27, 2021. In addition to the routine groundwater samples collected from the monitoring well network, a water sample was collected from a sump in the secondary collection system (KLI-SCS) and a surface water sample was collected from the primary collection system (KLI-PCS), as discussed in Section 2 above, such that leachate chemistry could be compared to groundwater chemistry. A sample of surface water was also collected from a ditch located north of the lined impoundment (SW-Ditch) to further evaluate site geochemistry (Figure 2). The SW-Ditch surface water grab sample represents water quality from the potentiometric high point adjacent to the Karn Lined Impoundment.

Groundwater samples collected during the July 2021 event were submitted to Consumers Energy Laboratory Services in Jackson, Michigan, for analysis of the following metals and inorganic indicator constituents.

Section 11511a(3)(c) – Detection Monitoring Constituents	Section 11519b(2) – Assessment Monitoring Constituents		
Boron	Antimony	Fluoride	Thallium
Calcium	Arsenic	Lead	Vanadium
Chloride	Barium	Lithium	Zinc
Fluoride	Beryllium	Mercury	
Iron	Cadmium	Molybdenum	
pH	Chromium, total	Nickel	
Sulfate	Cobalt	Selenium	
Total Dissolved Solids (TDS)	Copper	Silver	

Samples were also analyzed for additional constituents including magnesium, sodium, potassium, and bicarbonate, carbonate, and total alkalinity to provide additional evaluation of groundwater chemistry. Analytical results from the third quarter 2021 monitoring event are included in the attached laboratory reports (Appendix A).

Static water level measurements were collected at all locations after equilibration to atmospheric pressure and immediately prior to purging. The depth to water was recorded to the nearest 0.01-ft in accordance with the procedures in the HMP. Groundwater purging and sampling were conducted in accordance with low-flow sampling protocol. Static water elevation data are included in the attached field records (Appendix B).

Monitoring wells 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. Field notes are included as Appendix B. The samples were collected in vendor-provided, nitric acid pre-preserved (metals only) and unpreserved sample containers and submitted to the laboratory for analysis. Porewater sample preparation and analyses were performed in accordance with SW-846 "Test Methods for Evaluation Solid Waste – Chemical / Physical Methods," USEPA (latest revision). TRC followed chain of custody procedures to document the sample handling sequence.

TRC also collected quality assurance/quality control (QA/QC) samples during the groundwater sampling event. The QA/QC samples consisted of one field blank, one equipment blank, one field duplicate (OW-12), and field matrix spike/matrix spike duplicate samples collected at DEK-MW-18001.

3.2.1 Data Quality Review

Data were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The data were found to be complete and usable for the purposes of the HMP program. The data quality reviews for the Karn Lined Impoundment network wells are summarized in Appendix C.

3.2.2 Groundwater Flow Rate and Direction

Groundwater elevation data collected during the July 2021 groundwater monitoring events are provided in Table 1. The data were used to construct the groundwater contour map (Figure 3).

Groundwater elevations measured at the site in July 2021 are generally within the range of 581 to 587 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 data or within approximately 6 feet higher, flowing toward the bounding surface water features.

Although the point source discharge of sluiced bottom ash into the former Karn Bottom Ash Pond historically 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 in July 2021 demonstrate a reduction in groundwater elevation measurements by several feet when compared to measurement taken in June 2018. 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 and DEK-MW-15003 delineate the newly established groundwater elevation high point that was previously centered over the former Karn Bottom Ash Pond with porewater flow generally flowing radially towards the adjacent surface water features from this newly established potentiometric "high", as illustrated in Figure 3.

The average hydraulic gradient observed on May 3, 2021 in the vicinity of the former Karn Bottom Ash Pond and Karn Lined Impoundment is estimated at 0.0040 ft/ft. The gradients were calculated using the monitoring well pair DEK MW 15004/DEK-MW-15005, as well as the well water elevation difference and distance between DEK-MW-15003 and the discharge channel. The discharge channel surface water elevation was taken from the NOAA gauging station data on the same dates as the water level measurements. 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 calculated to be 0.20 ft/day or 73 ft/year in July 2021 which is reduced relative to previous estimated seepage velocities (e.g., 0.33 ft/day or 120 ft/year August 2018).

Due to the operational changes of the former bottom ash pond and the completion of the landfill capping activities in 2020, the gradient between the area of the Karn Bottom Ash Pond and Karn Lined Impoundment and the surrounding surface water bodies is flattening out as compared to previous quarters and is also attempting to reach a new equilibrium, as expected. The general flow direction relative to the Karn Lined Impoundment is similar to that identified in previous monitoring rounds and continues to demonstrate that the downgradient wells are appropriately positioned to detect the presence of Appendix III/IV parameters that could potentially migrate from the Karn Lined Impoundment.

4.0 Data Evaluation

Based on sampling results for the third quarter 2021, the Karn Lined Impoundment remains in detection monitoring in accordance with the HMP. The following section summarizes the statistical approach applied to assess the third quarter 2021 groundwater data in accordance with the detection monitoring program.

Water quality data are included in the attached laboratory reports (Appendix A). Groundwater analytical data for the most recent quarterly monitoring event is summarized in Table 3 along with the associated Part 201 generic drinking water criteria, the generic GSI criteria, and the site-specific mixing-zone GSI criteria. Mixing-zone criteria are provided for the Karn-Weadock complex in the December 23, 2015 mixing zone determination that consists of arsenic, boron, and selenium. As such, arsenic, boron, and selenium are compared to site-specific mixing zone-based GSI criteria, and all other constituents are screened against generic GSI criteria. GSI compliance is evaluated through monitoring performed at the Karn Landfill in accordance with the EGLE-approved Consumers Energy's revised Karn Landfill HMP (Hydrogeological Monitoring Plan, Rev. 3, DE Karn Solid Waste Disposal Area) dated December 19, 2017.

4.1 Statistical Evaluation of Trends

Groundwater in the vicinity of the Karn Lined Impoundment has been affected by CCR management before commencement of operation (January 2019, TRC). Given that the constituents associated with CCR currently managed in the Karn Lined Impoundment are indistinguishable from the constituents already present in groundwater from past operation of the former Karn Bottom Ash Pond, intrawell trend tests, in conjunction with KLI-SCS flow rates, will be utilized to assess whether a release has occurred from operation of the unit. The detection monitoring constituent concentrations will be analyzed using Mann-Kendall and Sen's Slope trend tests to determine if there is an upward trend that may indicate a release from the Karn Lined Impoundment. The data will be analyzed in the context of the Site hydrogeologic characteristics and an assessment made as to whether the source of an upward trend, if identified, is from a possible release from the Karn Lined Impoundment, another on-site release, or on-site migration of nearby impact (i.e., former Karn Bottom Ash Pond).

Time-series plots and statistical trend analyses are used to evaluate groundwater quality each quarter, which are included as Appendix D. Consumers Energy manages and evaluates its analytical data using Sanitas™ Statistical Software (Sanitas™). Consumers Energy conducts intra-well trend analyses to examine data for each monitoring well-constituent pair in the groundwater monitoring system over time to determine if changes in water quality are occurring that may be associated with the Karn Lined Impoundment. Data from October 2019 through July 2021 were analyzed using Mann-Kendall and Sen's Slope at a significance level (α) of 0.025 per tail for each constituent/sampling point dataset to assess trends. Sen's Slope estimator was used to assess the magnitude of the slope and the Mann-Kendall test was used to determine if the slope was statistically significant. The graphical output of the Sen's Slope/Mann-Kendall trend tests and time series are presented in Appendix D. Appendix D also includes a table summarizing these trends and the associated statistical trend charts.

Data trends for detection monitoring constituents are generally stable (i.e., no trend) or declining for the majority of the monitoring well/constituent pairs with the following exceptions:

- A continuous increasing trend in sulfate was observed in monitoring well DEK-MW-18001.
- A continuous increasing trend was observed for calcium in monitoring well OW-10.
- Continuous increasing trends were observed for boron and pH in monitoring well OW-11.

4.2 Detection Monitoring Data Discussion

Although preliminary detection monitoring trends noted in Section 4.1 exist, the groundwater conditions do not conclusively indicate a release from the unit. Groundwater quality is generally consistent with previous monitoring events. The location of one of the two identified liner damage locations is approximately 40-ft upgradient from monitoring well OW-12. Detection monitoring constituent concentrations at OW-12 exhibit no statistically significant increasing trends, indicating that if a release to groundwater occurred due to the apparent leak in the liner system, the effects on local groundwater quality at this point appear to be negligible. The three wells with noted trends are located much further away from where the release was likely to occur. Additionally, concentrations of several constituents observed at OW-11 are much higher than concentrations observed in the KLI-PCS and KLI-SCS, which support a source other than the Karn Lined Impoundment is affecting chemistry at OW-11. The increasing trends at OW-10 and DEK-MW-18001 will continue to be evaluated within context of changes in the site operational status. At this time, the increasing trend of calcium concentrations in monitoring well OW-10 and increasing trend of sulfate in monitoring well DEK-MW-18001 do not indicate a release from the unit, but instead are attributed to another change in conditions, such as groundwater flow regime or redox conditions as shown in Appendix F and discussed further in Section 4.3: Alternate Source Demonstration

4.3 Alternate Source Demonstration

At this time, Consumers Energy is continuing to assert an Alternate Source Demonstration (ASD), for the following, as detailed in the Second Quarter 2021 Hydrogeological Monitoring Report (TRC, July 2021):

- Sulfate in monitoring well DEK-MW-18001
- Calcium in monitoring well OW-10; and
- Boron and pH in monitoring well OW-11.

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5.0 Conclusions and Recommendations

Consumers Energy will continue the detection monitoring program for the Karn Lined Impoundment unit based on the data evaluations completed in Section 4.0 of this report in conformance with the Karn Lined Impoundment HMP. Although increasing trends for detection monitoring constituents were observed in three wells, these trends were found to not be a result of operation of the Karn Lined Impoundment. No SSIs over background limits were identified at the Karn Lined Impoundment during the July 2021 monitoring event. The use of secondary collection system flow rates as a leak detection system was successful. Increased flow rates observed in Q4 2020 triggered investigations by Consumers Energy that quickly identified deficiencies in the liner system and prompted actions to address the damaged liner. The results of the mitigation efforts continue to be monitored. The fourth quarter monitoring event is scheduled for October 2021.

6.0 References

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

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

Tables

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

Well Location	TOC Elevation (ft)	Geologic Unit of Screen Interval	Screen Interval Elevation (ft)	July 26, 2021	
				Depth to Water (ft BTOC)	Groundwater Elevation (ft)
Background					
MW-15002	587.71	Sand	580.9 to 570.9	6.39	581.32
MW-15008	585.36	Sand with clay	578.7 to 568.7	4.08	581.28
MW-15016	586.49	Sand	581.2 to 578.2	4.00	582.49
MW-15019	586.17	Sand and Sand/Clay	579.5 to 569.5	4.91	581.26
DEK Bottom Ash Pond					
DEK-MW-15002	590.87	Sand	578.3 to 575.3	6.08	584.79
DEK-MW-15004	611.04	Sand	576.6 to 571.6	27.83	583.21
DEK-MW-15005	589.72	Sand	572.3 to 567.3	8.48	581.24
DEK-MW-15006	589.24	Sand	573.0 to 568.0	8.00	581.24
DEK Bottom Ash Pond & Karn Lined Impoundment					
DEK-MW-15003	602.74	Sand	578.8 to 574.8	16.30	586.44
DEK-MW-18001	593.47	Sand	579.2 to 574.2	8.23	585.24
OW-10	591.58	Silty Sand and Silty Clay	576.0 to 571.0	6.30	585.28
OW-11	607.90	Silt/Fly Ash	587.5 to 582.5	21.44	586.46
OW-12	603.07	Silty Sand	584.2 to 579.2	16.96	586.11
DEK Nature and Extent					
MW-01	597.02	Sand	573.0 to 570.0	16.02	581.00
MW-03	597.30	Sand	569.8 to 566.8	16.32	580.98
MW-06	589.44	Sand and Silty Sand	578.5 to 563.5	8.33	581.11
MW-08	598.78	Sand and Silty Clay	580.9 to 570.9	17.24	581.54
MW-10	596.97	Sand	582.5 to 572.5	15.86	581.11
MW-12	598.60	Sand	583.9 to 573.9	17.52	581.08
MW-14	594.37	Sand and Silty Clay	584.7 to 574.7	13.30	581.07
MW-16	595.80	Sand and Sand/Bottom Ash	584.1 to 574.1	14.75	581.05
MW-22	598.99	Ash/Sand	571.4 to 568.4	16.34	582.65
MW-23	595.57	Ash/Sand	576.9 to 571.9	13.30	582.27
DEK Static Water Level					
MW-02	597.34	Sand and Silty Clay	572.5 to 567.5	16.34	581.00
MW-04	598.01	NR	569.5 to 564.5	17.02	580.99
MW-17	597.91	Sand	577.0 to 574.0	12.65	585.26
MW-18	609.22	Silty Sand and Silty Clay	575.8 to 573.8	25.48	583.74
MW-19	597.28	NR	572.1 to 567.1	15.78	581.50
MW-20	632.75	Sand	582.3 to 579.3	51.66	581.09
MW-21	632.91	Sand	587.1 to 584.1	50.69	582.22
OW-01	631.33	NR	572.5 to 567.5	50.18	581.15
OW-02	598.01	Fly Ash	579.4 to 576.4	15.21	582.80
OW-03	597.94	Fly Ash and Sand	573.6 to 568.6	16.50	581.44
OW-04	590.21	Sand and Bottom/Fly Ash	579.1 to 574.1	9.23	580.98
OW-05	593.53	Sand	576.9 to 571.9	12.10	581.43
OW-06	603.95	NR	580.9 to 575.9	21.25	582.70
OW-07	596.41	Ash	583.3 to 580.3	14.18	582.23
OW-08	593.93	NR	581.0 to 576.0	10.60	583.33
OW-09	593.45	NR	585.5 to 580.5	10.28	583.17
OW-13	588.52	NR	579.5 to 574.5	3.68	584.84
OW-15	587.75	NR	572.8 to 567.8	2.55	585.20

Notes:

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

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

TOC: Top of well casing.

ft BTOC: Feet below top of well casing.

NR: Not Recorded

Table 2
Summary of Field Parameters: July 2021
Third Quarter 2021 Quarterly Report
Karn Lined Impoundment - Essexville, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (°C)	Turbidity (NTU)
Karn Lined Impoundment							
DEK-MW-15003	7/27/2021	1.97	-96.3	8.4	459	19.5	2.0
DEK-MW-18001	7/27/2021	1.95	-109.5	7.5	821	14.8	1.6
KLI-PCS	7/27/2021	9.41	-29.3	9.0	565	25.7	17.5
KLI-SCS	7/27/2021	3.40	-5.2	7.5	1,708	20.8	3.8
OW-10	7/27/2021	1.96	30.7	7.0	787	14.7	9.6
OW-11	7/27/2021	2.14	31.2	9.4	327	14.7	8.3
OW-12	7/27/2021	1.70	-81.1	7.1	564	16.5	1.8
SW-DITCH	7/27/2021	8.26	-56.7	10.4	2,915	29.8	40.1

Notes:
mg/L - Milligrams per Liter.
mV - Millivolts.
SU - Standard Units.
umhos/cm - Micromhos per centimeter.
°C - Degrees Celsius.
NTU - Nephelometric Turbidity Unit.

Table 3
Summary of Groundwater Sampling Results (Analytical): July 2021
Thrid Quarter 2021
Karn Lined Impoundment – Essexville, Michigan

					Sample Location:	**DEK-MW-15003**	**DEK-MW-18001**	**OW-10**	**OW-11**	**OW-12**	**KLI-SCS**	**KLI-PCS**	**SW-Ditch**
					Sample Date:	7/27/2021	7/27/2021	7/27/2021	7/27/2021	7/27/2021	7/27/2021	7/27/2021	7/27/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	downgradient					Supplemental		
Appendix III[1]													
Boron	ug/L	NC	**500**	**500**	4,000	**825**	**1,230**	**872**	**3,190**	**721**	**521**	**668**	138
Calcium	mg/L	NC	NC	NC	500[EE]	23.6	67.9	127	9.32	62.4	116	55.7	51.6
Chloride	mg/L	250**	250[E]	250[E]	**50**	**53.1**	**52.5**	**86.2**	**63.9**	**57.6**	44.0	**60.5**	**124**
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	2,610	< 1,000	< 1,000	< 1,000	3,010
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	**500[EE]**	42.5	112	122	25.8	118	**506**	50.3	**645**
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	246	467	**626**	205	443	**1,240**	331	**1,690**
pH, Field	SU	**6.5 - 8.5****	**6.5 - 8.5[E]**	**6.5 - 8.5[E]**	**6.5 - 9.0**	8.4	7.5	7.0	**9.4**	7.1	7.5	**9.0**	**10.4**
Appendix IV[1]													
Antimony	ug/L	6	6.0	6.0	**2.0**	< 1	< 1	< 1	**3**	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	**354**	**78**	4	**497**	**86**	2	5	7
Barium	ug/L	2,000	2,000	2,000	1,200	40	127	169	33	56	87	408	82
Beryllium	ug/L	4	4.0	4.0	33	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	< 1	< 1	1	< 1	< 1	1	2	3
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	2,610	< 1,000	< 1,000	< 1,000	3,010
Lead	ug/L	NC	4.0	4.0	14	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	15	19	23	< 10	20	< 10	< 10	< 10
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	**73**	**210**	**120**	26	< 5	9	**253**	16	14	23	10
Selenium	ug/L	50	50	50	**5.0**	1	< 1	**14**	5	1	**8**	2	3
Thallium	ug/L	2	2.0	2.0	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115[2]													
Iron	ug/L	**300****	**300[E]**	**300[E]**	500,000[EE]	157	**1,290**	**1,230**	128	**3,470**	**2,350**	**731**	**696**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	< 1	< 1	3	2	< 1	3	4	6
Nickel	ug/L	NC	100	100	120	< 2	2	5	3	2	6	3	4
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	**62**	**27**	< 2	< 2	**11**	**1,120**	< 2	**8**	**25**	**5**
Zinc	ug/L	5,000**	2,400	5,000[E]	260	< 10	< 10	< 10	< 10	< 10	11	< 10	< 10

Notes:

ug/L - micrograms per liter; mg/L - milligrams 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

* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2021

** - 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 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

BOLD value indicates an exceedance of one or more of the listed criteria.

RED value indicates an exceedance of the MCL.

All metals were analyzed as total unless otherwise specified.

Table 4
Summary of Statistical Exceedances – July 2021
Karn Lined Impoundment
Essexville, Michigan

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
SUMMARY OF STATISTICAL EXCEEDANCES

Data is in (X) ug/L or ( ) mg/L unless otherwise stated

Facility: Karn Lined Impoundment – WDS# 392503

Well #	Location	Parameter	Part 201 GRCC	Statistical Limit (or 'CC' for Control Charts)	3 Qtr. 2021 (**bold** >201)	2 Qtr. 2021 (**bold** >201)	1 Qtr. 2021 (**bold** >201)	

No Exceedances

Figures

BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

N

1 " = 3,000 '
1:36,000

0 3,000 6,000
FEET

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
TRC - GIS

PROJECT:

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

TITLE:

SITE LOCATION MAP

DRAWN BY:	A. ADAIR
CHECKED BY:	J. KRENZ
APPROVED BY:	D. LITZ
DATE:	APRIL 2021
PROJ. NO.:	418425-001-002
FILE:	418425-101-001.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\1_DEKARN\2021_MXDs\2021_001_MARCH\418425-101-001.mxd -- Saved By: AADAIR on 4/19/2021, 22:21:24 PM

LEGEND

- DEK BOTTOM ASH POND & LINED IMPOUNDMENT MONITORING WELL
- DEK BOTTOM ASH POND MONITORING WELL
- DEK LINED IMPOUNDMENT MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- SURFACE WATER GAUGING STATION
- NATURE AND EXTENT WELL
- SECONDARY CONTAINMENT SUMP (KLI-SCS)
- PRIMARY CONTAINMENT SYSTEM SAMPLE (KLI-PCS)
- SURFACE WATER SAMPLE (SW-DITCH)
- SLURRY WALL (APPROXIMATE)
- LINED IMPOUNDMENT (COVENANT BOUNDARY)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. WELL LOCATIONS SURVEYED BY ROWE PROFESSIONAL SERVICES COMPANY ON 11/4/2015.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).
4. A SINGLE WELL SYMBOL IS SHOWN FOR WELL PAIRS MW-01/MW-02, MW-03/MW-04, OW-02/MW-22, AND OW-07/MW-23 AS THE WELLS ARE LOCATED WITHIN 15-FT OF EACH OTHER.

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

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

TITLE:

SITE LAYOUT MAP

DRAWN BY:	A. ADAIR	PROJ NO.:	418425.0001
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 2**
DATE:	OCTOBER 2021		

TRC

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

FILE NO.: 418425-101-002.mxd

Plot Date: 10/14/2021, 12:08:01 PM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 269767\1 DEKARN\2021 MXDs\2021 001 MARCH\418425-101-002.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

LEGEND

- DEK BOTTOM ASH POND & LINED IMPOUNDMENT MONITORING WELL
- DEK BOTTOM ASH POND MONITORING WELL
- DEK LINED IMPOUNDMENT MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- MONITORING WELL (STATIC ONLY)
- SURFACE WATER GAUGING STATION
- NATURE AND EXTENT WELL
- SLURRY WALL (APPROXIMATE)
- LINED IMPOUNDMENT (COVENANT BOUNDARY)
- GROUNDWATER ELEVATION CONTOUR (1' INTERVAL, DASHED WHERE INFERRED)
- *(580.50)* GROUNDWATER ELEVATION (FEET)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. WELL LOCATIONS SURVEYED BY ROWE PROFESSIONAL SERVICES COMPANY ON 11/4/2015.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.

0 600 1,200

Feet

1 " = 600 '

1:7,200

PROJECT:

CONSUMERS ENERGY COMPANY
DE KARN POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:

SHALLOW GROUNDWATER CONTOUR MAP JULY 2021

DRAWN BY:	A. ADAIR	PROJ NO.:	418425.0001
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 3**
DATE:	OCTOBER 2021		

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

FILE NO.: 418426-401-005.mxd

Plot Date: 10/15/2021, 11:12:41 AM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 26976\1 DEKARN\2021 MXDs\2021_003_JULY418426-401-005.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

Appendix A
Laboratory Analytical Reports

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

To: CDBatts, Karn/Weadock

From: EBlaj, T-258

Date: August 15, 2021

Subject: RCRA GROUNDWATER MONITORING – KARN BAP & LINED IMP. WELLS – 2021 Q3

CC: BTRunkel, P22-120
HDRegister, P22-521
BLSwanberg, P22-119

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

Chemistry Project: 21-0879

TRC Environmental, Inc. conducted groundwater monitoring at the DEKarn Bottom Ash Pond and Lined Impoundment Wells area on 07/27/2021, for the 3rd Quarter monitoring 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 07/29/2021.

Samples for Total and Dissolved Organic Carbon have been subcontracted to Brighton Analytical, LLC. and the results are listed under the analyst initials "BAL".

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

Reviewed and approved by:

Emil Blaj
Sr. Technical Analyst
Project Lead

ilac-MRA A2LA ACCREDITED Certificate #1097.04

CASE NARRATIVE

I. Sample Receipt

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

II. Methodology

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

III. Results/Quality Control

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

DEFINITIONS / QUALIFIERS

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

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

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

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Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q3-2021 DEK RCRA Bottom Ash Pond & Lined Impoundment
Date Received: 7/29/2022
Chemistry Project: 21-0879

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-0879-01	DEK-MW-15003	Groundwater	07/27/2021 01:41 PM	DEK Bottom Ash Pond & Lined Impoundment
21-0879-02	DEK-MW-18001	Groundwater	07/27/2021 02:30 PM	DEK Bottom Ash Pond & Lined Impoundment
21-0879-03	DEK-MW-18001 MS	Water	07/27/2021 02:30 PM	DEK Bottom Ash Pond & Lined Impoundment
21-0879-04	DEK-MW-18001 MSD	Water	07/27/2021 02:30 PM	DEK Bottom Ash Pond & Lined Impoundment

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-15003**
Lab Sample ID: 21-0879-01
Matrix: Groundwater

Laboratory Project: **21-0879**
Collect Date: 07/27/2021
Collect Time: 01:41 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0879-01-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/02/2021	AB21-0802-08

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

Aliquot #: 21-0879-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Arsenic	354		ug/L	1.0	08/06/2021	AB21-0806-01
Barium	40		ug/L	5.0	08/06/2021	AB21-0806-01
Beryllium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Boron	825		ug/L	20.0	08/06/2021	AB21-0806-01
Cadmium	ND		ug/L	0.2	08/13/2021	AB21-0806-01
Calcium	23600		ug/L	1000.0	08/06/2021	AB21-0806-01
Chromium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Cobalt	ND		ug/L	6.0	08/06/2021	AB21-0806-01
Copper	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Iron	157		ug/L	20.0	08/06/2021	AB21-0806-01
Lead	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Lithium	15		ug/L	10.0	08/06/2021	AB21-0806-01
Magnesium	3860		ug/L	1000.0	08/06/2021	AB21-0806-01
Molybdenum	26		ug/L	5.0	08/06/2021	AB21-0806-01
Nickel	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Potassium	5140		ug/L	100.0	08/06/2021	AB21-0806-01
Selenium	1		ug/L	1.0	08/06/2021	AB21-0806-01
Silver	ND		ug/L	0.2	08/06/2021	AB21-0806-01
Sodium	45700		ug/L	1000.0	08/06/2021	AB21-0806-01
Thallium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Vanadium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Zinc	ND		ug/L	10.0	08/06/2021	AB21-0806-01

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

Aliquot #: 21-0879-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	53100		ug/L	1000.0	08/10/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/10/2021	AB21-0810-23
Sulfate	42500		ug/L	1000.0	08/10/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0879-01-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	71200		ug/L	10000.0	08/04/2021	AB21-0804-03

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-15003**
Lab Sample ID: 21-0879-01
Matrix: Groundwater

Laboratory Project: **21-0879**
Collect Date: 07/27/2021
Collect Time: 01:41 PM

Alkalinity by SM 2320B

Aliquot #: 21-0879-01-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	71200		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2021	AB21-0804-03

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0879-01-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	246		mg/L	10.0	07/30/2021	AB21-0730-03

Total Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0879-01-C06-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Organic Carbon	4100		ug/L	1000.0	08/09/2021	AB21-0808-06

Dissolved Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0879-01-C07-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Dissolved Organic Carbon	6200		ug/L	1000.0	08/09/2021	AB21-0808-07

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001**
Lab Sample ID: 21-0879-02
Matrix: Groundwater

Laboratory Project: **21-0879**
Collect Date: 07/27/2021
Collect Time: 02:30 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0879-02-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/02/2021	AB21-0802-08

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

Aliquot #: 21-0879-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Arsenic	78		ug/L	1.0	08/06/2021	AB21-0806-01
Barium	127		ug/L	5.0	08/06/2021	AB21-0806-01
Beryllium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Boron	1230		ug/L	20.0	08/06/2021	AB21-0806-01
Cadmium	ND		ug/L	0.2	08/13/2021	AB21-0806-01
Calcium	67900		ug/L	1000.0	08/06/2021	AB21-0806-01
Chromium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Cobalt	ND		ug/L	6.0	08/06/2021	AB21-0806-01
Copper	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Iron	1290		ug/L	20.0	08/06/2021	AB21-0806-01
Lead	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Lithium	19		ug/L	10.0	08/06/2021	AB21-0806-01
Magnesium	12700		ug/L	1000.0	08/06/2021	AB21-0806-01
Molybdenum	ND		ug/L	5.0	08/06/2021	AB21-0806-01
Nickel	2		ug/L	2.0	08/06/2021	AB21-0806-01
Potassium	4420		ug/L	100.0	08/06/2021	AB21-0806-01
Selenium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Silver	ND		ug/L	0.2	08/06/2021	AB21-0806-01
Sodium	74100		ug/L	1000.0	08/06/2021	AB21-0806-01
Thallium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Vanadium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Zinc	ND		ug/L	10.0	08/06/2021	AB21-0806-01

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

Aliquot #: 21-0879-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	52500		ug/L	1000.0	08/10/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/10/2021	AB21-0810-23
Sulfate	112000		ug/L	1000.0	08/10/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0879-02-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	192000		ug/L	10000.0	08/04/2021	AB21-0804-03

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001**
Lab Sample ID: 21-0879-02
Matrix: Groundwater

Laboratory Project: **21-0879**
Collect Date: 07/27/2021
Collect Time: 02:30 PM

Alkalinity by SM 2320B

Aliquot #: 21-0879-02-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	192000		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2021	AB21-0804-03

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0879-02-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	467		mg/L	10.0	07/30/2021	AB21-0730-03

Total Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0879-02-C06-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Organic Carbon	4600		ug/L	1000.0	08/09/2021	AB21-0808-06

Dissolved Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0879-02-C07-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Dissolved Organic Carbon	8600		ug/L	1000.0	08/09/2021	AB21-0808-07

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001 MS**
Lab Sample ID: 21-0879-03
Matrix: Water

Laboratory Project: **21-0879**
Collect Date: 07/27/2021
Collect Time: 02:30 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0879-03-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	92.7		%	0.2	08/02/2021	AB21-0802-08

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

Aliquot #: 21-0879-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	108		%	1.0	08/06/2021	AB21-0806-01
Arsenic	97		%	1.0	08/06/2021	AB21-0806-01
Barium	105		%	5.0	08/06/2021	AB21-0806-01
Beryllium	98		%	1.0	08/06/2021	AB21-0806-01
Boron	118		%	20.0	08/06/2021	AB21-0806-01
Cadmium	99.3		%	0.2	08/13/2021	AB21-0806-01
Calcium	114		%	1000.0	08/06/2021	AB21-0806-01
Chromium	92		%	1.0	08/06/2021	AB21-0806-01
Cobalt	91		%	6.0	08/06/2021	AB21-0806-01
Copper	95		%	1.0	08/06/2021	AB21-0806-01
Iron	96		%	20.0	08/06/2021	AB21-0806-01
Lead	98		%	1.0	08/06/2021	AB21-0806-01
Lithium	82		%	10.0	08/06/2021	AB21-0806-01
Magnesium	113		%	1000.0	08/06/2021	AB21-0806-01
Molybdenum	111		%	5.0	08/06/2021	AB21-0806-01
Nickel	95		%	2.0	08/06/2021	AB21-0806-01
Potassium	106		%	100.0	08/06/2021	AB21-0806-01
Selenium	99		%	1.0	08/06/2021	AB21-0806-01
Silver	93.5		%	0.2	08/06/2021	AB21-0806-01
Sodium	114		%	1000.0	08/06/2021	AB21-0806-01
Thallium	98		%	2.0	08/06/2021	AB21-0806-01
Vanadium	97		%	2.0	08/06/2021	AB21-0806-01
Zinc	99		%	10.0	08/06/2021	AB21-0806-01

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

Aliquot #: 21-0879-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	107		%	1000.0	08/10/2021	AB21-0810-23
Fluoride	91		%	1000.0	08/10/2021	AB21-0810-23
Sulfate	105		%	1000.0	08/10/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0879-03-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	95		%	10000.0	08/04/2021	AB21-0804-03

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001 MSD**
Lab Sample ID: 21-0879-04
Matrix: Water

Laboratory Project: **21-0879**
Collect Date: 07/27/2021
Collect Time: 02:30 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0879-04-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	103		%	0.2	08/02/2021	AB21-0802-08

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

Aliquot #: 21-0879-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	108		%	1.0	08/06/2021	AB21-0806-01
Arsenic	96		%	1.0	08/06/2021	AB21-0806-01
Barium	102		%	5.0	08/06/2021	AB21-0806-01
Beryllium	100		%	1.0	08/06/2021	AB21-0806-01
Boron	118		%	20.0	08/06/2021	AB21-0806-01
Cadmium	103		%	0.2	08/13/2021	AB21-0806-01
Calcium	115		%	1000.0	08/06/2021	AB21-0806-01
Chromium	89		%	1.0	08/06/2021	AB21-0806-01
Cobalt	88		%	6.0	08/06/2021	AB21-0806-01
Copper	94		%	1.0	08/06/2021	AB21-0806-01
Iron	84		%	20.0	08/06/2021	AB21-0806-01
Lead	99		%	1.0	08/06/2021	AB21-0806-01
Lithium	85		%	10.0	08/06/2021	AB21-0806-01
Magnesium	113		%	1000.0	08/06/2021	AB21-0806-01
Molybdenum	111		%	5.0	08/06/2021	AB21-0806-01
Nickel	91		%	2.0	08/06/2021	AB21-0806-01
Potassium	109		%	100.0	08/06/2021	AB21-0806-01
Selenium	99		%	1.0	08/06/2021	AB21-0806-01
Silver	93.4		%	0.2	08/06/2021	AB21-0806-01
Sodium	119		%	1000.0	08/06/2021	AB21-0806-01
Thallium	101		%	2.0	08/06/2021	AB21-0806-01
Vanadium	92		%	2.0	08/06/2021	AB21-0806-01
Zinc	96		%	10.0	08/06/2021	AB21-0806-01

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

Aliquot #: 21-0879-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	111		%	1000.0	08/10/2021	AB21-0810-23
Fluoride	94		%	1000.0	08/10/2021	AB21-0810-23
Sulfate	107		%	1000.0	08/10/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0879-04-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	96		%	10000.0	08/04/2021	AB21-0804-03

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Analytical Report

Report Date: 08/15/21

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-0879

Inspection Date: 7/29/2021 **Inspection By:** Megan Reed

Sample Origin/Project Name: DEK Botham Ash Pond & LI

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx ✓ UPS _____ USPS _____ Airborne _____

Other/Hand Carry (whom) _____

Tracking Number: 815720417881 Shipping Form Attached: Yes _____ No _____

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

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

Loose/Unpackaged Containers _____ Other _____

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

Damaged Shipment Observed: None ✓ Dented _____ Leaking _____

Other _____

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

Shipping Containers Received: Opened _____ Sealed ✓

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

CoC ✓ Work Request _____ Air Data Sheet _____ Other _____

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

As-Received Temperature Range 1.0-2.0 °C Samples Received on Ice: Yes ✓ No _____

M&TE # and Expiration 015407 / 6/3/22

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

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

7/29/21 MLR

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251 • FAX (517) 788-2533

SAMPLING SITE: **DEK Bottom Ash Pond & LI – 2021 Q3**

PROJECT NUMBER: **21-0879**

SAMPLING TEAM:

DATE SHIPPED:

SITE SKETCHED ATTACHED? CIRCLE ONE: YES NO

SEND REPORT TO: CDBatts

HD Register, TRC

PHONE:

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	Alkalinity	TDS	TOC	DOC			REMARKS
21-0879-01	7/27/21	1341	GW	DEK-MW-15003		7	X	X	X	X	X	X			
-02		1430	GW	DEK-MW-18001		7	X	X	X	X	X	X			
-03		1430	GW	DEK-MW-18001 MS		4	X	X	X						
-04		1430	GW	DEK-MW-18001 MSD		4	X	X	X						

ANALYSIS REQUESTED

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
[signature]	7/28/21 /1450	FedEx
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)
Fed Ex	7-29-21 1000	[signature]

COMMENTS

1.0 F
2.0 F

015402

ORIGINAL TO LAB COPY TO CUSTOMER

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

To: CDBatts, Karn/Weadock

From: EBlaj, T-258

Date: August 15, 2021

Subject: RCRA GROUNDWATER MONITORING – KARN LINED IMPOUNDMENT – 2021 Q3

CC: BTRunkel, P22-120
HDRegister, P22-521
BLSwanberg, P22-119

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

Chemistry Project: 21-0880

TRC Environmental, Inc. conducted groundwater monitoring at the DE Karn Lined Impoundment area on 07/27/2021, for the 3rd Quarter monitoring 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 07/29/2021.

Samples for Total and Dissolved Organic Carbon have been subcontracted to Brighton Analytical, LLC. and the results are listed under the analyst initials "BAL".

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

Reviewed and approved by:

Emil Blaj
Sr. Technical Analyst
Project Lead

ilac-MRA A2LA ACCREDITED Certificate #1097.04

CASE NARRATIVE

I. Sample Receipt

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

II. Methodology

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

III. Results/Quality Control

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

DEFINITIONS / QUALIFIERS

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

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

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

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Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q3-2021 DEK RCRA Lined Impoundment Wells
Date Received: 7/29/2021
Chemistry Project: 21-0880

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-0880-01	OW-10	Groundwater	07/27/2021 12:49 PM	DEK Lined Impoundment
21-0880-02	OW-11	Groundwater	07/27/2021 01:55 PM	DEK Lined Impoundment
21-0880-03	OW-12	Groundwater	07/27/2021 03:25 PM	DEK Lined Impoundment
21-0880-04	KLI-SCS	Groundwater	07/27/2021 11:57 AM	DEK Lined Impoundment
21-0880-05	KLI-PCS	Groundwater	07/27/2021 11:41 AM	DEK Lined Impoundment
21-0880-06	SW-DITCH	Groundwater	07/27/2021 11:15 AM	DEK Lined Impoundment
21-0880-07	DUP-KLI	Groundwater	07/27/2021 12:00 AM	DEK Lined Impoundment
21-0880-08	EB-KLI	Water	07/27/2021 03:43 PM	DEK Lined Impoundment
21-0880-09	FB-KLI	Water	07/27/2021 03:25 PM	DEK Lined Impoundment

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-10**
Lab Sample ID: 21-0880-01
Matrix: Groundwater

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 12:49 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0880-01-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/02/2021	AB21-0802-08

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

Aliquot #: 21-0880-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Arsenic	4		ug/L	1.0	08/06/2021	AB21-0806-01
Barium	169		ug/L	5.0	08/06/2021	AB21-0806-01
Beryllium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Boron	872		ug/L	20.0	08/06/2021	AB21-0806-01
Cadmium	ND		ug/L	0.2	08/13/2021	AB21-0806-01
Calcium	127000		ug/L	1000.0	08/06/2021	AB21-0806-01
Chromium	1		ug/L	1.0	08/06/2021	AB21-0806-01
Cobalt	ND		ug/L	6.0	08/06/2021	AB21-0806-01
Copper	3		ug/L	1.0	08/06/2021	AB21-0806-01
Iron	1230		ug/L	20.0	08/06/2021	AB21-0806-01
Lead	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Lithium	23		ug/L	10.0	08/06/2021	AB21-0806-01
Magnesium	14800		ug/L	1000.0	08/06/2021	AB21-0806-01
Molybdenum	9		ug/L	5.0	08/06/2021	AB21-0806-01
Nickel	5		ug/L	2.0	08/06/2021	AB21-0806-01
Potassium	11100		ug/L	100.0	08/06/2021	AB21-0806-01
Selenium	14		ug/L	1.0	08/06/2021	AB21-0806-01
Silver	ND		ug/L	0.2	08/06/2021	AB21-0806-01
Sodium	59100		ug/L	1000.0	08/06/2021	AB21-0806-01
Thallium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Vanadium	11		ug/L	2.0	08/06/2021	AB21-0806-01
Zinc	ND		ug/L	10.0	08/06/2021	AB21-0806-01

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

Aliquot #: 21-0880-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	86200		ug/L	1000.0	08/10/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/10/2021	AB21-0810-23
Sulfate	122000		ug/L	1000.0	08/10/2021	AB21-0810-23

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0880-01-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	626		mg/L	10.0	07/30/2021	AB21-0730-03

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-10**
Lab Sample ID: 21-0880-01
Matrix: Groundwater

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 12:49 PM

Alkalinity by SM 2320B

Aliquot #: 21-0880-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	276000		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Bicarbonate	276000		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2021	AB21-0804-03

Total Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0880-01-C06-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Organic Carbon	4200		ug/L	1000.0	08/06/2021	AB21-0808-06

Dissolved Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0880-01-C07-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Dissolved Organic Carbon	4900		ug/L	1000.0	08/06/2021	AB21-0808-07

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-11**
Lab Sample ID: 21-0880-02
Matrix: Groundwater

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 01:55 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0880-02-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/02/2021	AB21-0802-08

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

Aliquot #: 21-0880-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	3		ug/L	1.0	08/06/2021	AB21-0806-01
Arsenic	497		ug/L	1.0	08/06/2021	AB21-0806-01
Barium	33		ug/L	5.0	08/06/2021	AB21-0806-01
Beryllium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Boron	3190		ug/L	20.0	08/06/2021	AB21-0806-01
Cadmium	ND		ug/L	0.2	08/13/2021	AB21-0806-01
Calcium	9320		ug/L	1000.0	08/06/2021	AB21-0806-01
Chromium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Cobalt	ND		ug/L	6.0	08/06/2021	AB21-0806-01
Copper	2		ug/L	1.0	08/06/2021	AB21-0806-01
Iron	128		ug/L	20.0	08/06/2021	AB21-0806-01
Lead	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Lithium	ND		ug/L	10.0	08/06/2021	AB21-0806-01
Magnesium	1230		ug/L	1000.0	08/06/2021	AB21-0806-01
Molybdenum	253		ug/L	5.0	08/06/2021	AB21-0806-01
Nickel	3		ug/L	2.0	08/06/2021	AB21-0806-01
Potassium	5540		ug/L	100.0	08/06/2021	AB21-0806-01
Selenium	5		ug/L	1.0	08/06/2021	AB21-0806-01
Silver	ND		ug/L	0.2	08/06/2021	AB21-0806-01
Sodium	60500		ug/L	1000.0	08/06/2021	AB21-0806-01
Thallium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Vanadium	1120		ug/L	2.0	08/06/2021	AB21-0806-01
Zinc	ND		ug/L	10.0	08/06/2021	AB21-0806-01

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

Aliquot #: 21-0880-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	63900		ug/L	1000.0	08/10/2021	AB21-0810-23
Fluoride	2610		ug/L	1000.0	08/10/2021	AB21-0810-23
Sulfate	25800		ug/L	1000.0	08/10/2021	AB21-0810-23

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0880-02-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	205		mg/L	10.0	07/30/2021	AB21-0730-03

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-11**
Lab Sample ID: 21-0880-02
Matrix: Groundwater

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 01:55 PM

Alkalinity by SM 2320B

Aliquot #: 21-0880-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	77300		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Bicarbonate	22700		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Carbonate	54600		ug/L	10000.0	08/04/2021	AB21-0804-03

Total Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0880-02-C06-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Organic Carbon	4800		ug/L	1000.0	08/06/2021	AB21-0808-06

Dissolved Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0880-02-C07-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Dissolved Organic Carbon	6400		ug/L	1000.0	08/06/2021	AB21-0808-07

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-12**
Lab Sample ID: 21-0880-03
Matrix: Groundwater

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 03:25 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0880-03-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/02/2021	AB21-0802-08

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

Aliquot #: 21-0880-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Arsenic	86		ug/L	1.0	08/06/2021	AB21-0806-01
Barium	56		ug/L	5.0	08/06/2021	AB21-0806-01
Beryllium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Boron	721		ug/L	20.0	08/06/2021	AB21-0806-01
Cadmium	ND		ug/L	0.2	08/13/2021	AB21-0806-01
Calcium	62400		ug/L	1000.0	08/06/2021	AB21-0806-01
Chromium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Cobalt	ND		ug/L	6.0	08/06/2021	AB21-0806-01
Copper	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Iron	3470		ug/L	20.0	08/06/2021	AB21-0806-01
Lead	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Lithium	20		ug/L	10.0	08/06/2021	AB21-0806-01
Magnesium	18400		ug/L	1000.0	08/06/2021	AB21-0806-01
Molybdenum	16		ug/L	5.0	08/06/2021	AB21-0806-01
Nickel	2		ug/L	2.0	08/06/2021	AB21-0806-01
Potassium	5760		ug/L	100.0	08/06/2021	AB21-0806-01
Selenium	1		ug/L	1.0	08/06/2021	AB21-0806-01
Silver	ND		ug/L	0.2	08/06/2021	AB21-0806-01
Sodium	43200		ug/L	1000.0	08/06/2021	AB21-0806-01
Thallium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Vanadium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Zinc	ND		ug/L	10.0	08/06/2021	AB21-0806-01

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

Aliquot #: 21-0880-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	57600		ug/L	1000.0	08/10/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/10/2021	AB21-0810-23
Sulfate	118000		ug/L	1000.0	08/10/2021	AB21-0810-23

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0880-03-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	443		mg/L	10.0	07/30/2021	AB21-0730-03

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-12**
Lab Sample ID: 21-0880-03
Matrix: Groundwater

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 03:25 PM

Alkalinity by SM 2320B

Aliquot #: 21-0880-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	155000		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Bicarbonate	155000		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2021	AB21-0804-03

Total Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0880-03-C06-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Organic Carbon	2200		ug/L	1000.0	08/06/2021	AB21-0808-06

Dissolved Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0880-03-C07-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Dissolved Organic Carbon	2200		ug/L	1000.0	08/06/2021	AB21-0808-07

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-SCS**
Lab Sample ID: 21-0880-04
Matrix: Groundwater

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 11:57 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0880-04-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/02/2021	AB21-0802-08

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

Aliquot #: 21-0880-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Arsenic	2		ug/L	1.0	08/06/2021	AB21-0806-01
Barium	87		ug/L	5.0	08/06/2021	AB21-0806-01
Beryllium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Boron	521		ug/L	20.0	08/06/2021	AB21-0806-01
Cadmium	ND		ug/L	0.2	08/13/2021	AB21-0806-01
Calcium	116000		ug/L	1000.0	08/06/2021	AB21-0806-01
Chromium	1		ug/L	1.0	08/06/2021	AB21-0806-01
Cobalt	ND		ug/L	6.0	08/06/2021	AB21-0806-01
Copper	3		ug/L	1.0	08/06/2021	AB21-0806-01
Iron	2350		ug/L	20.0	08/06/2021	AB21-0806-01
Lead	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Lithium	ND		ug/L	10.0	08/06/2021	AB21-0806-01
Magnesium	36700		ug/L	1000.0	08/06/2021	AB21-0806-01
Molybdenum	14		ug/L	5.0	08/06/2021	AB21-0806-01
Nickel	6		ug/L	2.0	08/06/2021	AB21-0806-01
Potassium	4460		ug/L	100.0	08/06/2021	AB21-0806-01
Selenium	8		ug/L	1.0	08/06/2021	AB21-0806-01
Silver	ND		ug/L	0.2	08/06/2021	AB21-0806-01
Sodium	293000		ug/L	1000.0	08/06/2021	AB21-0806-01
Thallium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Vanadium	8		ug/L	2.0	08/06/2021	AB21-0806-01
Zinc	11		ug/L	10.0	08/06/2021	AB21-0806-01

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

Aliquot #: 21-0880-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	44000		ug/L	1000.0	08/10/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/10/2021	AB21-0810-23
Sulfate	506000		ug/L	1000.0	08/11/2021	AB21-0810-23

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0880-04-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1240		mg/L	10.0	07/30/2021	AB21-0730-03

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-SCS**
Lab Sample ID: 21-0880-04
Matrix: Groundwater

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 11:57 AM

Alkalinity by SM 2320B

Aliquot #: 21-0880-04-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	474000		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Bicarbonate	474000		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2021	AB21-0804-03

Total Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0880-04-C06-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Organic Carbon	12000		ug/L	1000.0	08/06/2021	AB21-0808-06

Dissolved Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0880-04-C07-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Dissolved Organic Carbon	12000		ug/L	1000.0	08/06/2021	AB21-0808-07

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-PCS**
Lab Sample ID: 21-0880-05
Matrix: Groundwater

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 11:41 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0880-05-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/02/2021	AB21-0802-08

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

Aliquot #: 21-0880-05-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Arsenic	5		ug/L	1.0	08/06/2021	AB21-0806-01
Barium	408		ug/L	5.0	08/06/2021	AB21-0806-01
Beryllium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Boron	668		ug/L	20.0	08/06/2021	AB21-0806-01
Cadmium	ND		ug/L	0.2	08/13/2021	AB21-0806-01
Calcium	55700		ug/L	1000.0	08/06/2021	AB21-0806-01
Chromium	2		ug/L	1.0	08/06/2021	AB21-0806-01
Cobalt	ND		ug/L	6.0	08/06/2021	AB21-0806-01
Copper	4		ug/L	1.0	08/06/2021	AB21-0806-01
Iron	731		ug/L	20.0	08/06/2021	AB21-0806-01
Lead	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Lithium	ND		ug/L	10.0	08/06/2021	AB21-0806-01
Magnesium	14100		ug/L	1000.0	08/06/2021	AB21-0806-01
Molybdenum	23		ug/L	5.0	08/06/2021	AB21-0806-01
Nickel	3		ug/L	2.0	08/06/2021	AB21-0806-01
Potassium	3680		ug/L	100.0	08/06/2021	AB21-0806-01
Selenium	2		ug/L	1.0	08/06/2021	AB21-0806-01
Silver	ND		ug/L	0.2	08/06/2021	AB21-0806-01
Sodium	42100		ug/L	1000.0	08/06/2021	AB21-0806-01
Thallium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Vanadium	25		ug/L	2.0	08/06/2021	AB21-0806-01
Zinc	ND		ug/L	10.0	08/06/2021	AB21-0806-01

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

Aliquot #: 21-0880-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	60500		ug/L	1000.0	08/10/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/10/2021	AB21-0810-23
Sulfate	50300		ug/L	1000.0	08/10/2021	AB21-0810-23

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0880-05-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	331		mg/L	10.0	07/30/2021	AB21-0730-03

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-PCS**
Lab Sample ID: 21-0880-05
Matrix: Groundwater

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 11:41 AM

Alkalinity by SM 2320B

Aliquot #: 21-0880-05-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	133000		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Bicarbonate	124000		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2021	AB21-0804-03

Total Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0880-05-C06-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Organic Carbon	2800		ug/L	1000.0	08/06/2021	AB21-0808-06

Dissolved Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0880-05-C07-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Dissolved Organic Carbon	3500		ug/L	1000.0	08/06/2021	AB21-0808-07

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **SW-DITCH**
Lab Sample ID: 21-0880-06
Matrix: Groundwater

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 11:15 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0880-06-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/02/2021	AB21-0802-08

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

Aliquot #: 21-0880-06-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Arsenic	7		ug/L	1.0	08/06/2021	AB21-0806-01
Barium	82		ug/L	5.0	08/06/2021	AB21-0806-01
Beryllium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Boron	138		ug/L	20.0	08/06/2021	AB21-0806-01
Cadmium	ND		ug/L	0.2	08/13/2021	AB21-0806-01
Calcium	51600		ug/L	1000.0	08/06/2021	AB21-0806-01
Chromium	3		ug/L	1.0	08/06/2021	AB21-0806-01
Cobalt	ND		ug/L	6.0	08/06/2021	AB21-0806-01
Copper	6		ug/L	1.0	08/06/2021	AB21-0806-01
Iron	696		ug/L	20.0	08/06/2021	AB21-0806-01
Lead	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Lithium	ND		ug/L	10.0	08/06/2021	AB21-0806-01
Magnesium	17300		ug/L	1000.0	08/06/2021	AB21-0806-01
Molybdenum	10		ug/L	5.0	08/06/2021	AB21-0806-01
Nickel	4		ug/L	2.0	08/06/2021	AB21-0806-01
Potassium	4870		ug/L	100.0	08/06/2021	AB21-0806-01
Selenium	3		ug/L	1.0	08/06/2021	AB21-0806-01
Silver	ND		ug/L	0.2	08/06/2021	AB21-0806-01
Sodium	609000		ug/L	1000.0	08/06/2021	AB21-0806-01
Thallium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Vanadium	5		ug/L	2.0	08/06/2021	AB21-0806-01
Zinc	ND		ug/L	10.0	08/06/2021	AB21-0806-01

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

Aliquot #: 21-0880-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	124000		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	3010		ug/L	1000.0	08/10/2021	AB21-0810-23
Sulfate	645000		ug/L	1000.0	08/11/2021	AB21-0810-23

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0880-06-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1690		mg/L	10.0	07/30/2021	AB21-0730-03

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **SW-DITCH**
Lab Sample ID: 21-0880-06
Matrix: Groundwater

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 11:15 AM

Alkalinity by SM 2320B

Aliquot #: 21-0880-06-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	564000		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Bicarbonate	66700		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Carbonate	497000		ug/L	10000.0	08/04/2021	AB21-0804-03

Total Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0880-06-C06-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Organic Carbon	12000		ug/L	1000.0	08/06/2021	AB21-0808-06

Dissolved Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0880-06-C07-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Dissolved Organic Carbon	9600		ug/L	1000.0	08/06/2021	AB21-0808-07

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **DUP-KLI**
Lab Sample ID: 21-0880-07
Matrix: Groundwater

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 12:00 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0880-07-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/02/2021	AB21-0802-08

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

Aliquot #: 21-0880-07-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	7		ug/L	1.0	08/06/2021	AB21-0806-01
Arsenic	86		ug/L	1.0	08/06/2021	AB21-0806-01
Barium	58		ug/L	5.0	08/06/2021	AB21-0806-01
Beryllium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Boron	731		ug/L	20.0	08/06/2021	AB21-0806-01
Cadmium	ND		ug/L	0.2	08/13/2021	AB21-0806-01
Calcium	60300		ug/L	1000.0	08/06/2021	AB21-0806-01
Chromium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Cobalt	ND		ug/L	6.0	08/06/2021	AB21-0806-01
Copper	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Iron	3550		ug/L	20.0	08/06/2021	AB21-0806-01
Lead	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Lithium	20		ug/L	10.0	08/06/2021	AB21-0806-01
Magnesium	19000		ug/L	1000.0	08/06/2021	AB21-0806-01
Molybdenum	16		ug/L	5.0	08/06/2021	AB21-0806-01
Nickel	2		ug/L	2.0	08/06/2021	AB21-0806-01
Potassium	4370		ug/L	100.0	08/06/2021	AB21-0806-01
Selenium	1		ug/L	1.0	08/06/2021	AB21-0806-01
Silver	ND		ug/L	0.2	08/06/2021	AB21-0806-01
Sodium	45600		ug/L	1000.0	08/06/2021	AB21-0806-01
Thallium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Vanadium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Zinc	ND		ug/L	10.0	08/06/2021	AB21-0806-01

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

Aliquot #: 21-0880-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	57200		ug/L	1000.0	08/10/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/10/2021	AB21-0810-23
Sulfate	117000		ug/L	1000.0	08/10/2021	AB21-0810-23

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0880-07-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	441		mg/L	10.0	07/30/2021	AB21-0730-03

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **DUP-KLI**
Lab Sample ID: 21-0880-07
Matrix: Groundwater

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 12:00 AM

Alkalinity by SM 2320B

Aliquot #: 21-0880-07-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	158000		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Bicarbonate	158000		ug/L	10000.0	08/04/2021	AB21-0804-03
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2021	AB21-0804-03

Total Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0880-07-C06-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Organic Carbon	2000		ug/L	1000.0	08/06/2021	AB21-0808-06

Dissolved Organic Carbon by SM 5310B, Aqueous

Aliquot #: 21-0880-07-C07-A01 **Analyst: BAL**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Dissolved Organic Carbon	3500		ug/L	1000.0	08/06/2021	AB21-0808-07

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **EB-KLI**
Lab Sample ID: 21-0880-08
Matrix: Water

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 03:43 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0880-08-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/02/2021	AB21-0802-08

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

Aliquot #: 21-0880-08-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Arsenic	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Barium	ND		ug/L	5.0	08/06/2021	AB21-0806-01
Beryllium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Boron	ND		ug/L	20.0	08/06/2021	AB21-0806-01
Cadmium	ND		ug/L	0.2	08/13/2021	AB21-0806-01
Calcium	ND		ug/L	1000.0	08/06/2021	AB21-0806-01
Chromium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Cobalt	ND		ug/L	6.0	08/06/2021	AB21-0806-01
Copper	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Iron	ND		ug/L	20.0	08/06/2021	AB21-0806-01
Lead	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Lithium	ND		ug/L	10.0	08/06/2021	AB21-0806-01
Magnesium	ND		ug/L	1000.0	08/06/2021	AB21-0806-01
Molybdenum	ND		ug/L	5.0	08/06/2021	AB21-0806-01
Nickel	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Potassium	ND		ug/L	100.0	08/06/2021	AB21-0806-01
Selenium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Silver	ND		ug/L	0.2	08/06/2021	AB21-0806-01
Sodium	ND		ug/L	1000.0	08/06/2021	AB21-0806-01
Thallium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Vanadium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Zinc	ND		ug/L	10.0	08/06/2021	AB21-0806-01

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Analytical Report

Report Date: 08/15/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **FB-KLI**
Lab Sample ID: 21-0880-09
Matrix: Water

Laboratory Project: **21-0880**
Collect Date: 07/27/2021
Collect Time: 03:25 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0880-09-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/02/2021	AB21-0802-08

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

Aliquot #: 21-0880-09-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Arsenic	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Barium	ND		ug/L	5.0	08/06/2021	AB21-0806-01
Beryllium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Boron	ND		ug/L	20.0	08/06/2021	AB21-0806-01
Cadmium	ND		ug/L	0.2	08/13/2021	AB21-0806-01
Calcium	ND		ug/L	1000.0	08/06/2021	AB21-0806-01
Chromium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Cobalt	ND		ug/L	6.0	08/06/2021	AB21-0806-01
Copper	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Iron	ND		ug/L	20.0	08/06/2021	AB21-0806-01
Lead	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Lithium	ND		ug/L	10.0	08/06/2021	AB21-0806-01
Magnesium	ND		ug/L	1000.0	08/06/2021	AB21-0806-01
Molybdenum	ND		ug/L	5.0	08/06/2021	AB21-0806-01
Nickel	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Potassium	ND		ug/L	100.0	08/06/2021	AB21-0806-01
Selenium	ND		ug/L	1.0	08/06/2021	AB21-0806-01
Silver	ND		ug/L	0.2	08/06/2021	AB21-0806-01
Sodium	ND		ug/L	1000.0	08/06/2021	AB21-0806-01
Thallium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Vanadium	ND		ug/L	2.0	08/06/2021	AB21-0806-01
Zinc	ND		ug/L	10.0	08/06/2021	AB21-0806-01

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Analytical Report

Report Date: 08/15/21

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-0880

Inspection Date: 7.29.21 **Inspection By:** CVH

Sample Origin/Project Name: DEK lined impoundment

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx ✓ UPS _____ USPS _____ Airborne _____

Other/Hand Carry (whom) _____

Tracking Number: 815720417907 Shipping Form Attached: Yes ✓ No _____

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

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

Loose/Unpackaged Containers _____ Other _____

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

Damaged Shipment Observed: None ✓ Dented _____ Leaking _____

Other _____

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

Shipping Containers Received: Opened _____ Sealed ✓

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

CoC ✓ Work Request _____ Air Data Sheet _____ Other _____

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

As-Received Temperature Range 0.6-1.3°C Samples Received on Ice: Yes ✓ No _____

M&TE # and Expiration D151462 4.3.22

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

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL)	40=14				
Quart/Liter (g/p)	60=14				
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	30				
24 mL vial (glass)					
250 500 mL (plastic)	7				
Other					

PG. 2&2 not needed

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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SAMPLING SITE: **DEK Lined Impoundment – 2021 Q3**

PROJECT NUMBER: **21-0880**

SAMPLING TEAM: TRC

DATE SHIPPED: 7/28/21

SITE SKETCHED ATTACHED? CIRCLE ONE: YES NO

SEND REPORT TO: CDBatts

HD Register, TRC

PHONE:

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity	TOC	DOC			REMARKS
21-0880-01	7/27/21	1249	GW	OW-10		7	X	X	X	X	X	X			
-02		1355	GW	OW-11		7	X	X	X	X	X	X			
-03		1525	GW	OW-12		7	X	X	X	X	X	X			
-04		1157	GW	KLI-SCS		7	X	X	X	X	X	X			
-05		1141	GW	KLI-PCS		7	X	X	X	X	X	X			
-06		1115	GW	SW-DITCH		7	X	X	X	X	X	X			
-07		—	GW	DUP-KLI		7	X	X	X	X	X	X			
-08		1543	W	EB-KLI		1	X								
-09		1525	W	FB-KLI		1	X								

ANALYSIS REQUESTED

RELINQUISHED BY: (SIGNATURE) [signature] DATE/TIME 7/28/21 /1450 RECEIVED BY: (SIGNATURE) Fedex

RELINQUISHED BY: (SIGNATURE) Fed Ex DATE/TIME: 7-29-21 1000 RECEIVED BY: (SIGNATURE) [signature]

COMMENTS 0.6 - 1.3°C
015402

ORIGINAL TO LAB COPY TO CUSTOMER

Appendix B
Field Notes

TRC

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Compliance
PROJECT NUMBER:	418425.0001.0000
PROJECT MANAGER:	Darby Litz
SITE LOCATION:	2742 Weadock Hwy Essexville, MI 48732
DATES OF FIELDWORK:	7/26/21 TO 7/28/21
PURPOSE OF FIELDWORK:	3Q21 Supplemental Sampling Event
WORK PERFORMED BY:	David Disney, Jake Krenz, Javier Jasso

[signature] 7/30/21
SIGNED DATE

[signature] 8-2-21
CHECKED BY DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Comp	DATE:	7/26/21	TIME ARRIVED:	0730
PROJECT NUMBER:	418425.0001.0000	AUTHOR:	David Disney, Jake Krenz,	TIME LEFT:	1500

WEATHER

TEMPERATURE: 93 °F WIND: 0-5 MPH VISIBILITY: clear

WORK / SAMPLING PERFORMED

Sitewide water levels measured

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NA	NA

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Butts	CEC	Check in/out
		Site training for D. Disney

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
NA	NA	NA

Jake Krenz 7/30/21
SIGNED DATE

David Disney 8-2-21
CHECKED BY DATE

TRC

GENERAL NOTES

PROJECT NAME: CEC Karn BAP/LI: 2021 GW Comp	DATE: 7/27/21	TIME ARRIVED: 0700
PROJECT NUMBER: 418425.0001.0000	AUTHOR: David Disney, Jake Krenz,	TIME LEFT: ~~1630~~ 1645

WEATHER		
TEMPERATURE: 83 °F	WIND: 5-10 MPH	VISIBILITY: Clear

WORK / SAMPLING PERFORMED

collected samples from OW-10, OW-11, OW-12, SW-Ditch, KLI-PLS, KLI-SCS, DEK-MW-15003, and DEK-MW-18001.

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NA	NA

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Batts	CEC	check in/out

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
purge water	DRUM	purged to ground

Jake Krenz 7/30/21
SIGNED DATE

David Disney 8-2-21
CHECKED BY DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Comp	DATE:	7/28/21	TIME ARRIVED:	0600
PROJECT NUMBER:	418425.0001.0000	AUTHOR:	David Disney, Jake Krenz,	TIME LEFT:	1500

WEATHER

TEMPERATURE: 72 °F WIND: 25 MPH VISIBILITY: cloudy

WORK / SAMPLING PERFORMED

Collected samples from monitoring wells; DEK-MW-15002, DEK-MW-15004, DEK-MW-15005, and DEK-MW-15006

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NA	NA

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Batts	CEC	check in/out

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
purge water	1 DRM	purged to ground

Jake Krenz 7/30/21
SIGNED DATE

David Disney 8-2-21
CHECKED BY DATE

TRC

EQUIPMENT SUMMARY

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW	SAMPLER NAME:	David Disney, Jake Krenz, Javier Jasso
PROJECT NO.:	418425.0001.0000		

WATER LEVEL MEASUREMENTS COLLECTED WITH:

NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)
HERON DIPPER-T	TRC A2

PRODUCT LEVEL MEASUREMENTS COLLECTED WITH:

NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)
NA	NA

DEPTH TO BOTTOM OF WELL MEASUREMENTS COLLECTED WITH:

NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)
HERON DIPPER-T	TRC A2

PURGING METHOD

NAME AND MODEL OF PUMP OR TYPE OF BAILER	SERIAL NUMBER (IF APPLICABLE)
PERISTALTIC PUMP	TRC A2

SAMPLING METHOD

NAME AND MODEL OF PUMP OR TYPE OF BAILER	SERIAL NUMBER (IF APPLICABLE)
PERISTALTIC PUMP	TRC A2
NAME AND MODEL OF FILTERATION DEVICE	FILTER TYPE AND SIZE
GEOTECH DISPOSABLE FILTER	0.45 MICRON
TUBING TYPE	☑ LOW-FLOW SAMPLING EVENT
DEDICATED POLY TUBING	

PURGE WATER DISPOSAL METHOD

☑ GROUND ☐ DRUM ☐ POTW ☐ POLYTANK ☐ OTHER _____

DECONTAMINATION AND FIELD BLANK WATER SOURCE

POTABLE WATER SOURCE	DI WATER SOURCE
STORE BOUGHT	LABORATORY PROVIDED
SIGNED 7/20/21 DATE	CHECKED BY 8-2-21 DATE

REVISED 04/2019

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Compliance	DATE:	7/26/21
PROJECT NUMBER:	418425.0001.0000	AUTHOR:	David Disney, Jake Krenz, Ja

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
DE Karn Bottom Ash Pond						
DEK-MW-15002	0914	TOC	6.08	15.75		
DEK-MW-15004	0948	↓	27.83	41.80		
DEK-MW-15005	0924	↓	8.48	22.23		
DEK-MW-15006	0927	↓	8.00	21.50		
DE Karn Bottom Ash Pond and Lined Impoundment						
DEK-MW-18001	0932	TOC	8.23	19.65		
DEK-MW-15003	0941	TOC	16.30	27.87		
Karn Lined Impoundment						
OW-10	1318	TOC	6.30	17.95		
OW-11	0937	↓	21.44	25.47		
OW-12	0918	↓	16.96	23.45		
Background						
MW-15002						
MW-15008						
MW-15016						
MW-15019						

ALL WATER LEVELS MUST INCLUDE REFERENCE POINT AND TAPE CORRECTION FACTOR (E.G., 1.1 + 0.00 T/PVC).

Jake Krenz 7/30/21
SIGNED DATE

David Disney 8-2-21
CHECKED DATE

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Karn BAP/LI: 2021 GW C	PREPARED	CHECKED
PROJECT NUMBER: 418425.0001.0000	BY: DD, (JK) JJ DATE: 7/27/21	BY: DD DATE: 8-2-21

SAMPLE ID: SW - Ditch | WELL DIAMETER: ~~2"~~ ☐ 4" ☐ 6" ☒ OTHER NA

WELL MATERIAL: ~~☑ PVC~~ ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☒ OTHER NA

SAMPLE TYPE: ~~☑ GW~~ ☐ WW ☒ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME:	DATE:

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER _____

DEPTH TO WATER: _____ T/ PVC

DEPTH TO BOTTOM: _____ ~~T/ PVC~~

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: _____ ☐ LITERS ☐ GALLONS

COLOR: _____ ODOR: _____

TURBIDITY
☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1115	DATE: 7/27/21

PH: 10.36 SU | CONDUCTIVITY: 2915 umhos/cm

ORP: -56.7 mV | DO: 8.26 mg/L

TURBIDITY: 40.1 NTU

☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY

TEMPERATURE: 29.8 °C | OTHER: _____

COLOR: gray | ODOR: none

FILTRATE (0.45 um) ☒ YES ☐ NO

FILTRATE COLOR: clear | FILTRATE ODOR: none

QC SAMPLE: ☐ MS/MSD ☐ DUP- _____

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1115	NA	10.36	2915	-56.7	8.26	40.1	29.8	NA	INITIAL

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N	1	250mL	Plastic	A	☐ Y ☒ N
1	40mL	VOA	E	☐ Y ☒ N					☐ Y ☐ N
1	40mL	VOA	E	☒ Y ☐ N					☐ Y ☐ N
1	125mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	Plastic	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD: Fedex	DATE SHIPPED: 7/28/21	AIRBILL NUMBER: ~~~
COC NUMBER: ~~~	SIGNATURE: [signature]	DATE SIGNED: 7/30/21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Karn BAP/LI: 2021 GW C	PREPARED	CHECKED
PROJECT NUMBER: 418425.0001.0000	BY: DD, (R) JJ DATE: 7/27/21	BY: DD DATE: 8-2-21

SAMPLE ID: RLI - PLS | WELL DIAMETER: ☒ 2" ☐ 4" ☐ 6" ☒ OTHER NA

WELL MATERIAL: ☒ ~~PVC~~ ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☒ OTHER NA

SAMPLE TYPE: ☐ ~~GW~~ ☐ WW ☒ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME:	DATE:

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: _____ T/ PVC

DEPTH TO BOTTOM: _____ T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: _____ ☐ LITERS ☐ GALLONS

COLOR: _____ ODOR: _____

TURBIDITY

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1141	DATE: 7/27/21

PH: 8.98 SU | CONDUCTIVITY: 565 umhos/cm

ORP: -29.3 mV | DO: 9.41 mg/L

TURBIDITY: 17.5 NTU

☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY

TEMPERATURE: 25.7 °C | OTHER: _____

COLOR: gray | ODOR: none

FILTRATE (0.45 um) ☒ YES ☐ NO

FILTRATE COLOR: clear | FILTRATE ODOR: none

QC SAMPLE: ☐ MS/MSD ☐ DUP- _____

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1141	NA	8.98	565	-29.3	9.41	17.5	25.7	NA	INITIAL

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N	1	250mL	Plastic	A	☐ Y ☒ N
1	40mL	VOA	E	☐ Y ☒ N					☐ Y ☐ N
1	40mL	VOA	E	☒ Y ☐ N					☐ Y ☐ N
1	125mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	Plastic	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD: Fedex	DATE SHIPPED: 7-28-21	AIRBILL NUMBER: _____
COC NUMBER: _____	SIGNATURE:	DATE SIGNED: 7-30-21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: DD, JK, JJ	DATE: 7/27/21	BY: DD	DATE: 8-2-21

SAMPLE ID: KLI-SCS | WELL DIAMETER: ☑ ~~2"~~ ☐ 4" ☐ 6" ☒ OTHER NA

WELL MATERIAL: ☑ ~~PVC~~ ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☒ OTHER NA

SAMPLE TYPE: ☑ ~~GW~~ ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☒ OTHER Secondary collection

PURGING	TIME:	DATE:

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: _____ T/ PVC

DEPTH TO BOTTOM: _____ T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: _____ ☐ LITERS ☐ GALLONS

COLOR: _____ ODOR: _____

TURBIDITY

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1157	DATE: 7/27/21

PH: 7.48 SU | CONDUCTIVITY: 1708 umhos/cm

ORP: -5.2 mV | DO: 3.40 mg/L

TURBIDITY: 3.82 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 20.8 °C | OTHER: _____

COLOR: clear | ODOR: none

FILTRATE (0.45 um) ☒ YES ☐ NO

FILTRATE COLOR: clear | FILTRATE ODOR: none

QC SAMPLE: ☐ MS/MSD ☐ DUP- _____

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1157	NA	7.45	1708	-5.2	3.40	3.82	20.8	NA	INITIAL

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N	1	250mL	Plastic	A	☐ Y ☒ N
1	40mL	↓	E	☐ Y ☒ N					☐ Y ☐ N
1	40mL	↓	E	☒ Y ☐ N					☐ Y ☐ N
1	125mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	7/28/21	AIRBILL NUMBER:	—
COC NUMBER:	—	SIGNATURE:		DATE SIGNED:	7-30-21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: DD, (JK) JJ	DATE: 7/27/21	BY: DD	DATE: 8-2-21

SAMPLE ID: OW-10 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER _____

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER _____

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER _____

PURGING	TIME: 1211	DATE: 7/27/21	SAMPLE	TIME: 1249	DATE: 7/27/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER _____

DEPTH TO WATER: 6.40 T/ PVC

DEPTH TO BOTTOM: 17.95 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 3.5 ☒ LITERS ☐ GALLONS

COLOR: clear ODOR: none

TURBIDITY ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

PH: 6.99 SU | CONDUCTIVITY: 787 umhos/cm

ORP: 30.7 mV | DO: 1.96 mg/L

TURBIDITY: 9.57 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 14.7 °C | OTHER: _____

COLOR: clear | ODOR: none

FILTRATE (0.45 um) ☒ YES ☐ NO

FILTRATE COLOR: clear | FILTRATE ODOR: none

QC SAMPLE: ☐ MS/MSD ☐ DUP- _____

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1214	100	7.55	915	-9.1	4.56	9.00	16.4	6.70	INITIAL
1219	100	7.07	860	15.8	2.25	12.3	14.9	7.04	.5
1224	100	6.97	854	23.4	2.14	14.2	15.3	7.04	1.0
1229	100	6.96	838	26.3	2.12	15.3	15.1	7.06	1.5
1234	100	6.98	804	29.3	2.04	15.6	14.5	7.16	2.0
1239	100	6.97	802	30.0	2.02	9.81	14.7	7.20	2.5
1244	100	6.98	790	30.4	1.98	9.62	14.7	7.20	3.0
1249	100	6.99	787	30.7	1.96	9.57	14.7	7.20	3.5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N	1	250mL	Plastic	A	☐ Y ☒ N
1	40mL	VOA	E	☐ Y ☒ N					☐ Y ☐ N
1	40mL	VOA	E	☒ Y ☐ N					☐ Y ☐ N
1	125mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	Plastic	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	FedEx	DATE SHIPPED:	7-28-21	AIRBILL NUMBER:	_____
COC NUMBER:	_____	SIGNATURE:	[signature]	DATE SIGNED:	7-30-21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER: 418425.0001.0000	BY: DD, (JR) JJ	DATE: 7/27/21	BY: OD	DATE: 8-2-21

SAMPLE ID: OW-11	WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER
WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL	☐ OTHER
SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE	☐ OTHER

PURGING	TIME: 1319	DATE: 7/27/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER	
DEPTH TO WATER: 21.45 T/ PVC		
DEPTH TO BOTTOM: 25.47 T/ PVC		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS		
VOLUME REMOVED: 3.0 ☒ LITERS ☐ GALLONS		
COLOR: Clear	ODOR: none	
TURBIDITY ☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY		
DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER		

SAMPLE	TIME: 1355	DATE: 7/27/21
PH: 9.42 SU	CONDUCTIVITY: 327.0 umhos/cm	
ORP: 31.2 mV	DO: 2.14 mg/L	
TURBIDITY: 8.30 NTU		
☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
TEMPERATURE: 14.7 °C	OTHER: —	
COLOR: clear	ODOR: none	
FILTRATE (0.45 um) ☒ YES ☐ NO		
FILTRATE COLOR: clear	FILTRATE ODOR: none	
QC SAMPLE: ☐ MS/MSD	☐ DUP- _____	
COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1325	100	10.46	328.1	45.7	3.53	33.2	14.6	22.43	INITIAL
1330	100	9.68	324.9	27.5	2.44	19.5	14.7	22.54	.5
1335	100	9.52	337.8	25.1	2.84	23.5	15.8	22.70	1.0
1340	100	9.50	330.4	26.5	2.27	14.5	15.0	22.76	1.5
1345	100	9.46	328.5	28.7	2.20	9.76	14.9	22.81	2.0
1350	100	9.45	326.4	30.0	2.19	9.73	14.6	22.40	2.5
1355	100	9.42	327.0	31.2	2.14	8.30	14.7	22.90	3.0

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N	1	250mL	Plastic	A	☐ Y ☒ N
1	40mL	VOA	E	☐ Y ☒ N					☐ Y ☐ N
1	40mL	VOA	E	☒ Y ☐ N					☐ Y ☐ N
1	125mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	Plastic	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD: Fedex	DATE SHIPPED: 7-28-21	AIRBILL NUMBER: —
COC NUMBER: —	SIGNATURE: [signature]	DATE SIGNED: 7-30-21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER: 418425.0001.0000	BY: DD, JK, JJ	DATE: 7-27-21	BY: DD	DATE: 8-2-21

SAMPLE ID: OW-12 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1442	DATE: 7-27-21	SAMPLE	TIME: 1525	DATE: 7-27-21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 16.94 T/ PVC

DEPTH TO BOTTOM: 24.45 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 12 ☒ LITERS ☐ GALLONS

COLOR: Slight orange ODOR: none

TURBIDITY

☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

PH: 7.11 SU | CONDUCTIVITY: 564 umhos/cm

ORP: -81.1 mV | DO: 1.70 mg/L

TURBIDITY: 1.82 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 16.5 °C | OTHER: —

COLOR: clear | ODOR: none

FILTRATE (0.45 um) ☒ YES ☐ NO

FILTRATE COLOR: clear | FILTRATE ODOR: none

QC SAMPLE: ☐ MS/MSD ☒ DUP- KLI

COMMENTS: Field Blank collected

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1425	200	8.11	613	53.6	2.26	62.2	17.7	17.00	INITIAL
1430	200	7.14	582	19.8	1.89	24.9	16.6	17.00	1
1435	200	7.05	579	7.0	1.83	20.2	16.7	17.00	2
1440	200	7.02	583	-8.2	1.80	4.72	16.7	17.00	3
1445	200	7.03	583	-19.8	1.77	2.93	16.7	17.00	4
1450	200	7.05	575	-38.3	1.74	2.47	16.6	17.00	5
1455	200	7.06	573	-46.0	1.73	2.71	16.6	17.00	6
1500	200	7.08	571	-52.2	1.73	2.57	16.5	17.00	7
1505	200	7.09	565	-59.3	1.72	2.91	16.5	17.00	8
1510	200	7.10	563	-66.5	1.71	2.30	16.5	17.00	9

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	60mL	VOA	A	☐ Y ☒ N	2	250mL	Plastic	A	☐ Y ☒ N
2	40mL	VOA	E	☐ Y ☒ N					☐ Y ☐ N
2	40mL	VOA	E	☒ Y ☐ N					☐ Y ☐ N
2	125mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
3	125mL	Plastic	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD: Fedex	DATE SHIPPED: 7-28-21	AIRBILL NUMBER: —
COC NUMBER: —	SIGNATURE: [signature]	DATE SIGNED: 7-30-21

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Co	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: DD, (JK) JJ	DATE: 7-27-21	BY: DD	DATE: 7-28-21

SAMPLE ID: OW-12

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1515	200	7.10	566	-72.0	1.70	1.97	16.5	17.00	10
1520	200	7.11	564	-77.4	1.70	1.76	16.5	17.00	11
1525	200	7.11	564	-81.1	1.70	1.82	16.5	17.00	12

SIGNATURE: _____ DATE SIGNED: 7-30-21

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER: 418425.0001.0000	BY: DD, JK, JJ	DATE:	BY: DD	DATE: 8-2-21

SAMPLE ID: EB - KLI — WELL DIAMETER: ~~☑ 2"~~ ☐ 4" ☐ 6" ☒ OTHER NA

WELL MATERIAL: ~~☑ PVC~~ ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☒ OTHER NA

SAMPLE TYPE: ~~☑ GW~~ ☐ WW ☐ SW ☒ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME:	DATE:

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER _____

DEPTH TO WATER: _____ T/ PVC

DEPTH TO BOTTOM: _____ T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: _____ ☐ LITERS ☐ GALLONS

COLOR: _____ ODOR: _____

TURBIDITY

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1543	DATE: 7-27-21

PH: _____ SU CONDUCTIVITY: _____ umhos/cm

ORP: _____ mV DO: _____ mg/L

TURBIDITY: _____ NTU

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: _____ °C OTHER: _____

COLOR: _____ ODOR: _____

FILTRATE (0.45 um) ☐ YES ☐ NO

FILTRATE COLOR: _____ FILTRATE ODOR: _____

QC SAMPLE: ☐ MS/MSD ☐ DUP- _____

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
									INITIAL

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	125mL	Plastic	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: FedEx	DATE SHIPPED: 7-28-21	AIRBILL NUMBER: _____
COC NUMBER: _____	SIGNATURE: [signature]	DATE SIGNED: 7-30-21

PAGE _____ OF _____

TRC WATER SAMPLE LOG

CEC Kern BAP/LI

PROJECT NAME: ~~CEC KARN LF 2021 GW/ COMI~~	PREPARED		CHECKED	
PROJECT NUMBER: 418425.~~0000.0000~~ .0001	BY: JJASSO	DATE: 7/28/21	BY: SK	DATE: 8/2/21

SAMPLE ID: DEK-MW-15005	WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER	
WELL MATERIAL:	☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL	☐ OTHER
SAMPLE TYPE:	☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE	☐ OTHER

PURGING	TIME: 1135	DATE: 7/28/21	SAMPLE	TIME: 1205	DATE: 7/28/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP		PH: 7.58 SU	CONDUCTIVITY: 889	umhos/cm
	☐ BAILER _____		ORP: -129.5 mV	DO: ~~2.00~~ 1.95	mg/L
DEPTH TO WATER: 8.46 T/ PVC			TURBIDITY: 2.60 NTU		
DEPTH TO BOTTOM: 22.23 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 14.0 °C	OTHER:	
VOLUME REMOVED: 3	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: none	
COLOR: Clear	ODOR: none		FILTRATE (0.45 um) ☑ YES	☐ NO	
TURBIDITY			FILTRATE COLOR: Clear	FILTRATE ODOR: none	
☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD	☐ DUP- _____	
DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER			COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1135	160	7.95	967	-63.0	9.0	11.50	19.4	8.47	INITIAL
1140		7.60	881	-121.3	2.23	3.40	14.4	8.60	.5
1145		7.59	887	-129.0	2.06	2.67	14.2	8.61	1
1150		7.60	875	-132.0	1.99	2.90	14.1	8.63	1.5
1155		7.59	880	-130.0	1.96	2.60	14.0	8.64	2
1200		7.58	884	-129.9	1.95	2.58	13.9	8.65	2.5
1205		7.58	889	-129.5	1.95	2.60	14.0	8.66	3

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **10 %** ORP: +/- **10 %** D.O.: +/- **10 %** TURB: +/- **10 %** or **</= 5** TEMP.: +/- **0.5°C**

BOTTLES FILLED		PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____							
NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125 mL	VOA	A	☐ Y ☑ N	1	40	VOC	E	☑ Y ☐ N
1	125 mL	PLASTIC	A	~~☑ Y~~ ☑ N	1	250	PL	A	☐ Y ~~☑ N~~
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	40	VOC	E	☐ Y ~~☑ N~~					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off ~~FED EX~~	DATE SHIPPED:	7/29/21	AIRBILL NUMBER:	N/A
COC NUMBER:	N/A	SIGNATURE:		DATE SIGNED:	7/29/21

REVISED 04/2019

TRC CEC Kern BAP/LF WATER SAMPLE LOG

PROJECT NAME: ~~CEC KARN LF 2021 GW SAMP~~	PREPARED		CHECKED	
PROJECT NUMBER: 418425.~~0000.0000~~ 0001	BY: JJASSO	DATE: draft	BY: SK	DATE: 8/2/21

SAMPLE ID: DEK-MW-15006 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1220	DATE: 7/28/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER	
DEPTH TO WATER:	8.00 T/ PVC	
DEPTH TO BOTTOM:	21.50 T/ PVC	
WELL VOLUME:	N/A ☐ LITERS ☐ GALLONS	
VOLUME REMOVED:	2.5 ☑ LITERS ☐ GALLONS	
COLOR:	Clear	ODOR: none
TURBIDITY	☐ NONE ☑ SLIGHT ☐ MODERATE ☐ VERY	
DISPOSAL METHOD:	☑ GROUND ☐ DRUM ☐ OTHER	

SAMPLE	TIME: 1245	DATE: 7/28/21
PH: 7.60 SU	CONDUCTIVITY: 1263 umhos/cm	
ORP: -124.1 mV	DO: 1.89 mg/L	
TURBIDITY: 6.95 NTU		
☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
TEMPERATURE: 15.1 °C	OTHER:	
COLOR: Clear	ODOR: non	
FILTRATE (0.45 um) ☒ YES ☐ NO		
FILTRATE COLOR: Clear ✓	FILTRATE ODOR: non	
QC SAMPLE: ☐ MS/MSD	☐ DUP-	
COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1220	100	7.61	1216	-106.9	9.0	7.0	19.9	8.01	INITIAL
1225		7.63	1273	-97.2	2.16	7.30	16.1	8.10	.5
1230		7.59	1277	-116.0	1.98	6.70	15.7	8.10	1
1235		7.60	1273	-123.8	1.90	7.00	15.5	8.10	1.5
1240		7.60	1266	-124.0	1.89	7.00	15.5	8.10	2
1245		7.60	1263	-124.5	1.89	6.95	15.5	8.10	2.5
									~~3~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 10 % ORP: +/- 10 % D.O.: +/- 10 % TURB: +/- 10 % or </= 5 TEMP.: +/- 0.5°C

BOTTLES FILLED — PRESERVATIVE CODES: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125 mL	VOA	A	☐ Y ☑ N	1	40	VOC	E	☒ Y ☐ N
1	125 mL	PLASTIC	A	☒ Y ☑ N	1	250	P1	A	☐ Y ☒ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	40	VOC	E	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop ~~FEDEX~~ off	DATE SHIPPED:	7/29/21	AIRBILL NUMBER:	N/A
COC NUMBER:	N/A	SIGNATURE:		DATE SIGNED:	7/29/21

PAGE _____ OF _____

TRC CEC Karn BAP/LF WATER SAMPLE LOG

PROJECT NAME: ~~CEC KARN LF 2021 GW COM~~	PREPARED		CHECKED	
PROJECT NUMBER: 418425.~~0000.0000~~ 0001	BY: JJASS0	DATE: 7/29/21	BY: JK	DATE: 8/2/21

SAMPLE ID: DEKMW 15004	WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER
WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER	
SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER	

PURGING	TIME: 1318	DATE: 7/28/21	SAMPLE	TIME: 1338	DATE: 7/28/21
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.33 SU	CONDUCTIVITY: 880 umhos/cm	
			ORP: -120.2 mV	DO: 2.09 mg/L	
DEPTH TO WATER: 3763 T/ PVC			TURBIDITY: 1.95 NTU		
DEPTH TO BOTTOM: 4140 T/ PVC			☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS			TEMPERATURE: 16.7 °C	OTHER:	
VOLUME REMOVED: 2 ☑ LITERS ☐ GALLONS			COLOR: Clear	ODOR: NOK	
COLOR: Cloudy	ODOR: NOK		FILTRATE (0.45 um) ☒ YES ☐ NO		
TURBIDITY ☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY			FILTRATE COLOR: Clear	FILTRATE ODOR: NOK	
			QC SAMPLE: ☐ MS/MSD ☐ DUP-		
DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER			COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1318	104	7.59	448	-52.9	8.35	4.50	20.9	27.80	INITIAL
1323		7.26	884	-104.0	2.39	4.60	16.9	28.00	.5
1328		7.33	883	-120.0	2.10	2.0	16.8	28.00	1
1333		7.33	881	-120.3	2.08	2.0	16.7	28.00	1.5
1338		7.33	880	-120.2	2.09	1.95	16.7	28.00	2
									~~2.5~~
									~~3~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 10 % ORP: +/- 10 % D.O.: +/- 10 % TURB: +/- 10 % or </= 5 TEMP.: +/- 0.5°C

BOTTLES FILLED — PRESERVATIVE CODES: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125 mL	VOA	A	☐ Y ☑ N	1	40	VOC	E	~~☑~~ Y ☐ N
1	125 mL	PLASTIC	A	~~☑~~ Y ☑ N	1	250	P1	A	☐ Y ~~☑~~ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	40	VOC	E	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD: ~~FED EX~~	DATE SHIPPED: 7/29/21	AIRBILL NUMBER: N/A
COC NUMBER: N/A	SIGNATURE:	DATE SIGNED: 7/29/21

REVISED 04/2019

TRC WATER SAMPLE LOG

CEC Kern BAP/LF

PROJECT NAME: ~~CEC-KARN-LF-2021-GW/COM~~	PREPARED	CHECKED
PROJECT NUMBER: 418425.~~0000.0000~~ 10001	BY: JJASSO DATE: 7/29/21	BY: JK DATE: 8/2/21

SAMPLE ID: JEK-15003 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER _____

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER _____

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER _____

PURGING	TIME: 1316	DATE: 7/27/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER _____

DEPTH TO WATER: 16.30 T/ PVC

DEPTH TO BOTTOM: 27.87 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 2.5 ☑ LITERS ☐ GALLONS

COLOR: Clear ODOR: NOR

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1341	DATE: 7/27/21

PH: 8.37 SU CONDUCTIVITY: 459 umhos/cm

ORP: -96.3 mV DO: 1.97 mg/L

TURBIDITY: 1.98 NTU

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 19.1 °C OTHER: _____

COLOR: Clear ODOR: none

FILTRATE (0.45 um) ☑ YES ☐ NO

FILTRATE COLOR: Clear FILTRATE ODOR: none

QC SAMPLE: ☐ MS/MSD ☐ DUP- _____

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1316	100	8.12	556	-49.5	7.25	5.50	24.0	16.36	INITIAL
1321		8.37	461	-83.0	2.44	2.96	19.7	17.26	.5
1326		8.40	456	-87.0	2.00	3.0	19.4	17.90	1
1331		8.37	457	-95.8	1.95	2.00	19.6	18.05	1.5
1336		8.37	459	-96.1	1.97	1.99	19.5	18.12	2
1341		8.37	459	-96.3	1.97	1.98	19.5	18.21	2.5
									3

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **10 %** ORP: +/- **10 %** D.O.: +/- **10 %** TURB: +/- **10 %** or **</= 5** TEMP.: +/- **0.5°C**

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125 mL	VOA	A	☐ Y ☑ N	1	40	VOC	E	~~☑~~ Y ~~☑~~ N
1	125 mL	PLASTIC	A	☑ Y ☑ N	1	40	VOC	E	~~☑~~ Y ~~☑~~ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	250	PL	A	☐ Y ~~☑~~ N					☐ Y ☐ N

SHIPPING METHOD: ~~FED EX~~ LAB DROP OFF	DATE SHIPPED: 7/28/21	AIRBILL NUMBER: N/A
COC NUMBER: N/A	SIGNATURE:	DATE SIGNED: 7/29/21

TRC WATER SAMPLE LOG

CEC Karn BAP/LI

PROJECT NAME: ~~CEC KARN LF 2021 GW OGM~~	PREPARED		CHECKED	
PROJECT NUMBER: 418425.~~0000.0000~~ .00001	BY: JJASSO	DATE: 7/28/21	BY: JK	DATE: 8-2-21

SAMPLE ID: DEKMW18001	WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER
WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER	
SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER	

PURGING	TIME: 1400	DATE: 7/27/21	SAMPLE	TIME: 1430	DATE: 7/27/21
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.50 SU	CONDUCTIVITY: 821 umhos/cm	
			ORP: -109.1 mV	DO: 1.91 mg/L	
DEPTH TO WATER: 6.23 T/ PVC			TURBIDITY: 1.59 NTU		
DEPTH TO BOTTOM: 19.61 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS			TEMPERATURE: 14.8 °C	OTHER:	
VOLUME REMOVED: 3 ☑ LITERS ☐ GALLONS			COLOR: Clear	ODOR: non	
COLOR: Clear	ODOR: non		FILTRATE (0.45 um) ☒ YES ☐ NO		
TURBIDITY			FILTRATE COLOR: Clear	FILTRATE ODOR: non	
☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☑ MS/MSD ☐ DUP-		
DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER			COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1400	100	7.73	849	-69.7	7.46	17.0	22.9	8.31	INITIAL
1405		7.43	842	-112.0	2.26	5.60	14.1	8.50	.1
1410		7.47	831	-107.6	2.04	3.64	14.2	8.50	1
1415		7.49	827	-107.4	1.99	2.00	14.1	8.50	1.1
1420		7.50	824	-108.5	1.96	1.67	14.9	8.50	2
1425		7.50	823	-109.0	1.96	1.57	14.8	8.50	2.1
1430		7.50	821	-109.1	1.95	1.59	14.8	8.50	3

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **10 %** ORP: +/- **10 %** D.O.: +/- **10 %** TURB: +/- **10 %** or **</= 5** TEMP.: +/- **0.5°C**

BOTTLES FILLED		PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____							
NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
6	125 mL	VOA	A	☐ Y ☑ N	1	40	VOC	HF	☐ Y ☒ N
3	125 mL	PLASTIC	A	☑ Y ☑ N	1	40	VOC	E	☑ Y ☐ N
3	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	250	OI	A	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD: ~~hand drop~~ ~~FED EX~~	DATE SHIPPED: 7/28/21	AIRBILL NUMBER: N/A
COC NUMBER: N/A	SIGNATURE:	DATE SIGNED: 7/29/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Comp	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0000.0000	BY: DD, JJ, JK	DATE: 7-28-21	BY: JC	DATE: 8/2/21

SAMPLE ID: DEK-MW-15002 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1355	DATE: 7-28-21	SAMPLE	TIME: 1430	DATE: 7-28-21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 6.22 T/ PVC

DEPTH TO BOTTOM: 16.74 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 7 ☑ LITERS ☐ GALLONS

COLOR: None ODOR: None

TURBIDITY: ☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 7.42 SU | CONDUCTIVITY: 1026 umhos/cm

ORP: -52.9 mV | DO: 0.10 mg/L

TURBIDITY: 8.04 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 13.7 °C | OTHER:

COLOR: None | ODOR: None

FILTRATE (0.45 um) ☑ YES ☐ NO

FILTRATE COLOR: None | FILTRATE ODOR: None

QC SAMPLE: ☐ MS/MSD ☑ DUP- DEK-BAP

COMMENTS: FB collected Here

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C) DEK	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1355	200	7.52	1089	25.5	0.17	12.56	14.1	6.22	INITIAL
1400		7.40	1082	4.1	0.10	12.15	14.1	6.45	1
1405		7.39	1080	-16.2	0.09	8.84	14.0	6.45	2
1410		7.40	1071	-32.8	0.05	6.84	13.9	6.45	3
1415		7.40	1062	-38.8	0.07	7.53	13.9	6.45	4
1420		7.41	1054	-46.9	0.05	7.84	13.8	6.45	5
1425		7.41	1042	-50.3	0.08	8.70	13.8	6.45	6
1430		7.42	1026	-52.9	0.10	8.04	13.7	6.45	7

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
~~2~~ 4	60mL	VOA	A	☐ Y ☑ N	2	250mL	Plastic	~~D~~ A	☐ Y ☑ N
~~2~~ 2	40mL	VOA	E	☐ Y ☑ N					☐ Y ☐ N
2	40mL	VOA	E	☑ Y ☐ N					☐ Y ☐ N
2	125mL	Plastic	B	☐ Y ☑ N					☐ Y ☐ N
2	125mL	Plastic	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	7/29/21	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:	David Dewey	DATE SIGNED:	7-29-21

Appendix C
Data Quality Reviews

Laboratory Data Quality Review
Groundwater Monitoring Event July 2021
DE Karn Bottom Ash Pond and Lined Impoundment

Groundwater samples were collected by TRC for the July 2021 sampling event. Samples were analyzed for total metals, anions, total dissolved solids, and alkalinity by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery groups (SDGs) 21-0879.

During the July 2021 sampling event, a groundwater sample was collected from each of the following wells:

- DEK-MW-15003
- DEK-MW-18001

Each sample was analyzed for one or more of 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
Alkalinity (Bicarbonate, Carbonate, and Total)	SM 2320B

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. 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, TDS, and alkalinity 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, and additional Part 115 constituents 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, and alkalinity. The recoveries were within the acceptance limits. Relative percent differences (RPDs) were not provided by the laboratory and therefore were not evaluated; further, 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 a sample from this data set.

Laboratory Data Quality Review
Groundwater Monitoring Event July 2021
DE Karn Lined Impoundment

Groundwater, water, and surface water samples were collected by TRC for the July 2021 sampling event. Samples were analyzed for total metals, anions, total dissolved solids, and alkalinity by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery groups (SDGs) 21-0880.

During the July 2021 sampling event, a groundwater sample was collected from each of the following wells:

- OW-10
- OW-11
- OW-12

During the July 2021 sampling event, the following water/surface water samples were collected:

- KLI-SCS
- KLI-PCS
- SW-DITCH

Each sample was analyzed for one or more of 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
Alkalinity (Bicarbonate, Carbonate, and Total)	SM 2320B

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, TDS, and alkalinity 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, and additional Part 115 constituents will be utilized for the purposes of the detection monitoring program.
- Data are usable for the purposes of the detection monitoring program.
- When the data are evaluated through a detection or monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- One field blank (FB-KLI) and one equipment blank (EB-KLI) sample were collected. Total metals were not detected in these blanks.
- The field duplicate pair samples were DUP-KLI and OW-12; relative percent differences (RPDs) between the parent and duplicate sample were within the QC limits with the exception of antimony which was detected at 7 ug/L in DUP-KLI and was nondetect in sample OW-12. The RPD for antimony was not calculable in this sample but the absolute difference of the results was > the reporting limit. Potential uncertainty exists for positive and nondetect results for antimony in all groundwater samples, as summarized in Attachment 1.
- Laboratory duplicate analyses were not performed on a sample from this data set.

Attachment 1
Summary of Data Non-Conformances for Groundwater Analytical Data
DE Karn Lined Impoundment – RCRA CCR Monitoring Program
Erie, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
OW-10	7/27/2021	Antimony	Field duplicate variability; potential uncertainty exists.
OW-11	7/27/2021		
OW-12	7/27/2021		
DUP-KLI	7/27/2021		

Appendix D
Statistical Analysis

Appendix D
Statistical Summary for DE Karn Lined Impoundment
Third Quarter 2021
Data from October 2019 to July 2021

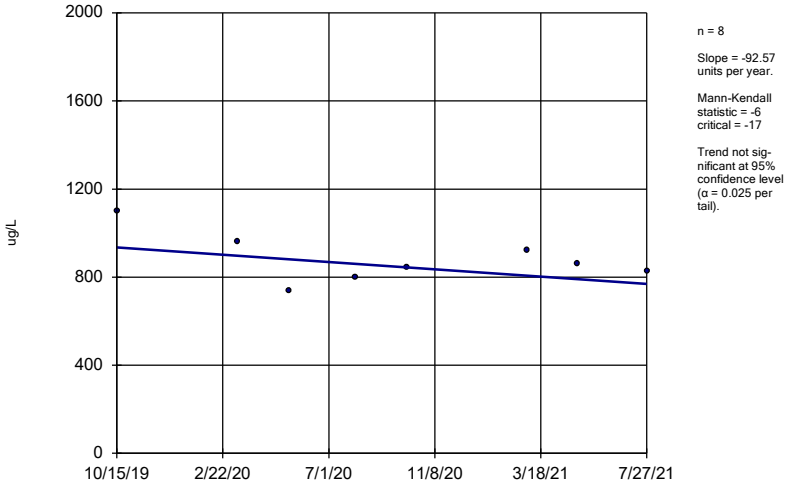
Karn Lined Impoundment Wells						
PARAMETER	**Range, Test, or Limit**	**DEK-MW-15003**	**DEK-MW-18001**	**OW-10**	**OW-11**	**OW-12**
Boron	Trend	O	↓	O	↑ ASD	O
Calcium	Trend	↓	↓	↑ ASD	↓	↓
Chloride	Trend	O	↓	O	O	O
Fluoride	Trend	O*	O	O*	O	O*
Iron	Trend	O	O	O	O	O
pH	Trend	O	O	O	↑	O
Sulfate	Trend	O	↑ ASD	O	O	↓
Total Dissolved Solids	Trend	O	O	O	↓	↓

Notes:

O* = Non-detect
O = No trend
↑ = Upward trend, continuous
↑* = Upward trend, new
↑ = Upward trend, confirmed
↓ = Downward trend, continuous
↓* = Downward trend, new
↑ ASD = Alternate Source Demonstration (Second Quarter 2021 Hydrogeological Monitoring Report for the Karn Lined Impoundment CCR Unit, TRC, July 2021.)

Boron, Total

DEK-MW-15003



n = 8

Slope = -92.57 units per year.

Mann-Kendall statistic = -6
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

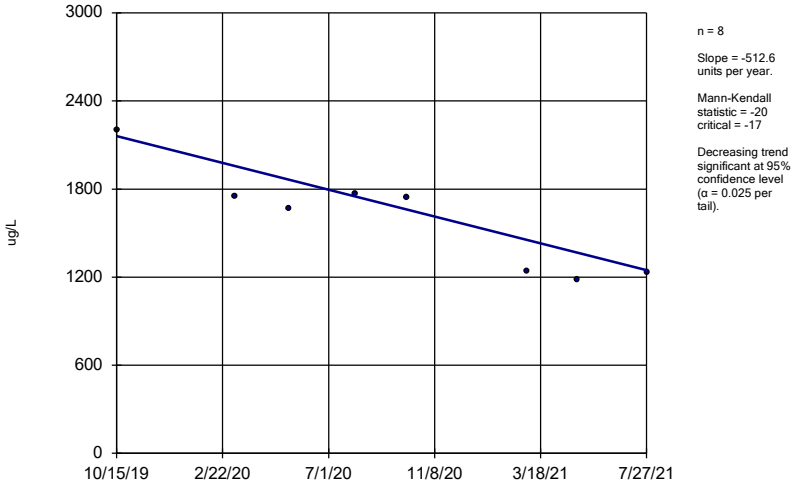
Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG

Boron, Total

DEK-MW-18001



n = 8

Slope = -512.6 units per year.

Mann-Kendall statistic = -20
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

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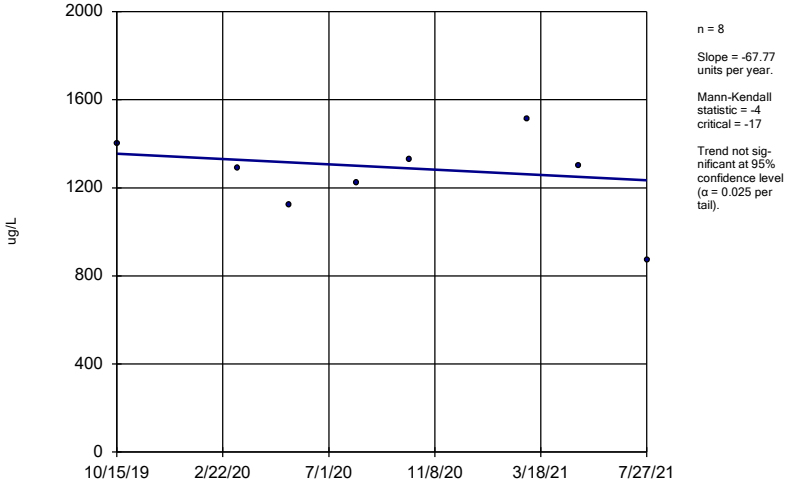
Boron, Total

OW-10



n = 8

Slope = -67.77 units per year.

Mann-Kendall statistic = -4
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

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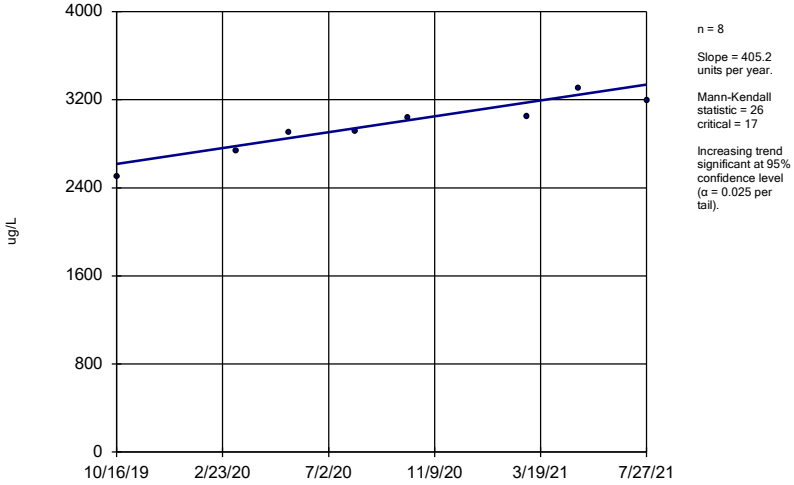
Boron, Total

OW-11



n = 8

Slope = 405.2 units per year.

Mann-Kendall statistic = 26
critical = 17

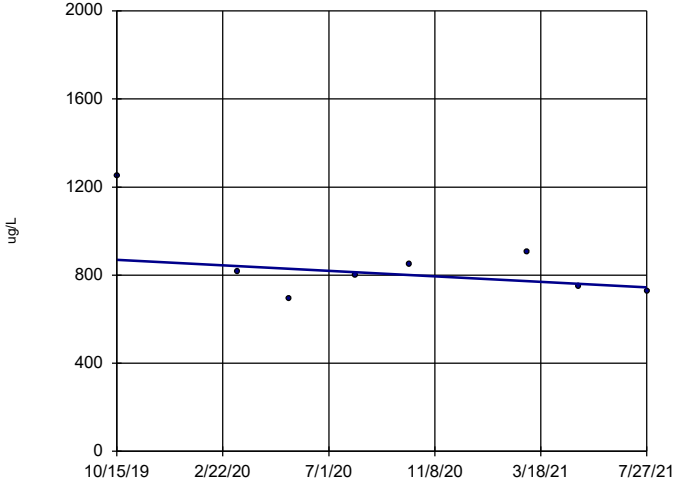
Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Boron, Total

OW-12



n = 8

Slope = -69.42 units per year.

Mann-Kendall statistic = -8 critical = -17

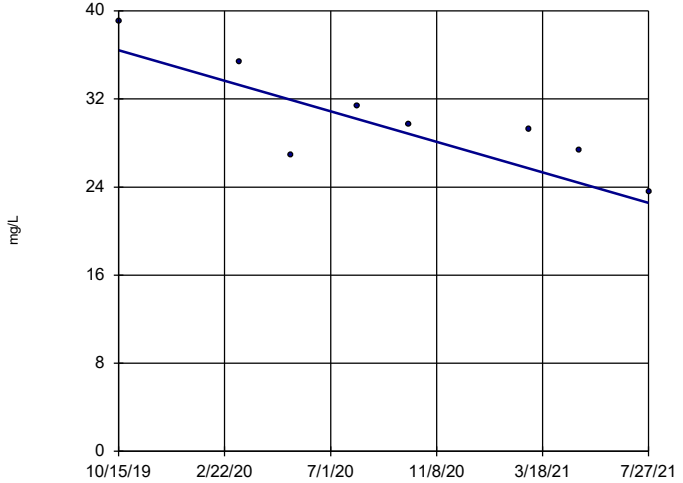
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Calcium, Total

DEK-MW-15003



n = 8

Slope = -7.763 units per year.

Mann-Kendall statistic = -20 critical = -17

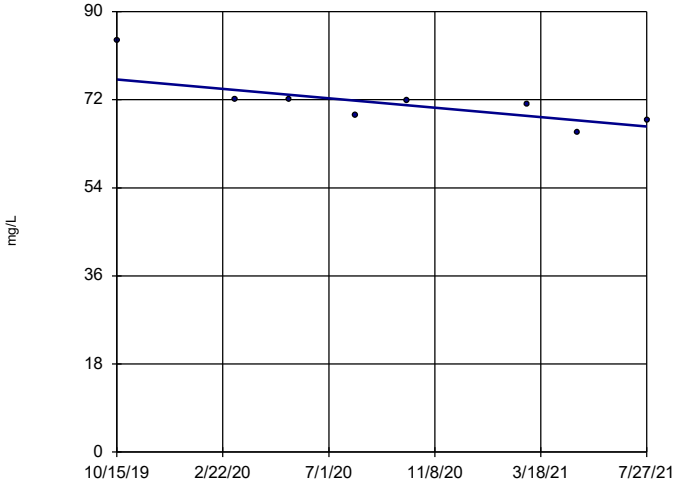
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Calcium, Total

DEK-MW-18001



n = 8

Slope = -5.401 units per year.

Mann-Kendall statistic = -22 critical = -17

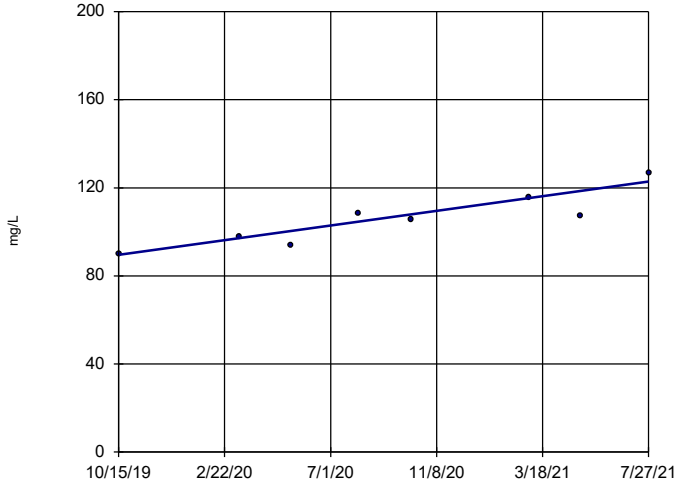
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Calcium, Total

OW-10



n = 8

Slope = 18.61 units per year.

Mann-Kendall statistic = 20 critical = 17

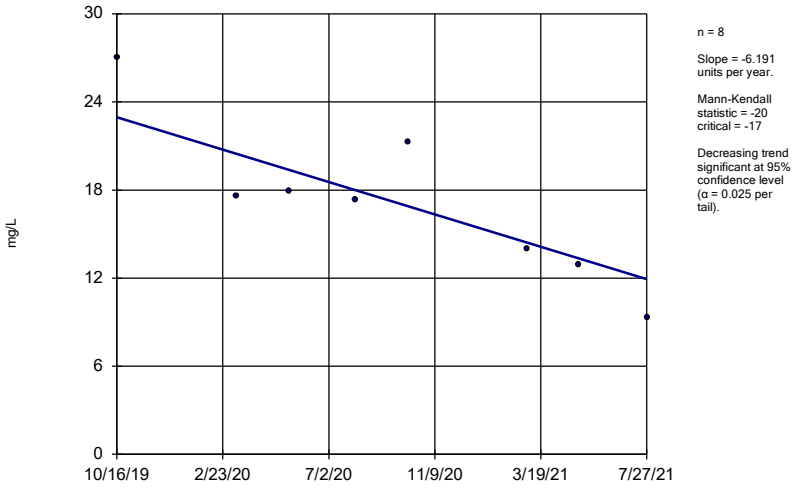
Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Calcium, Total

OW-11



n = 8

Slope = -6.191 units per year.

Mann-Kendall statistic = -20 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

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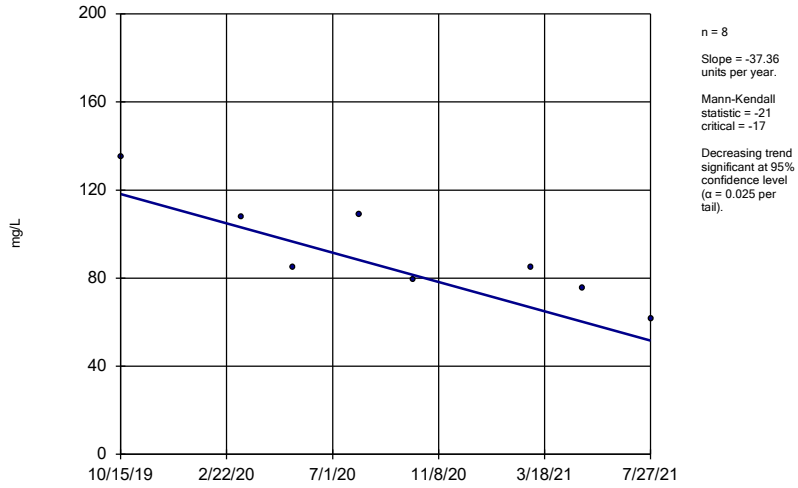
Calcium, Total

OW-12



n = 8

Slope = -37.36 units per year.

Mann-Kendall statistic = -21 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

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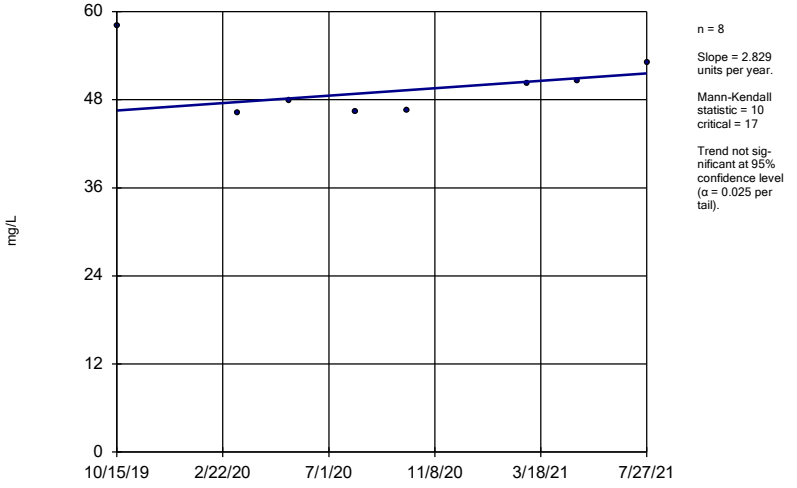
Chloride

DEK-MW-15003



n = 8

Slope = 2.829 units per year.

Mann-Kendall statistic = 10 critical = 17

Trend not sig-nificant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

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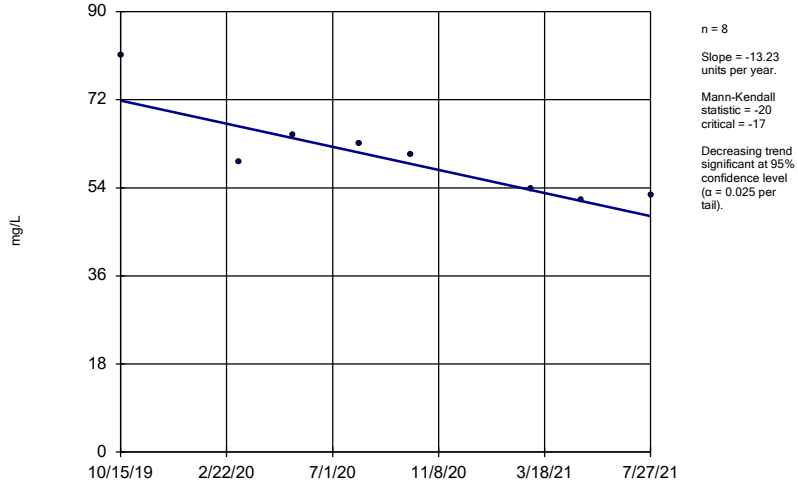
Chloride

DEK-MW-18001



n = 8

Slope = -13.23 units per year.

Mann-Kendall statistic = -20 critical = -17

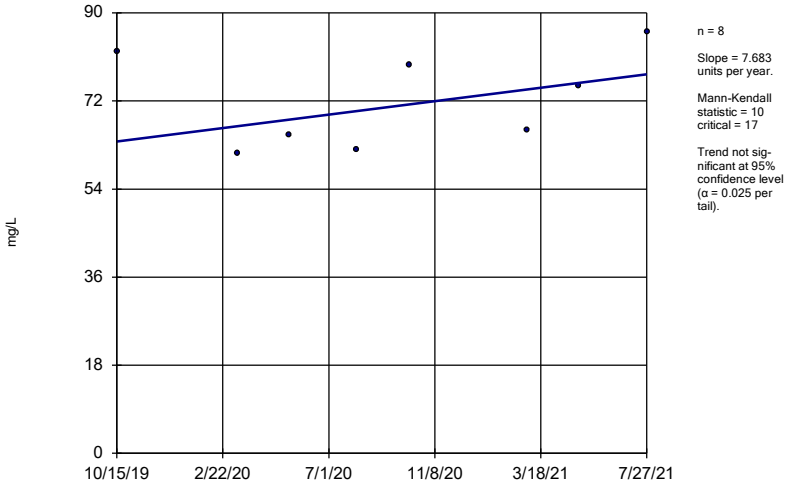
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Chloride

OW-10



n = 8

Slope = 7.683 units per year.

Mann-Kendall statistic = 10 critical = 17

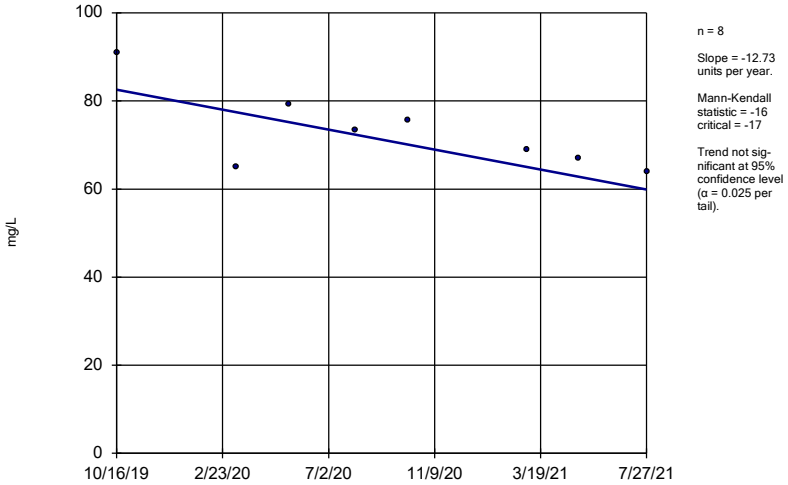
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Chloride

OW-11



n = 8

Slope = -12.73 units per year.

Mann-Kendall statistic = -16 critical = -17

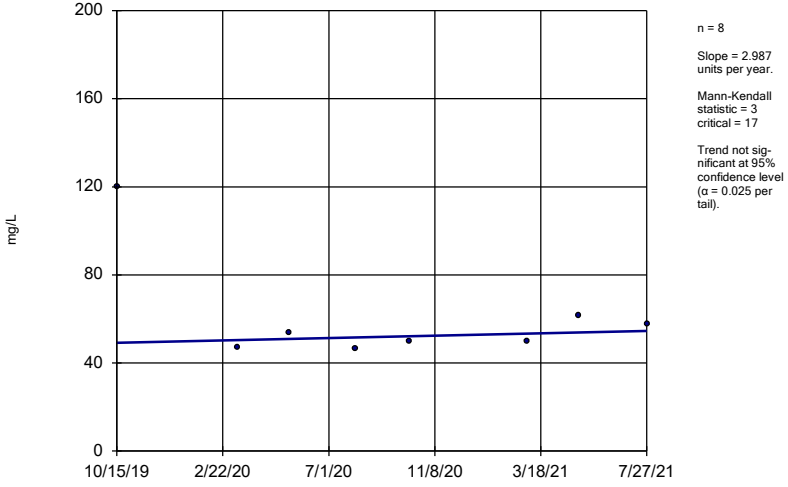
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Chloride

OW-12



n = 8

Slope = 2.987 units per year.

Mann-Kendall statistic = 3 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

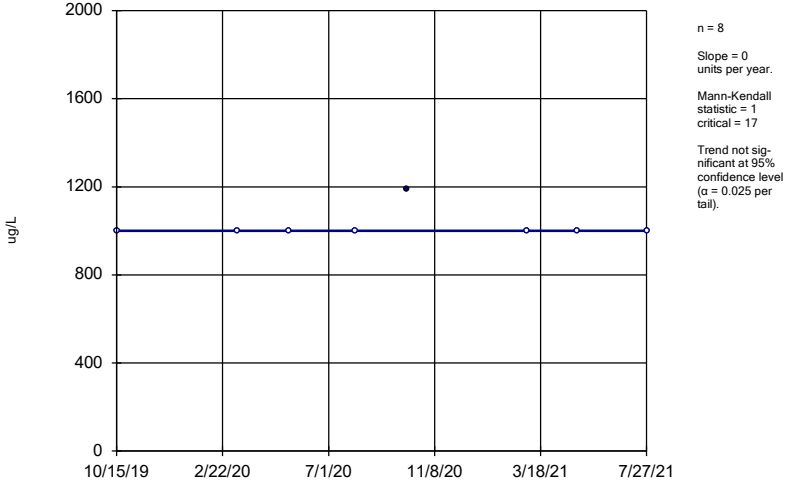
Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Hollow symbols indicate censored values.

Fluoride

DEK-MW-15003



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 1 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

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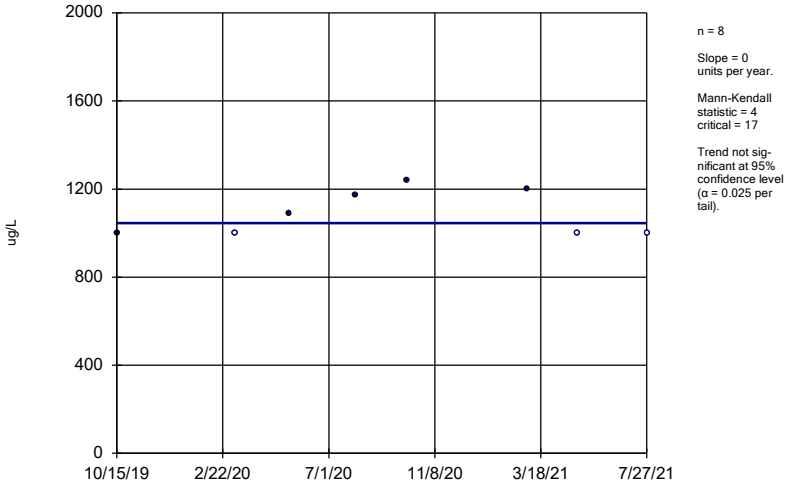
Hollow symbols indicate censored values.

Fluoride

DEK-MW-18001



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 4 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

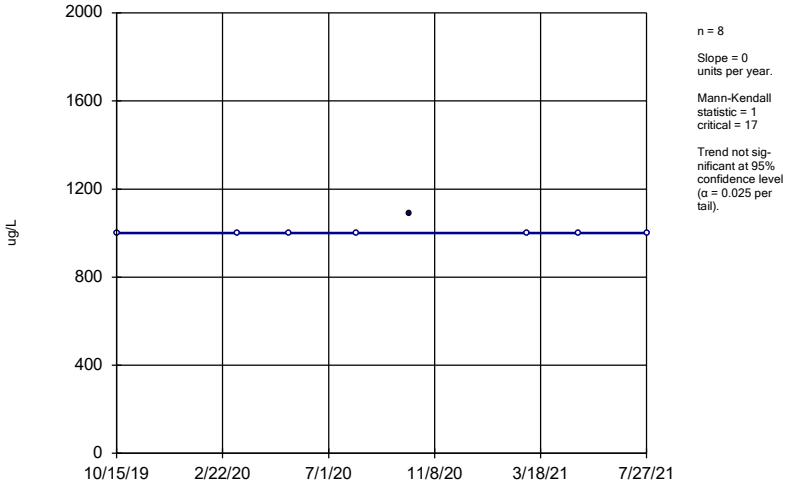
Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Fluoride

OW-10



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 1 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

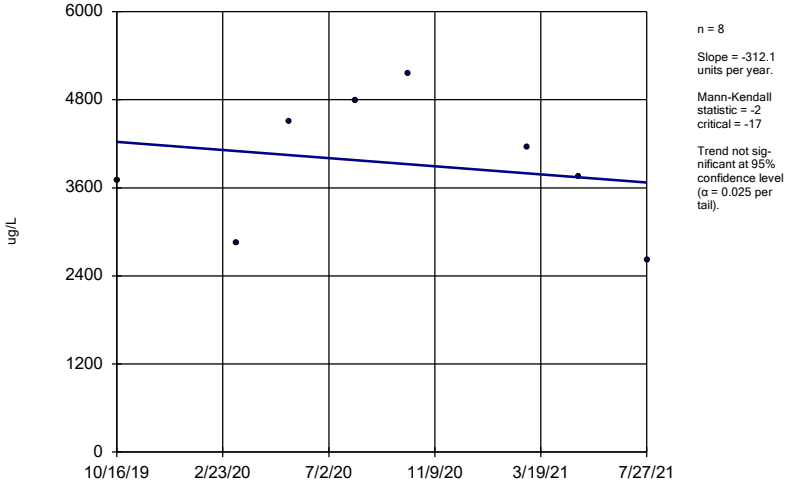
Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG

Fluoride

OW-11



n = 8

Slope = -312.1 units per year.

Mann-Kendall statistic = -2 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

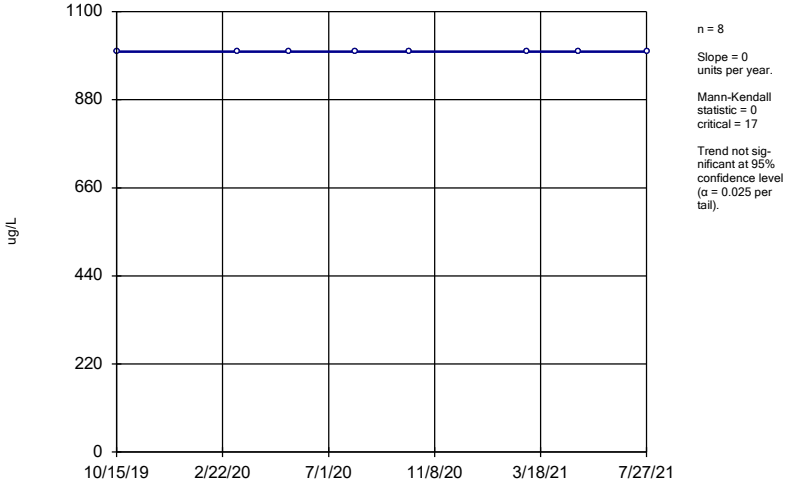
Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Fluoride

OW-12



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

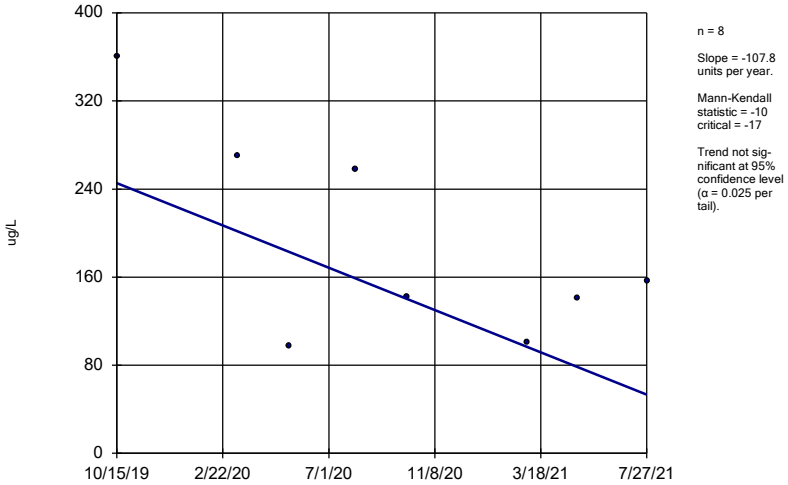
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Iron, Total

DEK-MW-15003



n = 8

Slope = -107.8 units per year.

Mann-Kendall statistic = -10 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

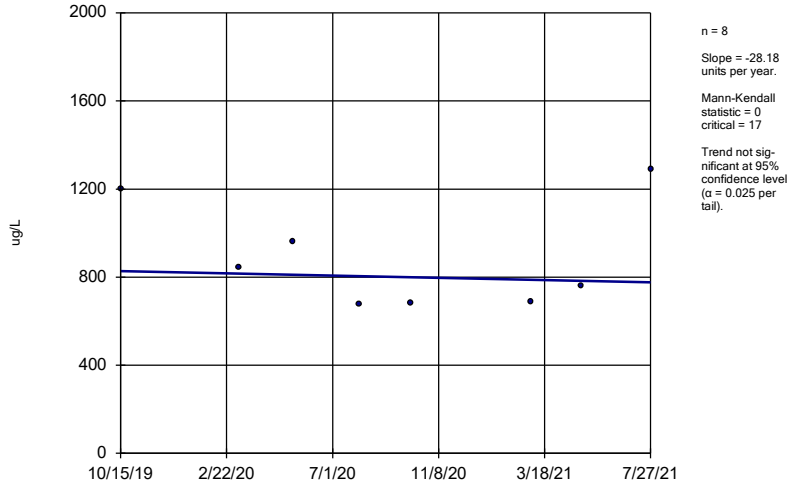
Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG

Iron, Total

DEK-MW-18001



n = 8

Slope = -28.18 units per year.

Mann-Kendall statistic = 0 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

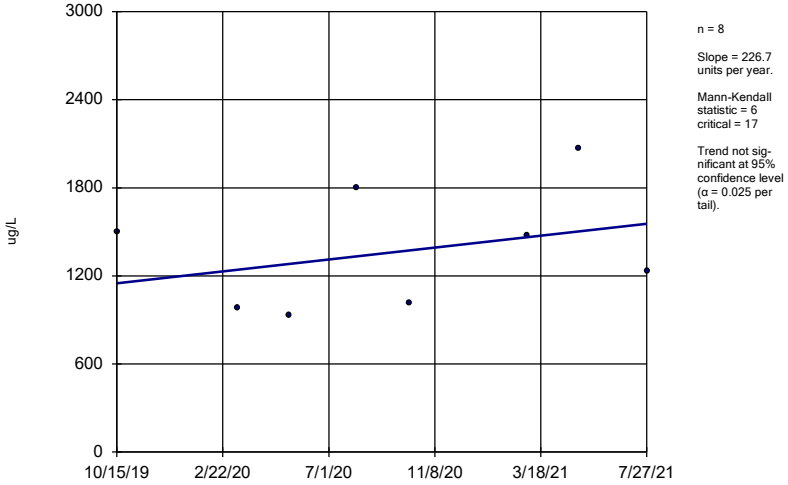
Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG

Iron, Total

OW-10



n = 8

Slope = 226.7 units per year.

Mann-Kendall statistic = 6 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

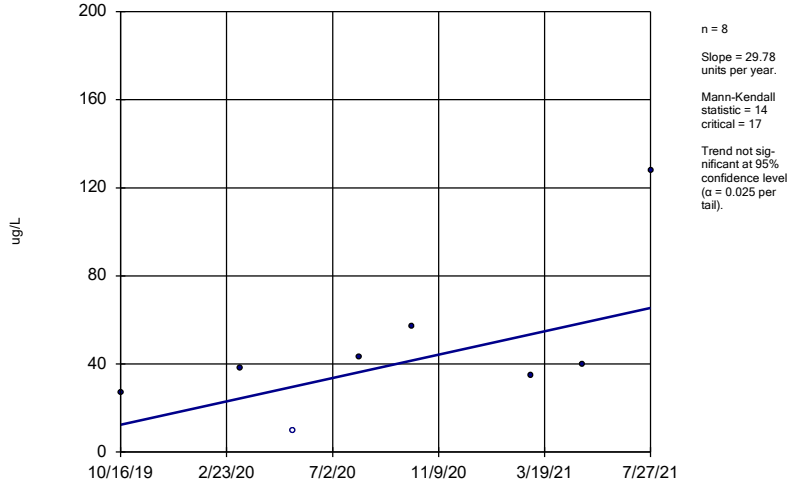
Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG

Hollow symbols indicate censored values.

Iron, Total

OW-11



n = 8

Slope = 29.78 units per year.

Mann-Kendall statistic = 14 critical = 17

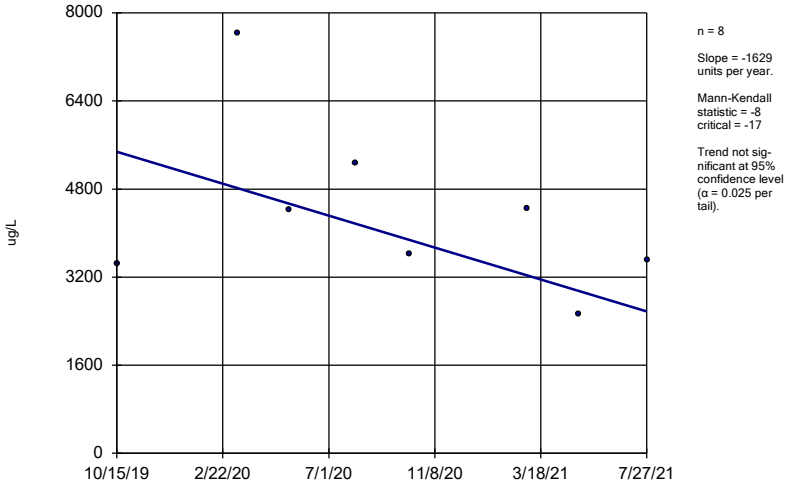
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Iron, Total

OW-12



n = 8

Slope = -1629 units per year.

Mann-Kendall statistic = -8 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

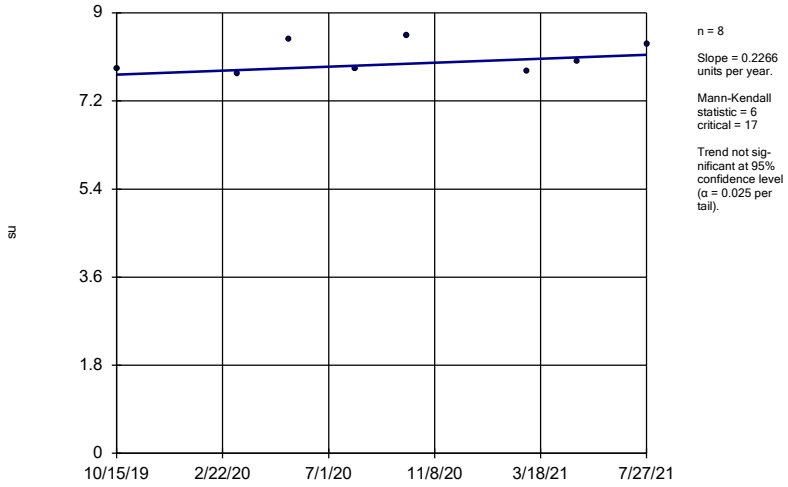
Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG

pH, Field

DEK-MW-15003



n = 8

Slope = 0.2266 units per year.

Mann-Kendall statistic = 6 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

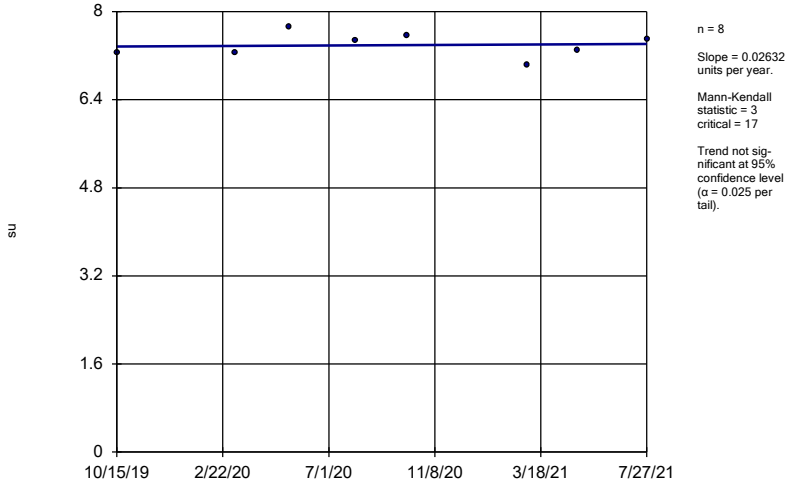
Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG

pH, Field

DEK-MW-18001



n = 8

Slope = 0.02632 units per year.

Mann-Kendall statistic = 3 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

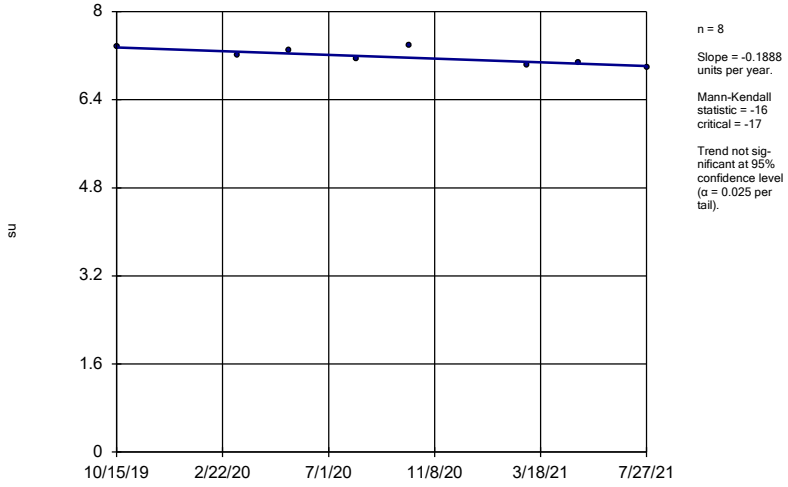
Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG

pH, Field

OW-10



n = 8

Slope = -0.1888 units per year.

Mann-Kendall statistic = -16 critical = -17

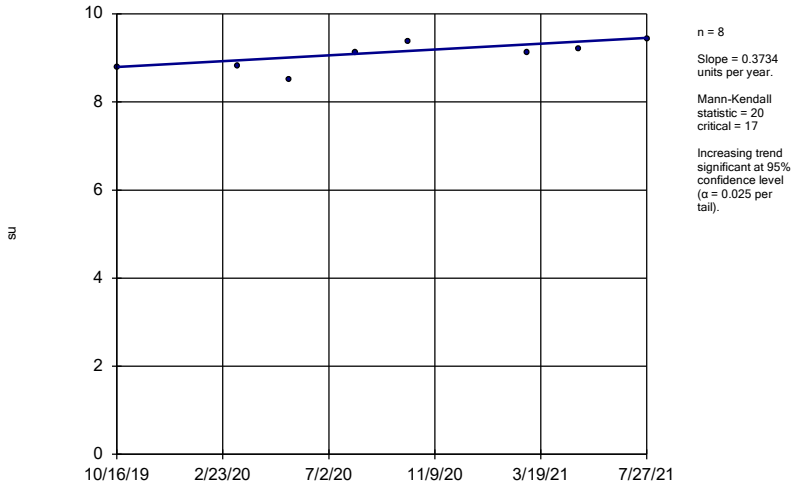
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

pH, Field

OW-11



n = 8

Slope = 0.3734 units per year.

Mann-Kendall statistic = 20
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

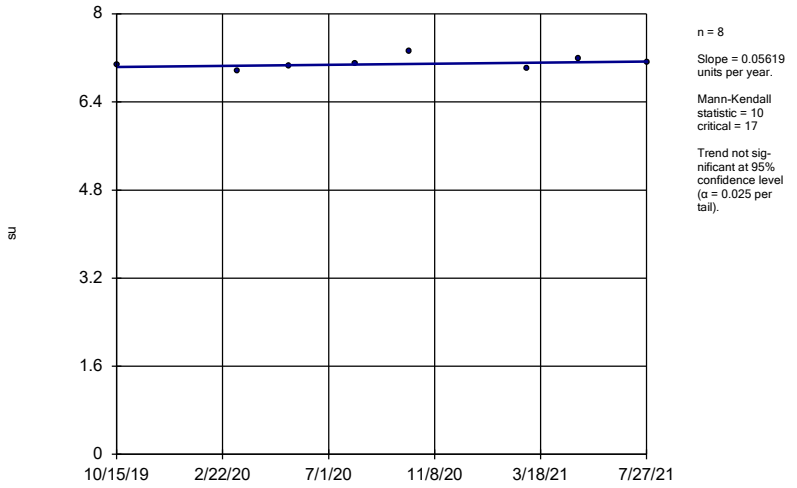
Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG

pH, Field

OW-12



n = 8

Slope = 0.05619 units per year.

Mann-Kendall statistic = 10
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

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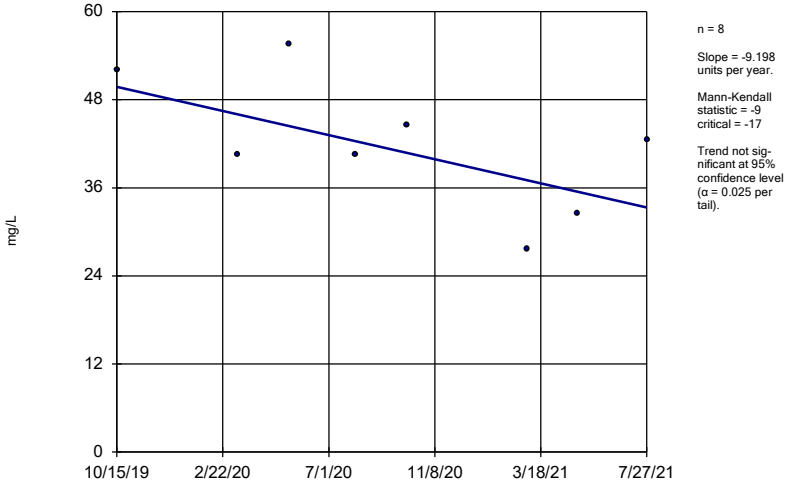
Sulfate

DEK-MW-15003



n = 8

Slope = -9.198 units per year.

Mann-Kendall statistic = -9
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

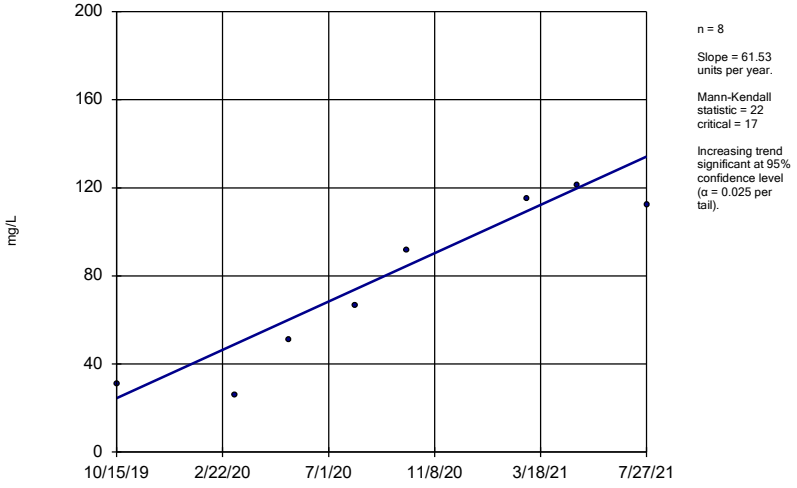
Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG

Sulfate

DEK-MW-18001



n = 8

Slope = 61.53 units per year.

Mann-Kendall statistic = 22
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

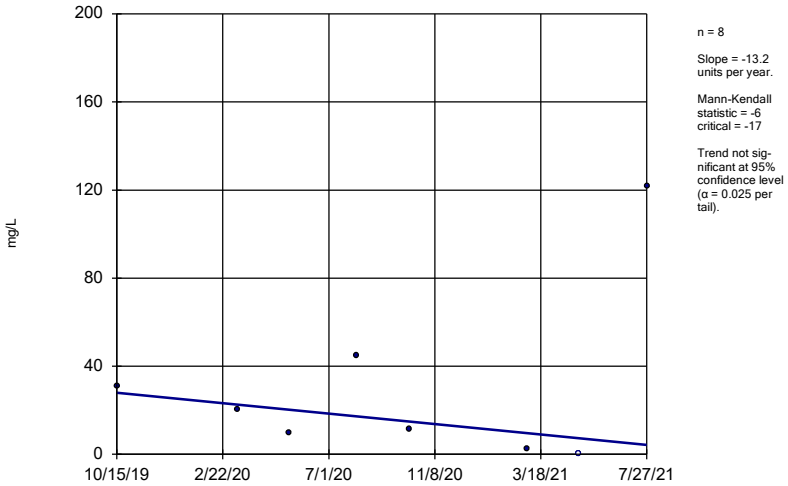
Sen's Slope Estimator Analysis Run 9/16/2021 1:30 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Hollow symbols indicate censored values.

Sulfate

OW-10



n = 8

Slope = -13.2 units per year.

Mann-Kendall statistic = -6
critical = -17

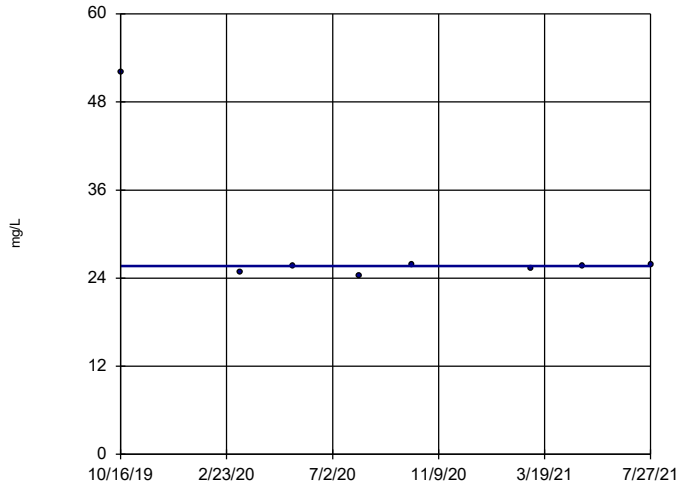
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:31 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sulfate

OW-11



n = 8

Slope = -0.009837 units per year.

Mann-Kendall statistic = 0
critical = 17

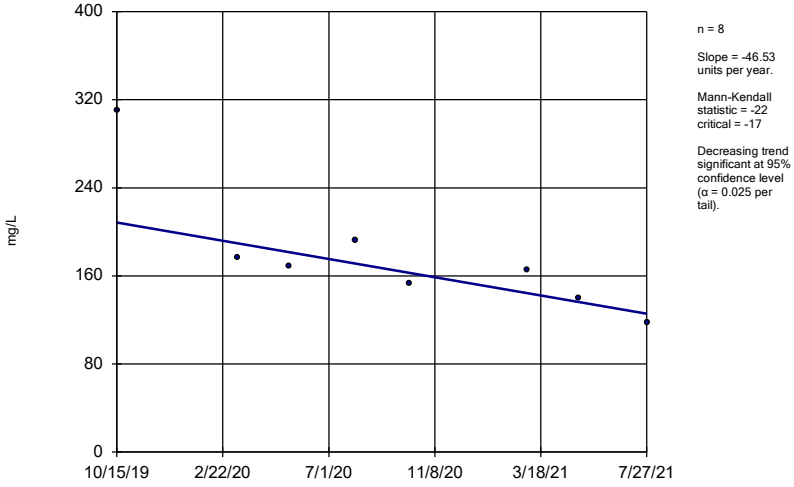
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:31 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sulfate

OW-12



n = 8

Slope = -46.53 units per year.

Mann-Kendall statistic = -22
critical = -17

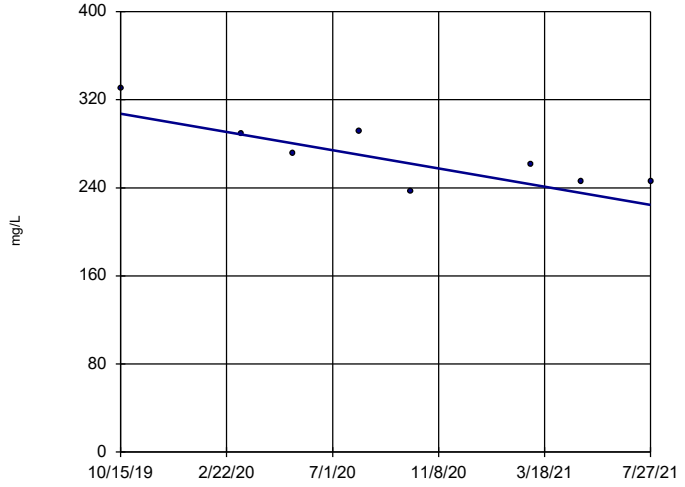
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:31 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Total Dissolved Solids

DEK-MW-15003



n = 8

Slope = -46.49 units per year.

Mann-Kendall statistic = -17
critical = -17

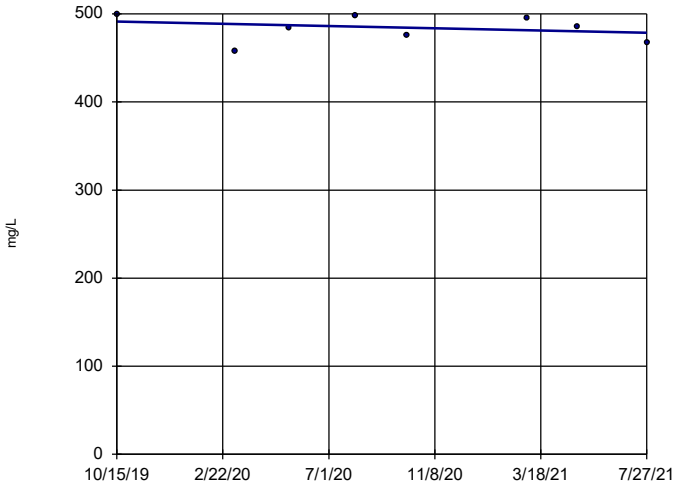
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:31 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Total Dissolved Solids

DEK-MW-18001



n = 8

Slope = -7.109 units per year.

Mann-Kendall statistic = -6
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/16/2021 1:31 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

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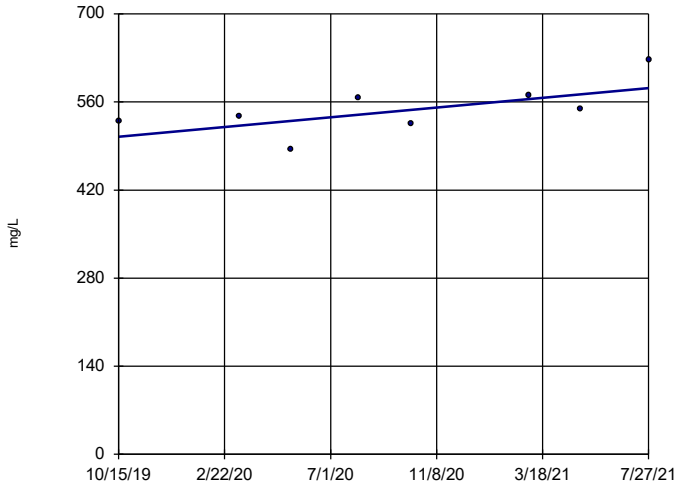
Total Dissolved Solids

OW-10



n = 8

Slope = 43.15 units per year.

Mann-Kendall statistic = 14
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

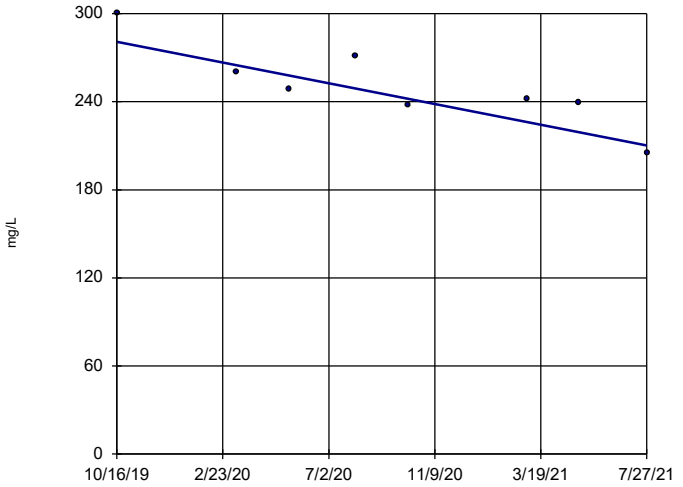
Sen's Slope Estimator Analysis Run 9/16/2021 1:31 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

OW-11



n = 8

Slope = -39.62 units per year.

Mann-Kendall statistic = -20
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

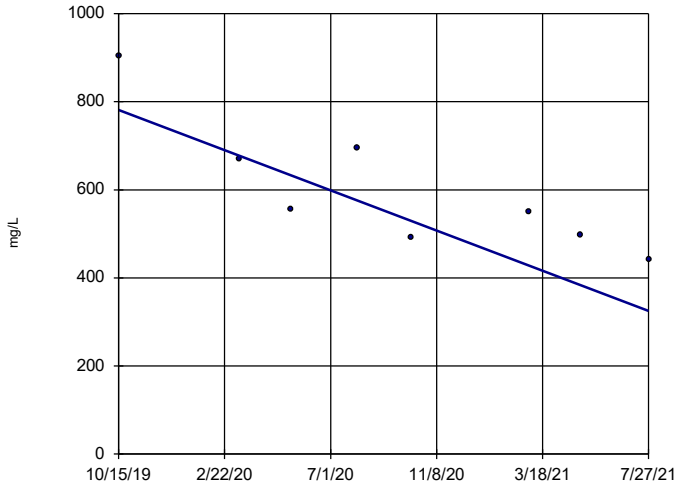
Sen's Slope Estimator Analysis Run 9/16/2021 1:31 PM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

OW-12



n = 8

Slope = -256.1 units per year.

Mann-Kendall statistic = -20
critical = -17

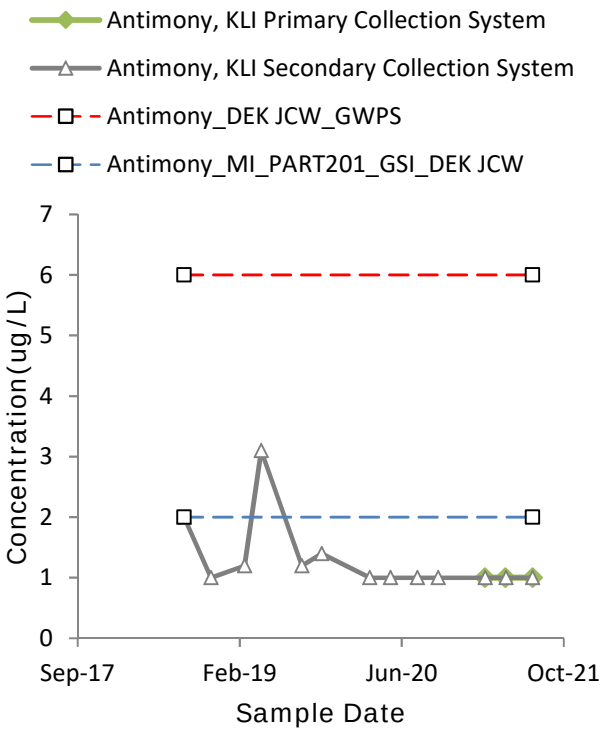
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

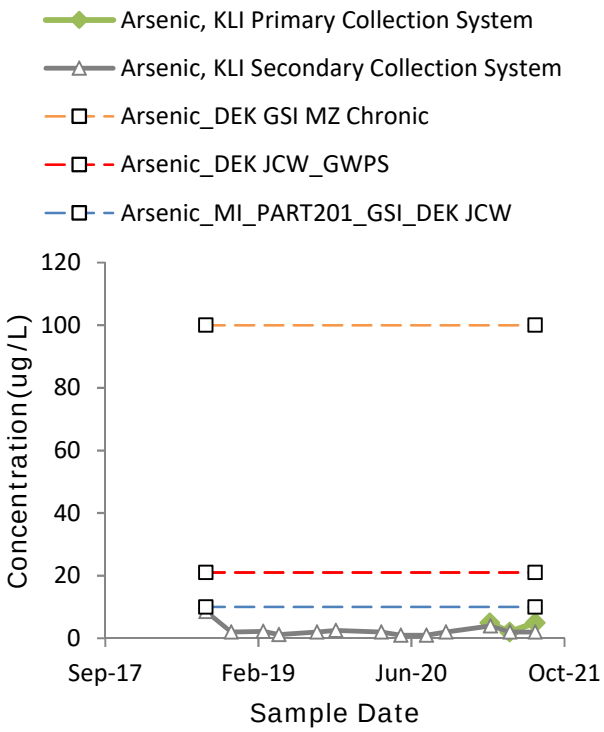
Sen's Slope Estimator Analysis Run 9/16/2021 1:31 PM

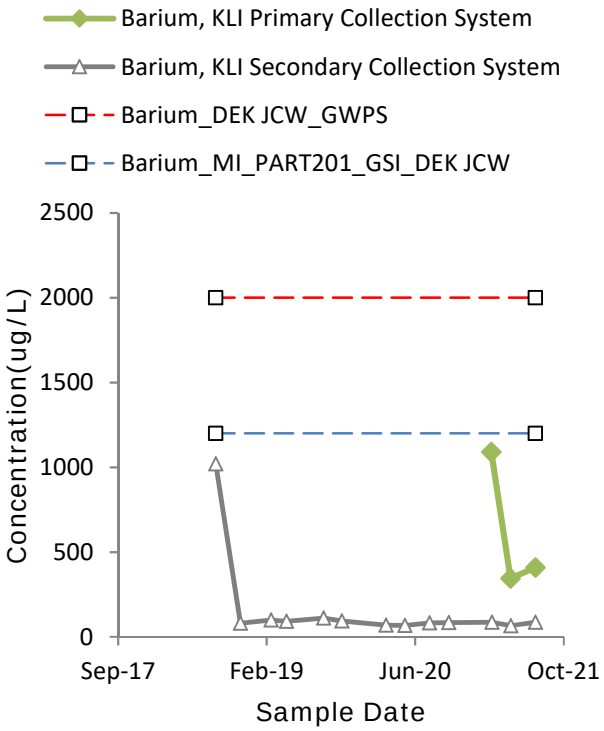
Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q3

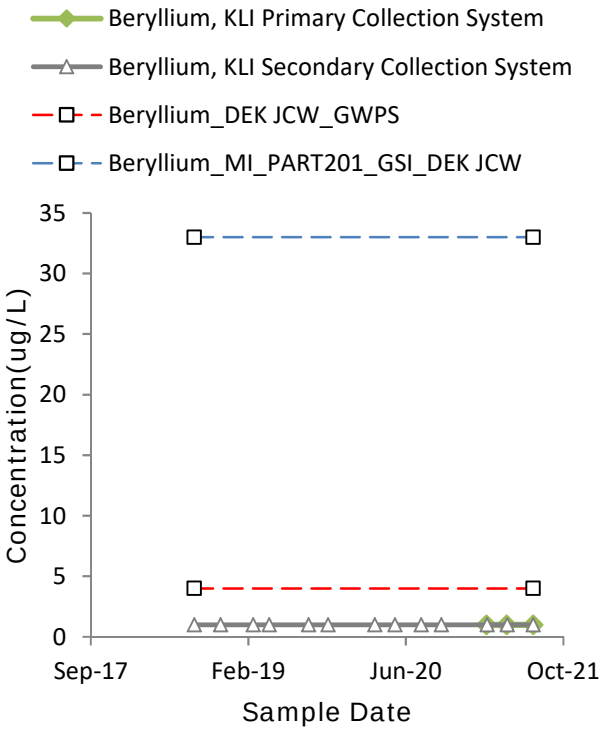
Appendix E
Secondary Leachate Collection System Monitoring

Water Quality Time Series

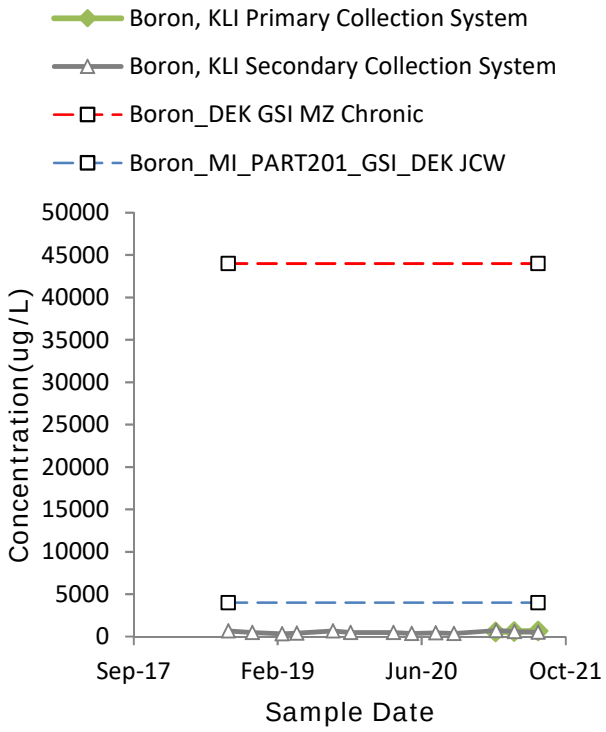


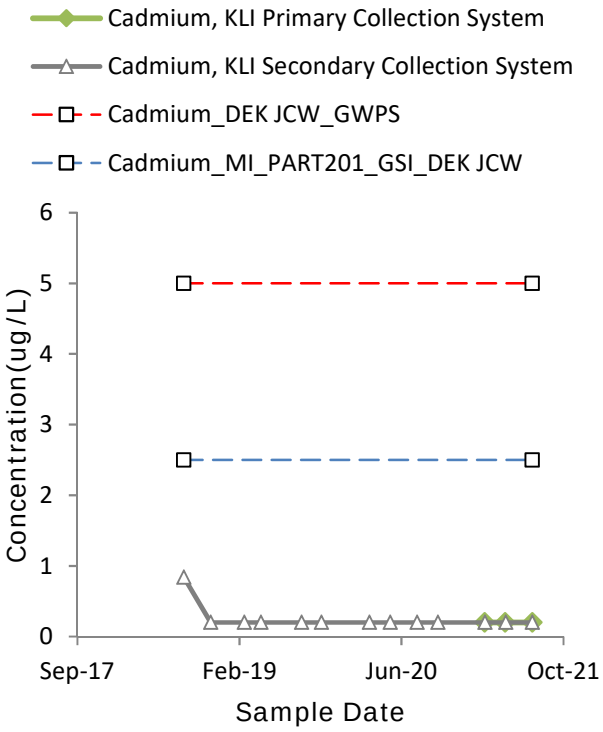


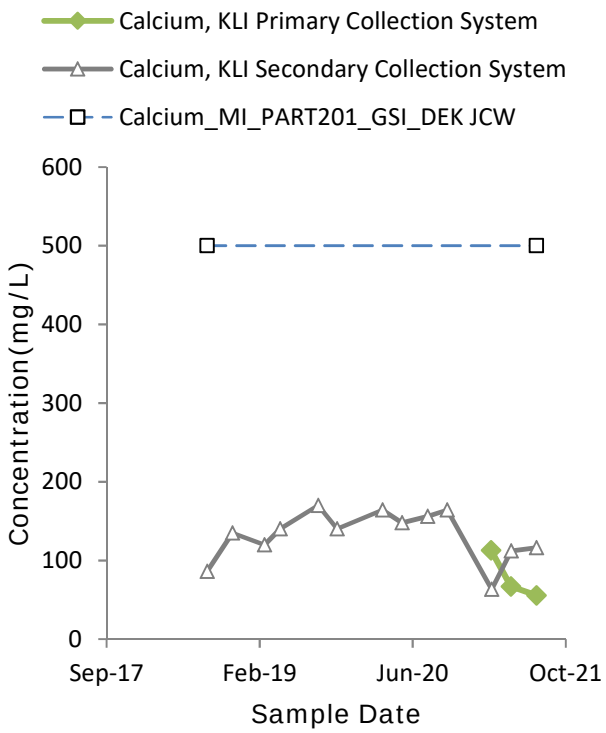


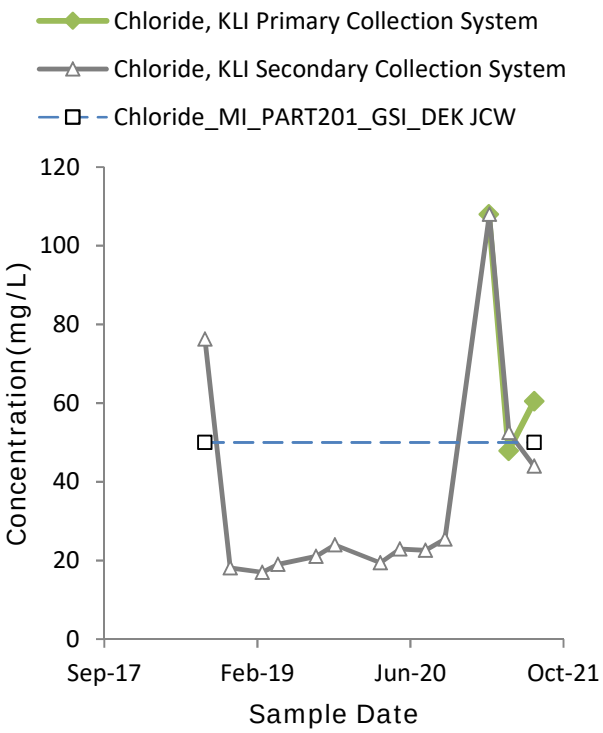


Water Quality Time Series

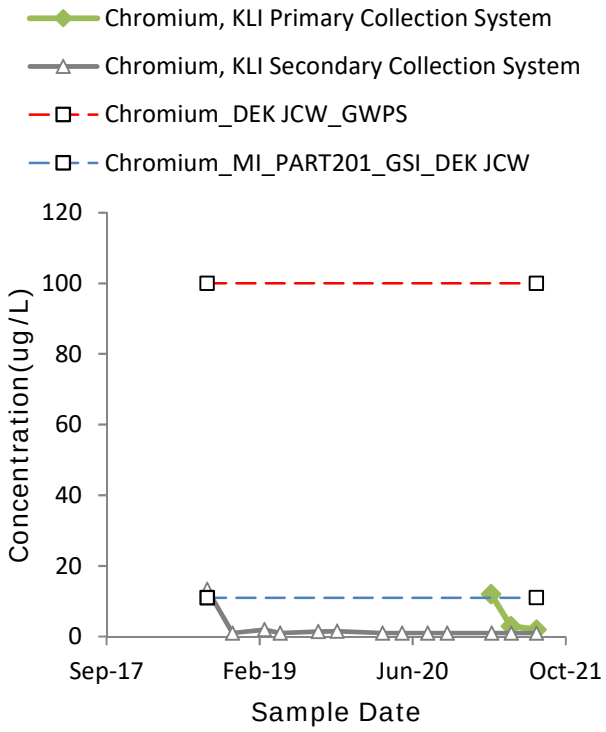


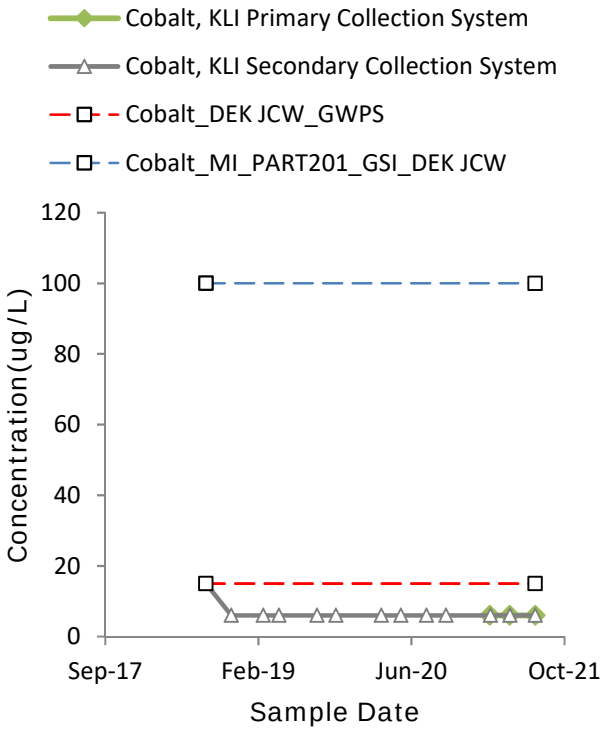


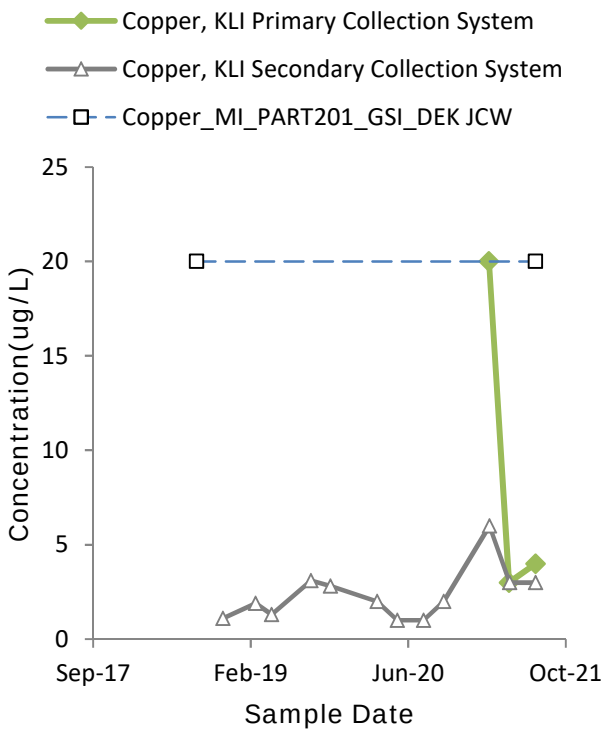


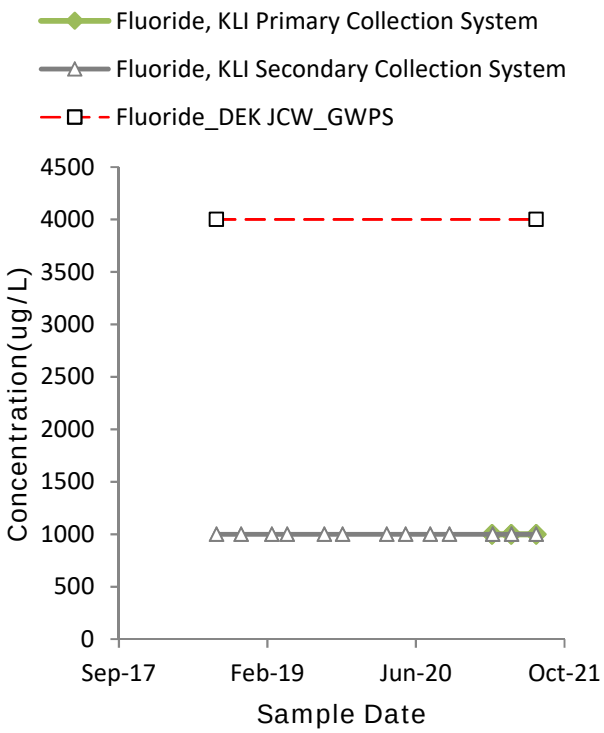


Water Quality Time Series









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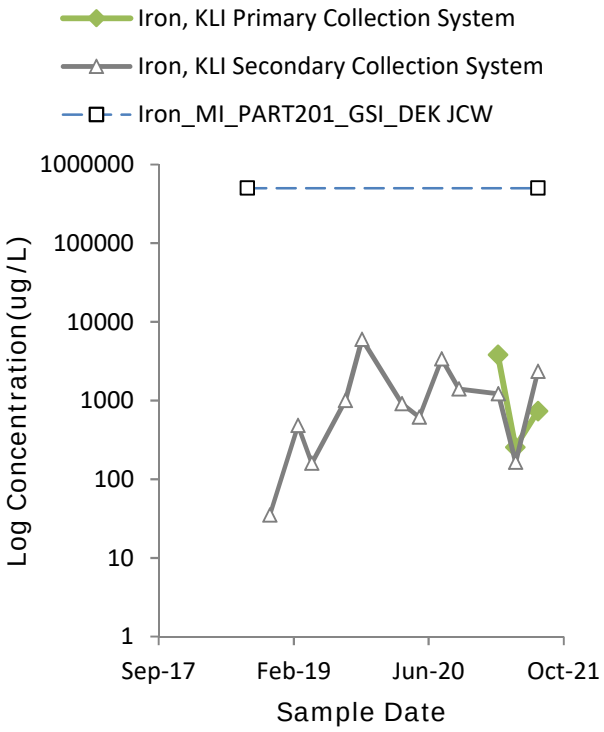
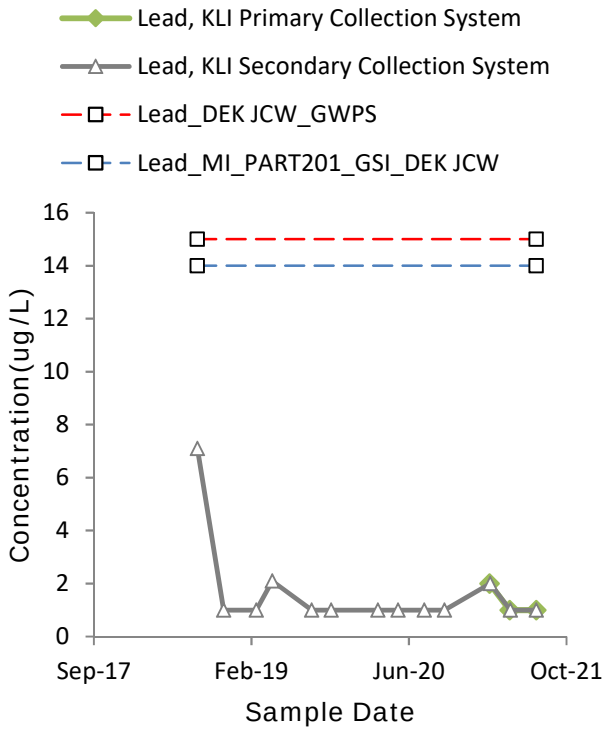
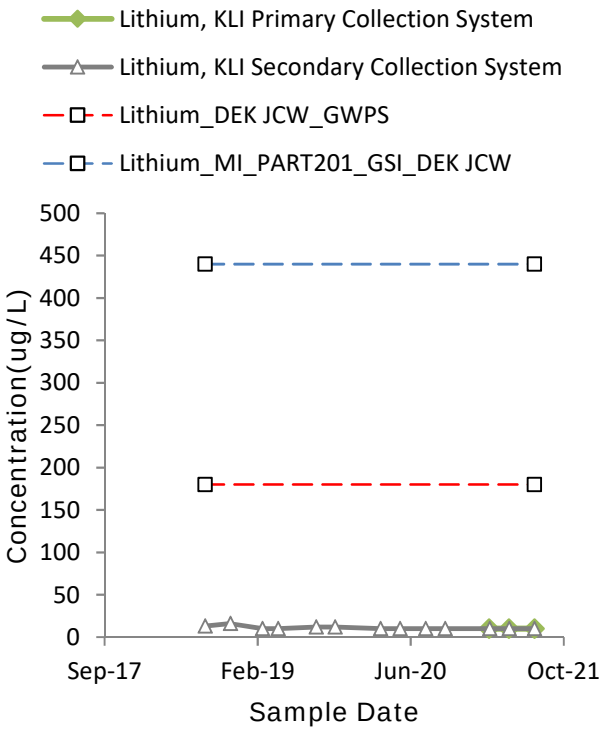
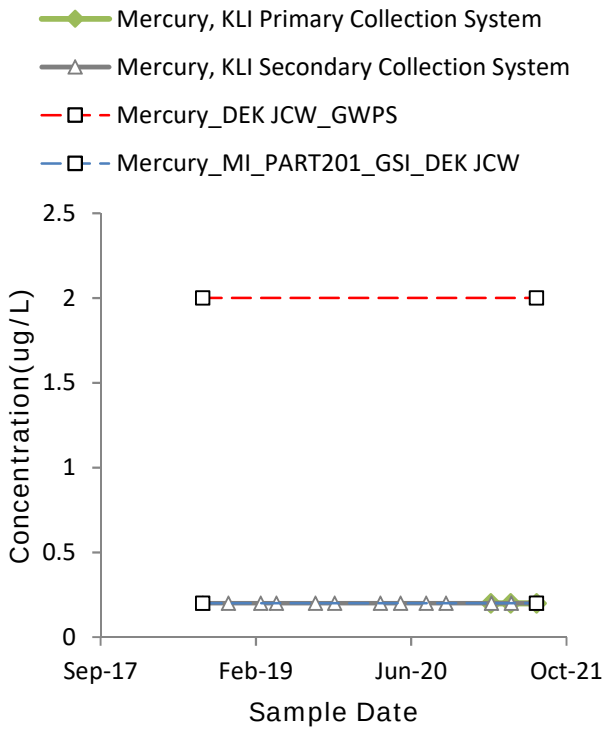
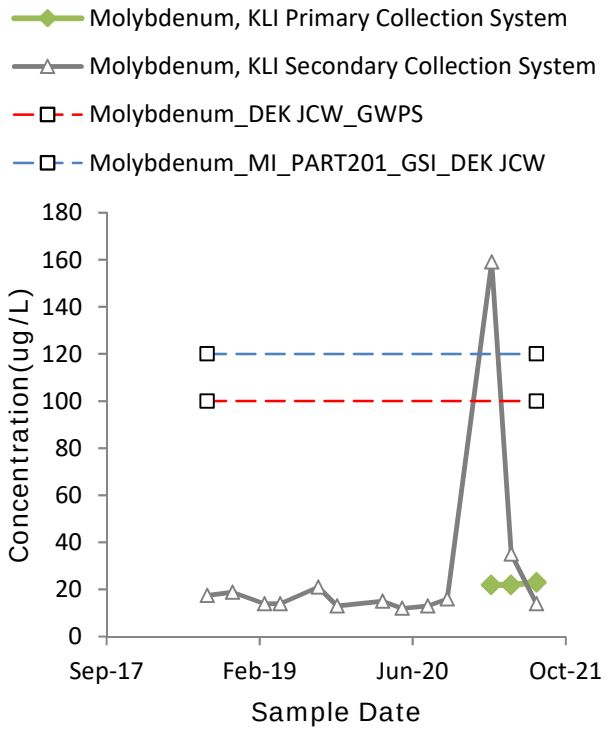


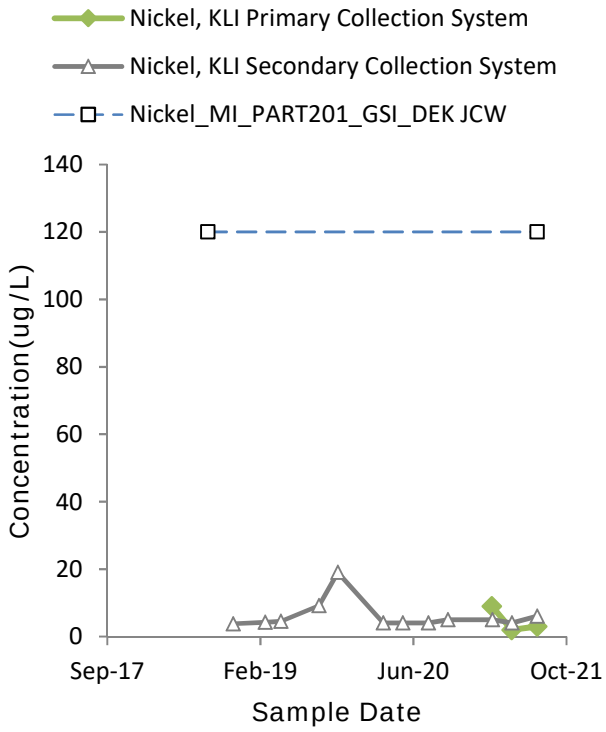


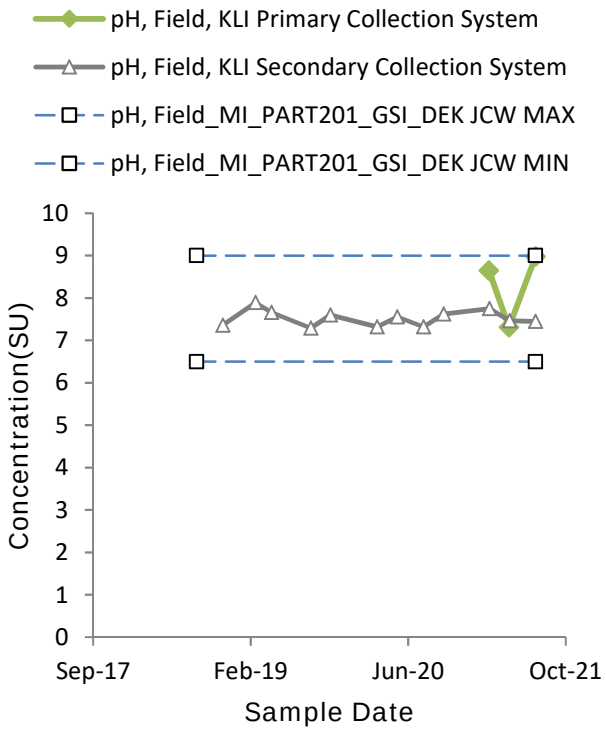


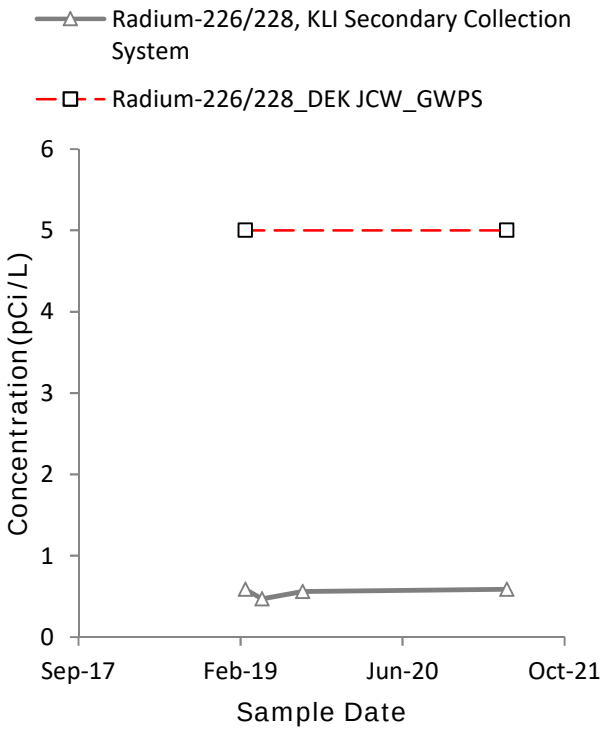


Water Quality Time Series

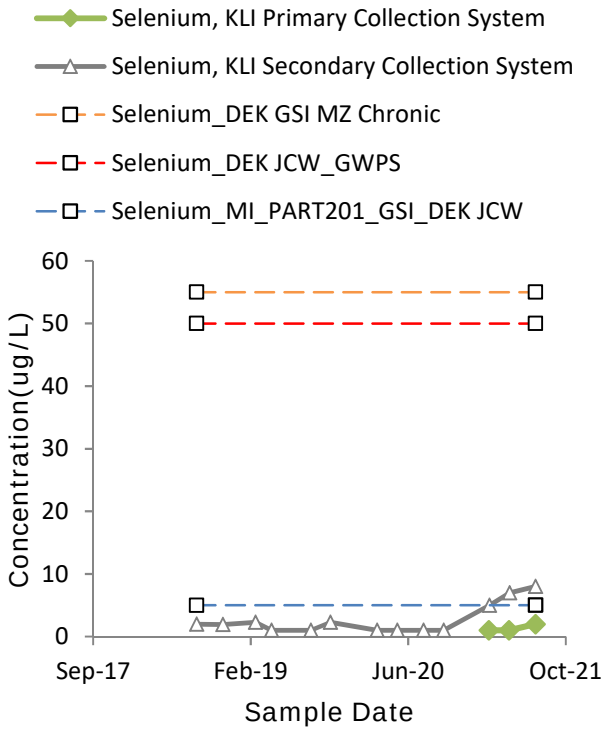


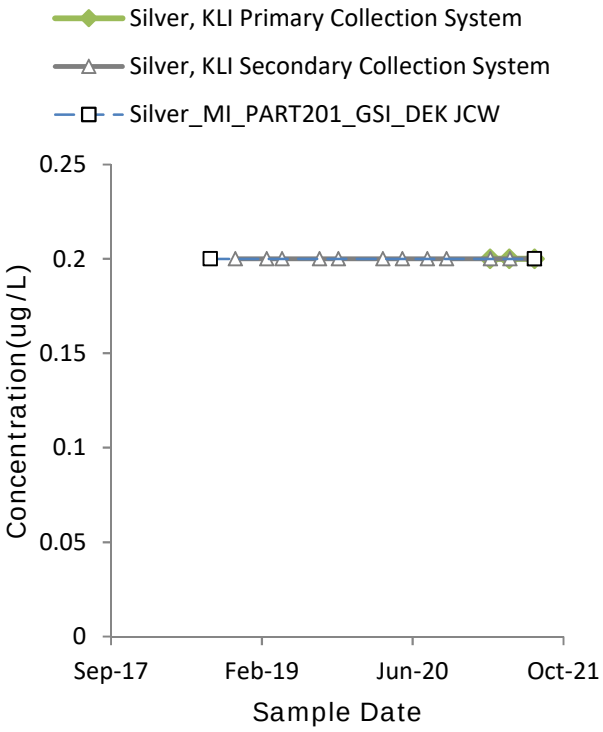


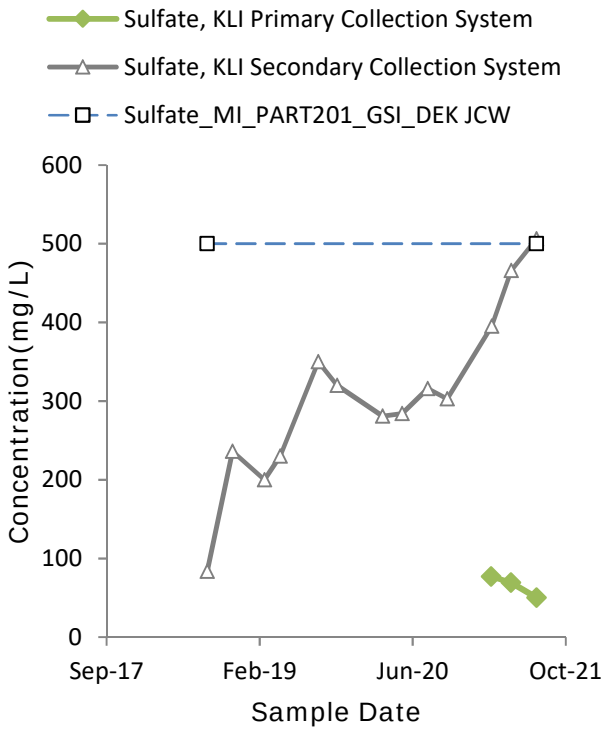


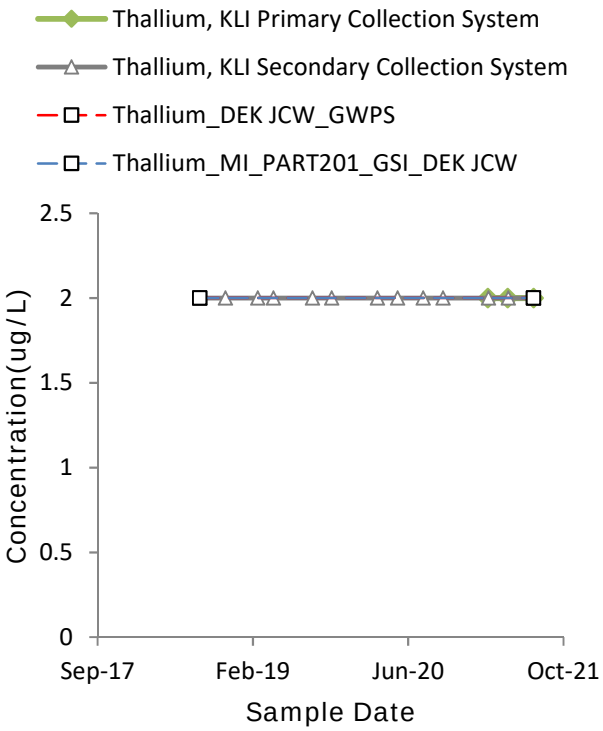


Water Quality Time Series

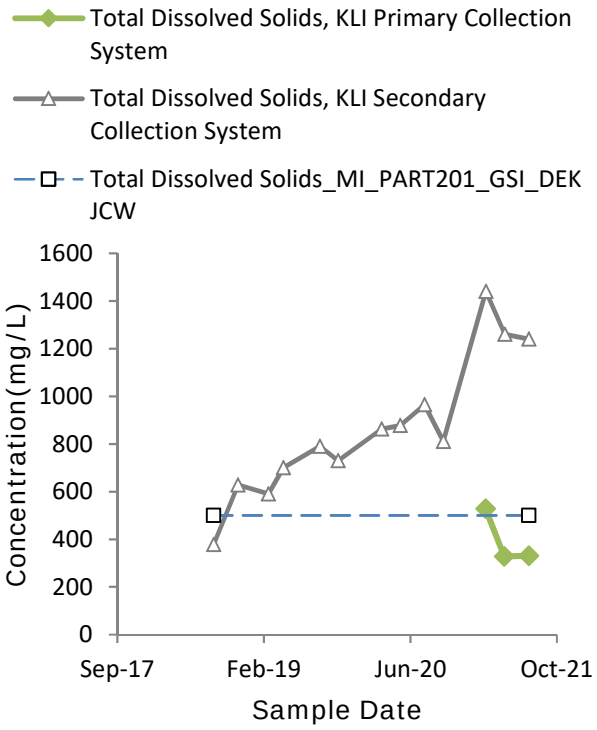


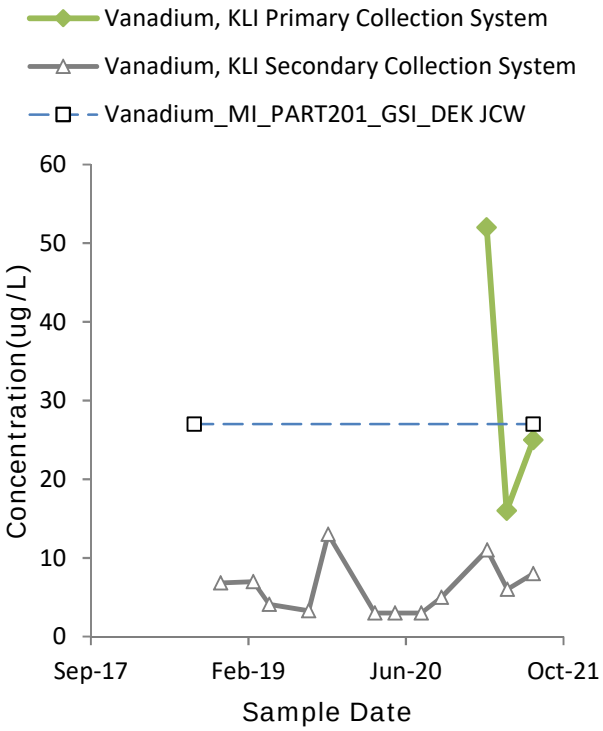


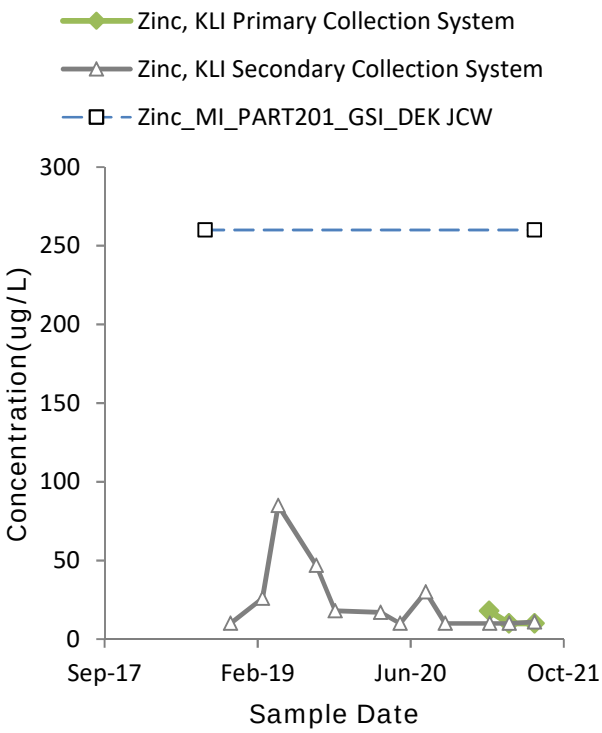




Water Quality Time Series







January 28, 2022 *VIA email: BabcockL4@michigan.gov*

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

SUBJECT: DE KARN LINED IMPOUNDMENT LICENSE REQUIREMENTS – GROUNDWATER QUALITY MONITORING RESULTS FOR FOURTH QUARTER 2021

Dear Ms. Babcock,

Attached you will find the above-referenced compliance monitoring report for the DE Karn Lined Impoundment (Report) to satisfy quarterly groundwater monitoring requirements during the active life of the coal ash impoundment. The monitoring event was conducted and the report was prepared by TRC under the direction of Consumers Energy Environmental Services. The report includes the items listed in Appendix A (Solid Waste Monitoring Submittal Components) of the May 15, 2015 Michigan Department of Environmental Quality - Office of Waste Management and Radiological Protection communication prescribing the format for solid waste disposal facility monitoring submittals.

This report was prepared in conformance with the *Karn Lined Impoundment Hydrogeological Monitoring Plan,* dated November 2020 ("HMP") that was approved by the MDEQ on November 13, 2020 and incorporated, by reference, in Solid Waste Disposal Area Operating License No. 9629 issued on December 10, 2020. Should you have any questions regarding this submittal, please contact the undersigned at (517) 788-2982.

Sincerely,

Harold D. Register, Jr., P.E.
Principal Engineer
Landfill Operations Compliance
Phone: (517) 788-2982
Email: harold.registerjr@cmsenergy.com

cc: Mr. Phil Roycraft, EGLE Saginaw Bay District Office (via email ROYCRAFTP@michigan.gov)
Mr. Mike Quigg, EGLE Saginaw Bay District Office (via email QuiggM@michigan.gov)
Mr. Caleb Batts, Consumers Energy (via email Caleb.Batts@cmsenergy.com)

Encl: Karn Lined Impoundment – 4Q2021 Groundwater Monitoring Report
Karn Lined Impoundment – 4Q2021 Laboratory Analysis Data Spreadsheet

Fourth Quarter 2021 Hydrogeological Monitoring Report

DE Karn Lined Impoundment CCR Unit

Essexville, Michigan

January 2022

Prepared For:

Consumers Energy
1945 W. Parnall Road
Jackson, MI 49201

Prepared By:

TRC
1540 Eisenhower Place
Ann Arbor, Michigan 48108

Darby Litz
Project Manager/Hydrogeologist

Graham Crockford, C.P.G.
Program Manager

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FIGURES

APPENDICES

1.0 Introduction

Pursuant to the Federal CCR Rule[1], Consumers Energy initiated a detection monitoring program for the Karn Lined Impoundment that went into service on June 7, 2018. After establishing the groundwater monitoring system and detection monitoring project pursuant to the requirements and schedule of §257.90 - §257.94, the State of Michigan enacted Public Act No. 640 of 2018 (PA 640) on December 28, 2018 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 amendments to the solid waste statute amended state groundwater monitoring requirements for coal ash impoundments; therefore, Consumers Energy submitted the *Karn Lined Impoundment Hydrogeological Monitoring Plan* (HMP) to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to comply with the requirements of Part 115, Rule 299.4905, and the CCR Rule. The HMP was approved by the EGLE on November 13, 2020 and incorporated, by reference, in Solid Waste Disposal Area Operating License No. 9629 issued on December 10, 2020.

1.1 Statement of Adherence to Approved Hydrogeological Monitoring Plan

This Fourth Quarter 2021 Karn Lined Impoundment Hydrogeological Monitoring Report (Report) has been prepared by TRC on behalf of Consumers Energy to satisfy quarterly groundwater monitoring requirements during the active life of the coal ash impoundment. This Report was prepared in accordance with the items listed in Appendix A (Solid Waste Monitoring Submittal Components) of the May 15, 2015 Michigan Department of Environmental Quality (MDEQ) – Office of Waste Management and Radiological Protection, now the EGLE Materials Management Division (MMD), communication prescribing the format for solid waste disposal facility monitoring submittals as published in OWMRP-115-29, *Format for Solid Waste Disposal Facility Monitoring Submittals*, dated July 5, 2013. All references herein to the EGLE are inclusive of the MDEQ. Information contained in this report was prepared in adherence to the facility's approved HMP that was approved by the EGLE on November 13, 2020. This HMP is compliant with the requirements set forth in Public Act No. 640 of 2018 (PA 640) to amend the Natural Resources and Environmental Protection Act (NREPA), also known as Part 115 of PA 451 of 1994, as amended (Part 115) (a.k.a., Michigan Part 115 Solid Waste Management).

1.2 Program Summary

This Report provides results and summarizes the monitoring activities completed in the Fourth Quarter 2021 at the Karn Lined Impoundment located at 2742 Weadock Highway in Essexville, Michigan (Figure 1). Groundwater in the vicinity of the Karn Lined Impoundment has been documented to be affected by the management of CCR prior to the construction of the unit (January 2019, TRC). Given that the constituents associated with CCR currently managed at the Karn Lined Impoundment are indistinguishable from the constituents already present in groundwater from past operation of the former Karn Bottom Ash Pond, the compliance monitoring program for the Karn Lined Impoundment consists of two parts to evaluate if there are new releases from the unit:

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

1. Monitoring of secondary collection system flow rates and water quality to detect leaks in the liner; and
2. Groundwater monitoring to determine if there are potential new releases from the Karn Lined Impoundment.

Based on sampling results for the fourth quarter 2021, the Karn Lined Impoundment remains in detection monitoring in accordance with the HMP.

1.3 Site Overview

The Karn Lined Impoundment is located within the DE Karn Power Plant site (Site) located north of the former 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 former Karn Bottom Ash Pond that was closed by removal and the Karn Landfill that was certified closed and now in post-closure care.

1.4 Geology/Hydrogeology

The majority of the Karn Lined Impoundment area is comprised of surficial CCR and sand fill, as described in the HMP. 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, was generally encountered at 80 to 90 ft bgs.

The Site is bound by several surface water features (Figures 1 and 2): 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 Lined Impoundment, the shallow groundwater flow is generally radial, with a potentiometric high point near the unlined ditch north of the Karn Lined Impoundment and near DEK-MW-15003, flowing outward toward the surrounding surface water bodies.

2.0 Second Collection System Monitoring

Consumers Energy initiated secondary collection system flow monitoring to comply with the EGLE-approved HMP in December 2020. The SCS serves as a leak detection system and the SCS flow rate data is used to demonstrate compliance with Part 115. Consumers Energy continues to comply with the requirements for unmonitorable units under Rule 437 of the Part 115 Rules.

The Average Daily Flow Rate for the period from December 10, 2020 – January 6, 2021 was calculated as 137.0 gallons per acre per day (GPAD), which exceeded the Response Action Flow Rate of 25 GPAD. Although this calculated flow rate does not constitute the average flow rate for the previous three months per the definition of average daily flow rate under Part 115, Consumers provided a proactive notification and a preliminary written assessment of the flow rate exceedances to the EGLE January 15, 2021 and January 22, 2021, respectively. The use of secondary collection system flow rates as a leak detection system was successful. Increased flow rates triggered investigations by Consumers Energy that quickly identified deficiencies in the liner system and prompted actions to address the damaged liner. Following repairs to the liner, Consumers Energy continues to monitor improvements in the secondary collection system for improvements in the Daily Average Flow Rate. The Average Daily Flow Rate for December 2021 was calculated as 51.2 gallons per acre per day (GPAD), which exceeded the Response Action Flow Rate of 25 GPAD, as documented in the Consumers Energy Notification of Secondary Flow Rates, DE Karn Lined Impoundment (Type III Coal Ash Impoundment) WDS #392503 (Consumers Energy, December 7, 2021). The data presented in the letter indicate that the daily average flow rate on a weekly and monthly basis continues a decreasing trend following the short-term daily extraction for three weeks in September 2021 and weekly extraction in October and November 2021.

In response to the exceedance of the SCS Response Action Flow Rate), samples were collected from the surface water of the primary collection system (KLI-PCS) and from the secondary leachate collection system sump (KLI-SCS) in October 2021 to compare leachate chemistry to groundwater chemistry. The samples were analyzed for the following constituents:

- Primary Indicator Parameters: Section 11511a(3)(c) - Detection Monitoring Constituents
- Alternative Indicator Parameters: Section 11519b(2) - Assessment Monitoring Constituents
- Optional Analyses in support of Piper or Stiff diagrams

The KLI-PCS and KLI-SCS data were evaluated for comparison to groundwater quality and water chemistry and to also assess potential of hazard and mobility of constituents. A series of time-series plots are included in Appendix E to illustrate water quality data changes over time for the secondary collection system from the start of operation in June 2018 to present. This analysis demonstrates that each monitored constituent is generally present at concentrations less than the Groundwater Protection Standard (GWPS) established under 40 CFR 257.95(h) or generic groundwater surface water interface (GSI) criteria adopted by the Department pursuant to Section 20120a, with the exception of total dissolved solids and chloride. A few notable observations:

- **Arsenic is higher in groundwater than the secondary collection system:** Arsenic was detected in both the primary and secondary collection systems at 3 ug/L and 2 ug/L, respectively, in October 2021. In contrast, the arsenic concentration observed in OW-12, the monitoring well located closest to the damaged liner areas, is 105 ug/L, which is consistent with concentrations observed in August 2020, before the liner damage occurred. Arsenic present in groundwater does not appear to be a result of a release from the unit.
- **Vanadium is detected in the primary and secondary collection system and not in groundwater**: Vanadium was present in the primary collection system sample at 25 ug/L in July 2021 and 23 ug/L in October 2021, which are higher than the vanadium concentrations in the secondary collection system (8 ug/L in July 2021 and 7 ug/L in October 2021). Vanadium was not detected in the well nearest the observed liner damage OW-12 (<2 ug/L).
- **Secondary Collection System chemistry has not appreciably changed:** The time series plots in Attachment A show relatively stable trends in chemistry for samples collected from the primary collection system, with the exception of TDS and sulfate. These also are the only two constituents in the secondary collection system sample were present above relevant criteria (i.e. GSI criteria) this event. In both cases the concentration in the primary collection system leachate is significantly lower in concentration suggesting that the elevated TDS and sulfate is not likely from the primary collection system leachate. The TDS and sulfate concentrations in the secondary collection system are also more closely linked to water coming through the system from the intake water than as a byproduct of the commingled ash and other waste products.

Water quality data collected for Fourth Quarter 2021 are included in the attached laboratory reports (Appendix A). Groundwater chemistry is discussed in Section 4.1. Groundwater conditions will continue to be monitored. Using the secondary collection system flow rates as a leak detection system was successful. The leak was identified in the fourth quarter of 2020, actions were promptly taken to address the leak. In January 2021, liner damage was noted in two areas denoted as Visual Observation Point No. 1 (VOP 1) and Visual Observation Point No. 2 (VOP 2). VOP 2 was repaired on March 10, 2021 and VOP 1 was repaired on May 24, 2021 as documented by Golder Associates Inc. Consumers Energy submitted the repair certification reports to the EGLE on May 25, 2021 and June 29, 2021, respectively. The results of the mitigation efforts continue to be monitored.

Consumers Energy continues to monitor the secondary collection system flow rates, record flow rates and head level on the secondary liner in the operating record and evaluate flow rate trends on a weekly basis. Written notifications of flow rates in the secondary collection system will be provided monthly and evaluations of the chemical characteristics of liquid in the secondary collection system will be reported quarterly. In addition, Consumers Energy continues to provide quarterly updates on remedial actions performed on the leachate collection system through the quarterly groundwater monitoring report required by the HMP.

3.0 Groundwater Monitoring

3.1 Monitoring Well Network

In accordance with §257.91, Consumers Energy developed a groundwater monitoring system for the Karn Lined Impoundment prior to the initial receipt of waste in the CCR unit (TRC, 2018c). Given the radial groundwater flow direction and constituents associated with CCR currently managed at the Karn Lined Impoundment are indistinguishable from the constituents already present in groundwater from past operation of the Karn Bottom Ash Pond, the groundwater monitoring system design incorporates an *intrawell statistical approach* for detection monitoring as described in the HMP and in accordance with the "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance" (USEPA, 2009). Five monitoring wells that are screened in the uppermost saturated unit were selected for the Karn Lined Impoundment HMP detection monitoring (DEK-MW-15003, DEK-MW-18001, OW-10, OW-11, and OW-12). Monitoring well locations are shown on Figure 2.

3.2 October 2021 Detection Monitoring Event

In accordance with the HMP, TRC conducted the fourth quarter 2021 monitoring event for the Karn Lined Impoundment on October 6th and 7th, 2021. In addition to the routine groundwater samples collected from the monitoring well network, a water sample was collected from a sump in the secondary collection system (KLI-SCS) and a surface water sample was collected from the primary collection system (KLI-PCS), as discussed in Section 2 above, such that leachate chemistry could be compared to groundwater chemistry. A sample of surface water was also collected from a ditch located north of the lined impoundment (SW-Ditch) to further evaluate site geochemistry (Figure 2). The SW-Ditch surface water grab sample represents water quality from the potentiometric high point adjacent to the Karn Lined Impoundment.

Groundwater samples collected during the October 2021 event were submitted to Consumers Energy Laboratory Services in Jackson, Michigan, for analysis of the following metals and inorganic indicator constituents.

Section 11511a(3)(c) – Detection Monitoring Constituents	Section 11519b(2) – Assessment Monitoring Constituents		
Boron	Antimony	Fluoride	Thallium
Calcium	Arsenic	Lead	Vanadium
Chloride	Barium	Lithium	Zinc
Fluoride	Beryllium	Mercury	
Iron	Cadmium	Molybdenum	
pH	Chromium, total	Nickel	
Sulfate	Cobalt	Selenium	
Total Dissolved Solids (TDS)	Copper	Silver	

Samples were also analyzed for additional constituents including magnesium, sodium, potassium, and bicarbonate, carbonate, and total alkalinity to provide additional evaluation of groundwater chemistry. Analytical results from the fourth quarter 2021 monitoring event are included in the attached laboratory reports (Appendix A).

Static water level measurements were collected at all locations after equilibration to atmospheric pressure and immediately prior to purging. The depth to water was recorded to the nearest 0.01-ft in accordance with the procedures in the HMP. Groundwater purging and sampling were conducted in accordance with low-flow sampling protocol. Static water elevation data are included in the attached field records (Appendix B).

Monitoring wells 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. Field notes are included as Appendix B. The samples were collected in vendor-provided, nitric acid pre-preserved (metals only) and unpreserved sample containers and submitted to the laboratory for analysis. Porewater sample preparation and analyses were performed in accordance with SW-846 "Test Methods for Evaluation Solid Waste – Chemical / Physical Methods," USEPA (latest revision). TRC followed chain of custody procedures to document the sample handling sequence.

TRC also collected quality assurance/quality control (QA/QC) samples during the groundwater sampling event. The QA/QC samples consisted of one field blank, one equipment blank, one field duplicate (DEK-MW-15006 from adjacent Karn Bottom Ash Pond CCR Unit), and field matrix spike/matrix spike duplicate samples collected at DEK-MW-18001.

3.2.1 Data Quality Review

Data were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The data were found to be complete and usable for the purposes of the HMP program. The data quality reviews for the Karn Lined Impoundment network wells are summarized in Appendix C.

3.2.2 Groundwater Flow Rate and Direction

Groundwater elevation data collected during the October 2021 groundwater monitoring events are provided in Table 1. The data were used to construct the groundwater contour map (Figure 3).

Groundwater elevations measured at the site in October 2021 are generally within the range of 581 to 587 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 data or within approximately 6 feet higher, flowing toward the bounding surface water features.

Although the point source discharge of sluiced bottom ash into the former Karn Bottom Ash Pond historically 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 in October 2021 demonstrate a reduction in groundwater elevation measurements by several feet when compared to measurement taken in June 2018. 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 and DEK-MW-15003 delineate the newly established groundwater elevation high point that was previously centered over the former Karn Bottom Ash Pond with porewater flow generally flowing radially towards the adjacent surface water features from this newly established potentiometric “high”, as illustrated in Figure 3.

The average hydraulic gradient observed on October 4, 2021 in the vicinity of the former Karn Bottom Ash Pond and Karn Lined Impoundment is estimated at 0.0042 ft/ft. The gradients were calculated using the monitoring well pair DEK MW 15004/DEK-MW-15005, as well as the well water elevation difference and distance between DEK-MW-15003 and the discharge channel. The discharge channel surface water elevation was taken from the NOAA gauging station data on the same dates as the water level measurements. 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 calculated to be 0.21 ft/day or 71 ft/year in October 2021 which is reduced relative to previous estimated seepage velocities (e.g., 0.33 ft/day or 120 ft/year August 2018).

Due to the operational changes of the former bottom ash pond and the completion of the landfill capping activities in 2020, the gradient between the area of the Karn Bottom Ash Pond and Karn Lined Impoundment and the surrounding surface water bodies is flattening out as compared to previous quarters and is also attempting to reach a new equilibrium, as expected. The general flow direction relative to the Karn Lined Impoundment is similar to that identified in previous monitoring rounds and continues to demonstrate that the downgradient wells are appropriately positioned to detect the presence of Appendix III/IV parameters that could potentially migrate from the Karn Lined Impoundment.

4.0 Data Evaluation

Based on sampling results for the fourth quarter 2021, the Karn Lined Impoundment remains in detection monitoring in accordance with the HMP. The following section summarizes the statistical approach applied to assess the fourth quarter 2021 groundwater data in accordance with the detection monitoring program.

Water quality data are included in the attached laboratory reports (Appendix A). Groundwater analytical data for the most recent quarterly monitoring event is summarized in Table 3 along with the associated Part 201 generic drinking water criteria, the generic GSI criteria, and the site-specific mixing-zone GSI criteria. Mixing-zone criteria are provided for the Karn-Weadock complex in the December 23, 2015 mixing zone determination that consists of arsenic, boron, and selenium. As such, arsenic, boron, and selenium are compared to site-specific mixing zone-based GSI criteria, and all other constituents are screened against generic GSI criteria. GSI compliance is evaluated through monitoring performed at the Karn Landfill in accordance with the EGLE-approved Consumers Energy's revised Karn Landfill HMP (Hydrogeological Monitoring Plan, Rev. 3, DE Karn Solid Waste Disposal Area) dated December 19, 2017.

4.1 Statistical Evaluation of Trends

Groundwater in the vicinity of the Karn Lined Impoundment has been affected by CCR management before commencement of operation (January 2019, TRC). Given that the constituents associated with CCR currently managed in the Karn Lined Impoundment are indistinguishable from the constituents already present in groundwater from past operation of the former Karn Bottom Ash Pond, intrawell trend tests, in conjunction with KLI-SCS flow rates, will be utilized to assess whether a release has occurred from operation of the unit. The detection monitoring constituent concentrations will be analyzed using Mann-Kendall and Sen's Slope trend tests to determine if there is an upward trend that may indicate a release from the Karn Lined Impoundment. The data will be analyzed in the context of the Site hydrogeologic characteristics and an assessment made as to whether the source of an upward trend, if identified, is from a possible release from the Karn Lined Impoundment, another on-site release, or on-site migration of nearby impact (i.e., former Karn Bottom Ash Pond).

Time-series plots and statistical trend analyses are used to evaluate groundwater quality each quarter, which are included as Appendix D. Consumers Energy manages and evaluates its analytical data using Sanitas™ Statistical Software (Sanitas™). Consumers Energy conducts intra-well trend analyses to examine data for each monitoring well-constituent pair in the groundwater monitoring system over time to determine if changes in water quality are occurring that may be associated with the Karn Lined Impoundment. Data from October 2019 through July 2021 were analyzed using Mann-Kendall and Sen's Slope at a significance level (α) of 0.025 per tail for each constituent/sampling point dataset to assess trends. Sen's Slope estimator was used to assess the magnitude of the slope and the Mann-Kendall test was used to determine if the slope was statistically significant. The graphical output of the Sen's Slope/Mann-Kendall trend tests and time series are presented in Appendix D. Appendix D also includes a table summarizing these trends and the associated statistical trend charts.

Data trends for detection monitoring constituents are generally stable (i.e., no trend) or declining for the majority of the monitoring well/constituent pairs with the following exceptions:

- A new, unconfirmed increasing trend in chloride was observed in monitoring well DEK-MW-15003.
- A continuous increasing trend in sulfate was observed in monitoring well DEK-MW-18001.
- A continuous increasing trend was observed for calcium in monitoring well OW-10. New, unconfirmed increasing trends were observed for chloride and total dissolved solids in monitoring well OW-10.
- Continuous increasing trends were observed for boron and pH in monitoring well OW-11.

4.2 Detection Monitoring Data Discussion

Although preliminary detection monitoring trends noted in Section 4.1 exist, the groundwater conditions do not conclusively indicate a release from the unit. Groundwater quality is generally consistent with previous monitoring events. The location of one of the identified liner damage locations was approximately 40-ft upgradient from monitoring well OW-12 and the second location was approximately 130-ft upgradient from monitoring well DEK-MW-18001. Both leaks have been repaired. Detection monitoring constituent concentrations at OW-12, located closest to the identified liner damage, exhibit no statistically significant increasing trends, indicating that if a release to groundwater occurred due to the apparent leak in the liner system, the effects on local groundwater quality at this point appear to be negligible. Additionally, concentrations of several constituents observed at upgradient well OW-11 are much higher than concentrations observed in the KLI-PCS and KLI-SCS, which support a source other than the Karn Lined Impoundment is affecting chemistry at OW-11. The change in sulfate at DEK-MW-18001 and calcium in monitoring well OW-10 are likely a result of changes in the groundwater flow regime or redox conditions as a result of the Bottom Ash Pond closure activities, rather than a result of a release from the unit. The increasing concentrations began around the time of the dewatering and excavation that occurred in the adjacent Bottom Ash Pond area (April through July 2019), well before a leak in the Karn Lined Impoundment liner system was noted through the increase in the SCS daily average flow rate observed in December 2020 as detailed in the Second Quarter 2021 Hydrogeological Monitoring Report (TRC, July 2021). The increasing trends at OW-10 and DEK-MW-18001 will continue to be evaluated within context of changes in the site operational status.

4.3 Alternate Source Demonstration

At this time, Consumers Energy is continuing to assert an Alternate Source Demonstration (ASD), for the following, as detailed in the Second Quarter 2021 Hydrogeological Monitoring Report (TRC, July 2021):

- Sulfate in monitoring well DEK-MW-18001
- Calcium in monitoring well OW-10; and
- Boron and pH in monitoring well OW-11.

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5.0 Conclusions and Recommendations

Consumers Energy will continue the detection monitoring program for the Karn Lined Impoundment unit based on the data evaluations completed in Section 4.0 of this report in conformance with the Karn Lined Impoundment HMP. Although increasing trends for detection monitoring constituents were observed in three wells, these trends were found to not be a result of operation of the Karn Lined Impoundment. No SSIs over background limits were identified at the Karn Lined Impoundment during the July 2021 monitoring event. The use of secondary collection system flow rates as a leak detection system was successful. Increased flow rates observed in Q4 2020 triggered investigations by Consumers Energy that quickly identified deficiencies in the liner system and prompted actions to address the damaged liner. The results of the mitigation efforts continue to be monitored. The fourth quarter monitoring event is scheduled for October 2021.

6.0 References

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

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

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

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

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

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

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

Tables

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

Well Location	TOC Elevation (ft)	Geologic Unit of Screen Interval	Screen Interval Elevation (ft)	October 4, 2021	
				Depth to Water (ft BTOC)	Groundwater Elevation (ft)
Background					
MW-15002	587.71	Sand	580.9 to 570.9	6.68	581.03
MW-15008	585.36	Sand with clay	578.7 to 568.7	4.28	581.08
MW-15016	586.49	Sand	581.2 to 578.2	3.85	582.64
MW-15019	586.17	Sand and Sand/Clay	579.5 to 569.5	5.20	580.97
DEK Bottom Ash Pond					
DEK-MW-15002	590.87	Sand	578.3 to 575.3	6.38	584.49
DEK-MW-15004	611.04	Sand	576.6 to 571.6	27.88	583.16
DEK-MW-15005	589.72	Sand	572.3 to 567.3	8.81	580.91
DEK-MW-15006	589.24	Sand	573.0 to 568.0	8.28	580.96
DEK Bottom Ash Pond & Karn Lined Impoundment					
DEK-MW-15003	602.74	Sand	578.8 to 574.8	16.50	586.24
DEK-MW-18001	593.47	Sand	579.2 to 574.2	8.43	585.04
OW-10	591.58	Silty Sand and Silty Clay	576.0 to 571.0	6.48	585.10
OW-11	607.90	Silt/Fly Ash	587.5 to 582.5	21.66	586.24
OW-12	603.07	Silty Sand	584.2 to 579.2	17.10	585.97
DEK Nature and Extent					
MW-01	597.02	Sand	573.0 to 570.0	16.24	580.78
MW-03	597.30	Sand	569.8 to 566.8	16.51	580.79
MW-06	589.44	Sand and Silty Sand	578.5 to 563.5	8.60	580.84
MW-08	598.78	Sand and Silty Clay	580.9 to 570.9	17.38	581.40
MW-10	596.97	Sand	582.5 to 572.5	15.95	581.02
MW-12	598.60	Sand	583.9 to 573.9	17.75	580.85
MW-14	594.37	Sand and Silty Clay	584.7 to 574.7	13.63	580.74
MW-16	595.80	Sand and Sand/Bottom Ash	584.1 to 574.1	14.90	580.90
MW-22	598.99	Ash/Sand	571.4 to 568.4	16.54	582.45
MW-23	595.57	Ash/Sand	576.9 to 571.9	13.35	582.22
DEK Static Water Level					
MW-02	597.34	Sand and Silty Clay	572.5 to 567.5	16.56	580.78
MW-04	598.01	NR	569.5 to 564.5	17.22	580.79
MW-17	597.91	Sand	577.0 to 574.0	12.95	584.96
MW-18	609.22	Silty Sand and Silty Clay	575.8 to 573.8	25.25	583.97
MW-19	597.28	NR	572.1 to 567.1	16.20	581.08
MW-20	632.75	Sand	582.3 to 579.3	52.02	580.73
MW-21	632.91	Sand	587.1 to 584.1	50.72	582.19
OW-01	631.33	NR	572.5 to 567.5	50.63	580.70
OW-02	598.01	Fly Ash	579.4 to 576.4	15.36	582.65
OW-03	597.94	Fly Ash and Sand	573.6 to 568.6	17.47	580.47
OW-04	590.21	Sand and Bottom/Fly Ash	579.1 to 574.1	9.60	580.61
OW-05	593.53	Sand	576.9 to 571.9	11.10	582.43
OW-06	603.95	NR	580.9 to 575.9	21.38	582.57
OW-07	596.41	Ash	583.3 to 580.3	14.28	582.13
OW-08	593.93	NR	581.0 to 576.0	10.74	583.19
OW-09	593.45	NR	585.5 to 580.5	10.23	583.22
OW-13	588.52	NR	579.5 to 574.5	3.96	584.56
OW-15	587.75	NR	572.8 to 567.8	3.90	583.85

Notes:

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

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

TOC: Top of well casing.

ft BTOC: Feet below top of well casing.

NR: Not Recorded

Table 2
Summary of Field Parameters: October 2021
Fourth Quarter 2021 Quarterly Report
Karn Lined Impoundment - Essexville, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (°C)	Turbidity (NTU)
Karn Lined Impoundment							
DEK-MW-15003	10/7/2021	0.57	-210.3	8.3	461	20.8	2.0
DEK-MW-18001	10/7/2021	0.29	-158.5	7.4	850	14.3	2.2
KLI-PCS	10/6/2021	7.95	313.4	8.5	593	23.7	23.3
KLI-SCS	10/6/2021	2.21	158.3	7.2	1,759	20.2	0.8
OW-10	10/7/2021	0.23	-146.3	7.0	1165	14.3	6.9
OW-11	10/7/2021	0.65	-137.5	9.5	470	12.7	4.0
OW-12	10/7/2021	0.30	-140.3	7.2	976	16.9	5.9
SW-DITCH	10/6/2021	7.14	460.6	2.6	2,406	30.2	8.6

Notes:
mg/L - Milligrams per Liter.
mV - Millivolts.
SU - Standard Units.
umhos/cm - Micromhos per centimeter.
°C - Degrees Celsius.
NTU - Nephelometric Turbidity Unit.

Table 3
Summary of Groundwater Sampling Results (Analytical): October 2021
Fourth Quarter 2021
Karn Lined Impoundment – Essexville, Michigan

					Sample Location:	DEK-MW-15003	DEK-MW-18001	OW-10	OW-11	OW-12	KLI-SCS	KLI-PCS	SW-Ditch
					Sample Date:	10/7/2021	10/7/2021	10/7/2021	10/7/2021	10/7/2021	10/6/2021	10/6/2021	10/6/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	upgradient	downgradient		upgradient	downgradient	Supplemental		
Appendix III[(1)]													
Boron	ug/L	NC	**500**	**500**	4,000	**976**	**1,370**	**1,400**	**3,580**	**1,060**	**640**	**682**	201
Calcium	mg/L	NC	NC	NC	500[EE]	24.5	71	140	9.44	91.8	117	72	159
Chloride	mg/L	250**	250[E]	250[E]	**50**	**54**	**55.2**	**87.5**	**64.6**	**56.1**	**52.1**	44.5	42.9
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	3,310	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	**500[EE]**	39.7	118	70.2	23.9	173	**381**	74.9	**704**
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	253	494	**668**	227	**585**	**1,330**	372	**1,020**
pH, Field	SU	**6.5 - 8.5****	**6.5 - 8.5[E]**	**6.5 - 8.5[E]**	**6.5 - 9.0**	8.3	7.4	7.0	**9.5**	7.2	7.2	8.5	**2.6**
Appendix IV[(1)]													
Antimony	ug/L	6	6.0	6.0	**2.0**	< 1	< 1	< 1	**3**	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	**481**	**85**	4	**738**	**105**	2	3	3
Barium	ug/L	2,000	2,000	2,000	1,200	42	135	167	25	81	65	503	273
Beryllium	ug/L	4	4.0	4.0	33	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	< 1	< 1	1	3	< 1	< 1	4	7
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	3,310	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	14	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	19	24	38	< 10	32	< 10	< 10	< 10
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	**73**	**210**	**120**	28	< 5	< 5	**236**	17	12	21	5
Selenium	ug/L	50	50	50	**5.0**	1	2	4	5	2	**7**	2	2
Thallium	ug/L	2	2.0	2.0	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115[(2)]													
Iron	ug/L	**300****	**300[E]**	**300[E]**	500,000[EE]	103	**1,190**	**1,730**	64	**6,110**	251	**441**	**895**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	< 1	< 1	2	< 1	< 1	3	3	13
Nickel	ug/L	NC	100	100	120	< 2	4	8	5	5	8	4	15
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	**62**	**27**	< 2	< 2	3	**1,000**	< 2	**7**	**23**	**9**
Zinc	ug/L	5,000**	2,400	5,000[E]	260	< 10	< 10	< 10	< 10	< 10	< 10	< 10	20

Notes:

ug/L - micrograms per liter; mg/L - milligrams 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

* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2021

** - 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 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

BOLD value indicates an exceedance of one or more of the listed criteria.

RED value indicates an exceedance of the MCL.

All metals were analyzed as total unless otherwise specified.

Table 4
Summary of Statistical Exceedances – October 2021
Karn Lined Impoundment
Essexville, Michigan

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
SUMMARY OF STATISTICAL EXCEEDANCES

Data is in (X) ug/L or ( ) mg/L unless otherwise stated

Facility: Karn Lined Impoundment – WDS# 392503

Well #	Location	Parameter	Part 201 GRCC	Statistical Limit (or 'CC' for Control Charts)	3 Qtr. 2021 (**bold** >201)	2 Qtr. 2021 (**bold** >201)	1 Qtr. 2021 (**bold** >201)	

No Exceedances

Figures

BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

N

1 " = 3,000 '
1:36,000

0 3,000 6,000
FEET

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
TRC - GIS

PROJECT:

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

TITLE:

SITE LOCATION MAP

DRAWN BY:	A. ADAIR
CHECKED BY:	J. KRENZ
APPROVED BY:	D. LITZ
DATE:	APRIL 2021
PROJ. NO.:	418425-001-002
FILE:	418425-101-001.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\1_DEKARN\2021_MXDs\2021_001_MARCH\418425-101-001.mxd -- Saved By: AADAIR on 4/19/2021, 22:21:24 PM

LEGEND

- DEK BOTTOM ASH POND MONITORING WELL
- DEK LINED IMPOUNDMENT MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- SURFACE WATER GAUGING STATION
- NATURE AND EXTENT WELL
- SECONDARY CONTAINMENT SUMP (KLI-SCS)
- PRIMARY CONTAINMENT SYSTEM SAMPLE (KLI-PCS)
- SURFACE WATER SAMPLE (SW-DITCH)
- SLURRY WALL (APPROXIMATE)
- LINED IMPOUNDMENT (COVENANT BOUNDARY)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. WELL LOCATIONS SURVEYED BY ROWE PROFESSIONAL SERVICES COMPANY ON 11/4/2015.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).
4. A SINGLE WELL SYMBOL IS SHOWN FOR WELL PAIRS MW-01/MW-02, MW-03/MW-04, OW-02/MW-22, AND OW-07/MW-23 AS THE WELLS ARE LOCATED WITHIN 15-FT OF EACH OTHER.

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

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

TITLE:

SITE LAYOUT MAP

DRAWN BY:	A. ADAIR	PROJ NO.:	418425.0001
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 2**
DATE:	JANUARY 2022		

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

FILE NO.: 418425-101-002.mxd

Plot Date: 1/7/2022, 12:31:23 PM by BTRACY -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 26976\1 DEKARN\2021 MXDs\2021 001 MARCH\418425-101-002.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

LEGEND

- DEK BOTTOM ASH POND MONITORING WELL
- DEK LINED IMPOUNDMENT MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- SURFACE WATER GAUGING STATION
- NATURE AND EXTENT WELL
- SLURRY WALL (APPROXIMATE)
- LINED IMPOUNDMENT (COVENANT BOUNDARY)
- GROUNDWATER ELEVATION CONTOUR (1' INTERVAL, DASHED WHERE INFERRED)
- *(580.50)* GROUNDWATER ELEVATION (FEET)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. WELL LOCATIONS SURVEYED BY ROWE PROFESSIONAL SERVICES COMPANY ON 11/4/2015.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

CONSUMERS ENERGY COMPANY
DE KARN POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:

SHALLOW GROUNDWATER CONTOUR MAP OCTOBER 2021

DRAWN BY:	A. ADAIR	PROJ NO.:	418425.0001
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 3**
DATE:	JANUARY 2022		

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

FILE NO.: 418426-501-003.mxd

Plot Date: 1/7/2022, 13:06:45 PM by BTRACY -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 26976711 DEKARM\2021 MXDs\2021 004 OCTOBER\418426-501-003.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

Appendix A
Laboratory Analytical Reports

Consumers Energy
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135 W. Trail St.
Jackson, MI 49201

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

To: CDBatts, Karn/Weadock

From: EBlaj, T-258

Date: October 31, 2021

Subject: RCRA GROUNDWATER MONITORING – KARN LINED IMPOUNDMENT – 2021 Q4

CC: HDRegister, P22-521
BLSwanberg, P22-119

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

Chemistry Project: 21-1170

TRC Environmental, Inc. conducted groundwater monitoring at the DE Karn Lined Impoundment area on 10/06/2021 and 10/07/2021, for the 4th Quarter monitoring 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 10/07/2021.

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

Reviewed and approved by:

Emil Blaj
Sr. Technical Analyst
Project Lead

ilac-MRA A2LA ACCREDITED Certificate #1097.04

CASE NARRATIVE

I. Sample Receipt

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

II. Methodology

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

III. Results/Quality Control

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

DEFINITIONS / QUALIFIERS

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

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

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

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Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q4-2021 DEK RCRA Lined Impoundment Wells
Date Received: 10/7/2021
Chemistry Project: 21-1170

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-1170-01	OW-10	Groundwater	10/07/2021 08:50 AM	DEK Lined Impoundment
21-1170-02	OW-11	Groundwater	10/07/2021 09:50 AM	DEK Lined Impoundment
21-1170-03	OW-12	Groundwater	10/07/2021 10:49 AM	DEK Lined Impoundment
21-1170-04	KLI-SCS	Groundwater	10/06/2021 08:44 AM	DEK Lined Impoundment
21-1170-05	KLI-PCS	Groundwater	10/06/2021 08:36 AM	DEK Lined Impoundment
21-1170-06	SW-DITCH	Groundwater	10/06/2021 08:14 AM	DEK Lined Impoundment

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Analytical Report

Report Date: 10/31/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-10**
Lab Sample ID: 21-1170-01
Matrix: Groundwater

Laboratory Project: **21-1170**
Collect Date: 10/07/2021
Collect Time: 08:50 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1170-01-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-03

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

Aliquot #: 21-1170-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Arsenic	4		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	167		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	1400		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	140000		ug/L	1000.0	10/28/2021	AB21-1028-02
Chromium	1		ug/L	1.0	10/28/2021	AB21-1028-02
Cobalt	ND		ug/L	6.0	10/28/2021	AB21-1028-02
Copper	2		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	1730		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	38		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	18800		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	8		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	7400		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	4		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	70800		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	3		ug/L	2.0	10/28/2021	AB21-1028-02
Zinc	ND		ug/L	10.0	10/28/2021	AB21-1028-02

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

Aliquot #: 21-1170-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	87500		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	70200		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1170-01-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	668		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 10/31/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-10**
Lab Sample ID: 21-1170-01
Matrix: Groundwater

Laboratory Project: **21-1170**
Collect Date: 10/07/2021
Collect Time: 08:50 AM

Alkalinity by SM 2320B

Aliquot #: 21-1170-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	368000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Bicarbonate	368000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/14/2021	AB21-1014-10

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-11**
Lab Sample ID: 21-1170-02
Matrix: Groundwater

Laboratory Project: **21-1170**
Collect Date: 10/07/2021
Collect Time: 09:50 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1170-02-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-03

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

Aliquot #: 21-1170-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	3		ug/L	1.0	10/28/2021	AB21-1028-02
Arsenic	738		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	25		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	3580		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	9440		ug/L	1000.0	10/28/2021	AB21-1028-02
Chromium	3		ug/L	1.0	10/28/2021	AB21-1028-02
Cobalt	ND		ug/L	6.0	10/28/2021	AB21-1028-02
Copper	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	64		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	ND		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	1240		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	236		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	5		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	3660		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	5		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	66100		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	1000		ug/L	2.0	10/28/2021	AB21-1028-02
Zinc	ND		ug/L	10.0	10/28/2021	AB21-1028-02

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

Aliquot #: 21-1170-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	64600		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	3310		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	23900		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1170-02-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	227		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 10/31/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-11**
Lab Sample ID: 21-1170-02
Matrix: Groundwater

Laboratory Project: **21-1170**
Collect Date: 10/07/2021
Collect Time: 09:50 AM

Alkalinity by SM 2320B

Aliquot #: 21-1170-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	75800		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Bicarbonate	24200		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Carbonate	51500		ug/L	10000.0	10/14/2021	AB21-1014-10

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Analytical Report

Report Date: 10/31/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-12**
Lab Sample ID: 21-1170-03
Matrix: Groundwater

Laboratory Project: **21-1170**
Collect Date: 10/07/2021
Collect Time: 10:49 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1170-03-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-03

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

Aliquot #: 21-1170-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Arsenic	105		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	81		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	1060		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	91800		ug/L	1000.0	10/28/2021	AB21-1028-02
Chromium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Cobalt	ND		ug/L	6.0	10/28/2021	AB21-1028-02
Copper	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	6110		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	32		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	25800		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	17		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	5		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	5450		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	2		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	53800		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Zinc	ND		ug/L	10.0	10/28/2021	AB21-1028-02

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

Aliquot #: 21-1170-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	56100		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	173000		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1170-03-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	585		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 10/31/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **OW-12**
Lab Sample ID: 21-1170-03
Matrix: Groundwater

Laboratory Project: **21-1170**
Collect Date: 10/07/2021
Collect Time: 10:49 AM

Alkalinity by SM 2320B

Aliquot #: 21-1170-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	200000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Bicarbonate	200000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/14/2021	AB21-1014-10

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-SCS**
Lab Sample ID: 21-1170-04
Matrix: Groundwater

Laboratory Project: **21-1170**
Collect Date: 10/06/2021
Collect Time: 08:44 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1170-04-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-03

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

Aliquot #: 21-1170-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Arsenic	2		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	65		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	640		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	117000		ug/L	1000.0	10/28/2021	AB21-1028-02
Chromium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Cobalt	ND		ug/L	6.0	10/28/2021	AB21-1028-02
Copper	3		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	251		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	ND		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	36200		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	12		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	8		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	3720		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	7		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	308000		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	7		ug/L	2.0	10/28/2021	AB21-1028-02
Zinc	ND		ug/L	10.0	10/28/2021	AB21-1028-02

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

Aliquot #: 21-1170-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	52100		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	381000		ug/L	1000.0	10/18/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1170-04-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1330		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 10/31/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-SCS**
Lab Sample ID: 21-1170-04
Matrix: Groundwater

Laboratory Project: **21-1170**
Collect Date: 10/06/2021
Collect Time: 08:44 AM

Alkalinity by SM 2320B

Aliquot #: 21-1170-04-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	476000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Bicarbonate	476000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/14/2021	AB21-1014-10

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-PCS**
Lab Sample ID: 21-1170-05
Matrix: Groundwater

Laboratory Project: **21-1170**
Collect Date: 10/06/2021
Collect Time: 08:36 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1170-05-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-03

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

Aliquot #: 21-1170-05-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Arsenic	3		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	503		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	682		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	72000		ug/L	1000.0	10/28/2021	AB21-1028-02
Chromium	4		ug/L	1.0	10/28/2021	AB21-1028-02
Cobalt	ND		ug/L	6.0	10/28/2021	AB21-1028-02
Copper	3		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	441		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	ND		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	16100		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	21		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	4		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	4100		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	2		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	37200		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	23		ug/L	2.0	10/28/2021	AB21-1028-02
Zinc	ND		ug/L	10.0	10/28/2021	AB21-1028-02

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

Aliquot #: 21-1170-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	44500		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	74900		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1170-05-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	372		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 10/31/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **KLI-PCS**
Lab Sample ID: 21-1170-05
Matrix: Groundwater

Laboratory Project: **21-1170**
Collect Date: 10/06/2021
Collect Time: 08:36 AM

Alkalinity by SM 2320B

Aliquot #: 21-1170-05-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	139000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Bicarbonate	139000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/14/2021	AB21-1014-10

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Analytical Report

Report Date: 10/31/21

Sample Site: **DEK Lined Impoundment**
Field Sample ID: **SW-DITCH**
Lab Sample ID: 21-1170-06
Matrix: Groundwater

Laboratory Project: **21-1170**
Collect Date: 10/06/2021
Collect Time: 08:14 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1170-06-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-03

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

Aliquot #: 21-1170-06-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Arsenic	3		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	273		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	201		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	159000		ug/L	1000.0	10/28/2021	AB21-1028-02
Chromium	7		ug/L	1.0	10/28/2021	AB21-1028-02
Cobalt	ND		ug/L	6.0	10/28/2021	AB21-1028-02
Copper	13		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	895		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	ND		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	42200		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	5		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	15		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	5730		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	2		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	64100		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	9		ug/L	2.0	10/28/2021	AB21-1028-02
Zinc	20		ug/L	10.0	10/28/2021	AB21-1028-02

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

Aliquot #: 21-1170-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	42900		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	704000		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1170-06-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1020		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 10/31/21

Sample Site:	**DEK Lined Impoundment**	Laboratory Project:	**21-1170**
Field Sample ID:	**SW-DITCH**	Collect Date:	10/06/2021
Lab Sample ID:	21-1170-06	Collect Time:	08:14 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1170-06-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	ND		ug/L	10000.0	10/18/2021	AB21-1014-10
Alkalinity Bicarbonate	ND		ug/L	10000.0	10/18/2021	AB21-1014-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1014-10

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Analytical Report

Report Date: 10/31/21

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-1170

Inspection Date: 10/8/21 **Inspection By:** UH

Sample Origin/Project Name: DGK LI

Shipment Delivered By: Enter the type of shipment carrier

Pony _____ FedEx _____ UPS _____ USPS _____ Airborne _____

Other/Hand Carry (whom) TRC

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

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

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

Loose/Unpackaged Containers _____ Other _____

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

Damaged Shipment Observed: None ✓ Dented _____ Leaking _____

Other _____

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

Shipping Containers Received· Opened _____ Sealed ✓

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

CoC ✓ Work Request _____ Air Data Sheet_____ Other_____

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

As-Received Temperature Range 2.4-5.3°C Samples Received on Ice Yes Y No____

M&TE # and Expiration 015402/6.3.22

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

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL)	4 12 EB 100821				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	10 12 EB 10821				
24 mL vial (glass)					
150 ~~500~~ mL (plastic)	7 6 EB 100821				
Other _____					

 Pg. 292 not needed

CHAIN OF CUSTODY

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SAMPLING SITE	PROJECT NUMBER	ANALYSIS REQUESTED	Page 1 of 1
DEK Lined Impoundment – 2021 Q4	**21-1170**		SEND REPORT TO CDBatts
SAMPLING TEAM	DATE SHIPPED / SITE SKETCHED ATTACHED? CIRCLE ONE YES NO		HD Register, TRC PHONE

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity					REMARKS
21-1170-01	10/7/21	0950	GW	OW-10		5	x	x	x	x					
-02	"	0950	GW	OW-11		5	x	x	x	x					
-03	"	1049	GW	OW-12		5	x	x	x	x					
-04	10-6-21	0844	GW	KLI-SCS		5	x	x	x	x					
-05	10-6-21	0836	GW	KLI-PCS		5	x	x	x	x					
-06	10-6-21	0814	GW	SW-DITCH		5	x	x	x	x					
-07			GW	DUP-KLI		5	x	x	x	x					Not Collected
-08			W	EB-KLI		1	x								1
-09			W	FB-KLI		1	x								

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	COMMENTS
	10/7/21 1530		2.4°c to 5.3°c * 015402
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	
			ORIGINAL TO LAB COPY TO CUSTOMER

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

To: CDBatts, Karn/Weadock

From: EBlaj, T-258

Date: October 31, 2021

Subject: RCRA GROUNDWATER MONITORING – KARN BAP & LINED IMP. WELLS – 2021 Q4

CC: HDRegister, P22-521
BLSwanberg, P22-119

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

Chemistry Project: 21-1169

TRC Environmental, Inc. conducted groundwater monitoring at the DEKarn Bottom Ash Pond and Lined Impoundment Wells area on 10/07/2021, for the 4th Quarter monitoring 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 10/07/2021.

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

Reviewed and approved by:

Emil Blaj
Sr. Technical Analyst
Project Lead

ilac-MRA A2LA ACCREDITED Certificate #1097.04

CASE NARRATIVE

I. Sample Receipt

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

II. Methodology

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

III. Results/Quality Control

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

DEFINITIONS / QUALIFIERS

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

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

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

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Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q4-2021 DEK RCRA Bottom Ash Pond & Lined Impoundment
Date Received: 10/7/2021
Chemistry Project: 21-1169

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-1169-01	DEK-MW-15003	Groundwater	10/07/2021 07:27 AM	DEK Bottom Ash Pond & Lined Impoundment
21-1169-02	DEK-MW-18001	Groundwater	10/07/2021 06:32 AM	DEK Bottom Ash Pond & Lined Impoundment
21-1169-03	DEK-MW-18001 MS	Groundwater	10/07/2021 06:32 AM	DEK Bottom Ash Pond & Lined Impoundment
21-1169-04	DEK-MW-18001 MSD	Groundwater	10/07/2021 06:32 AM	DEK Bottom Ash Pond & Lined Impoundment

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Analytical Report

Report Date: 10/31/21

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-15003**
Lab Sample ID: 21-1169-01
Matrix: Groundwater

Laboratory Project: **21-1169**
Collect Date: 10/07/2021
Collect Time: 07:27 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1169-01-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-03

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

Aliquot #: 21-1169-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Arsenic	481		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	42		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	976		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	24500		ug/L	1000.0	10/28/2021	AB21-1028-02
Chromium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Cobalt	ND		ug/L	6.0	10/28/2021	AB21-1028-02
Copper	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	103		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	19		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	3970		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	28		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	4520		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	1		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	50100		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Zinc	ND		ug/L	10.0	10/28/2021	AB21-1028-02

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

Aliquot #: 21-1169-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	54000		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	39700		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1169-01-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	253		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 10/31/21

Sample Site:	**DEK Bottom Ash Pond & Lined Impoundment**	Laboratory Project:	**21-1169**
Field Sample ID:	**DEK-MW-15003**	Collect Date:	10/07/2021
Lab Sample ID:	21-1169-01	Collect Time:	07:27 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1169-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	65200		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Bicarbonate	65200		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/14/2021	AB21-1014-10

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Analytical Report

Report Date: 10/31/21

Sample Site:	**DEK Bottom Ash Pond & Lined Impoundment**	Laboratory Project:	**21-1169**
Field Sample ID:	**DEK-MW-18001**	Collect Date:	10/07/2021
Lab Sample ID:	21-1169-02	Collect Time:	06:32 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1169-02-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-03

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

Aliquot #: 21-1169-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Arsenic	85		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	135		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	1370		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	71000		ug/L	1000.0	10/28/2021	AB21-1028-02
Chromium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Cobalt	ND		ug/L	6.0	10/28/2021	AB21-1028-02
Copper	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	1190		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	24		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	12600		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	4		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	3540		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	2		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	79300		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Zinc	ND		ug/L	10.0	10/28/2021	AB21-1028-02

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

Aliquot #: 21-1169-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	55200		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	118000		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1169-02-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	494		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 10/31/21

Sample Site:	**DEK Bottom Ash Pond & Lined Impoundment**	Laboratory Project:	**21-1169**
Field Sample ID:	**DEK-MW-18001**	Collect Date:	10/07/2021
Lab Sample ID:	21-1169-02	Collect Time:	06:32 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1169-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	192000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Bicarbonate	192000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/14/2021	AB21-1014-10

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Analytical Report

Report Date: 10/31/21

Sample Site: **DEK Bottom Ash Pond & Lined Impoundment**
Field Sample ID: **DEK-MW-18001 MS**
Lab Sample ID: 21-1169-03
Matrix: Groundwater

Laboratory Project: **21-1169**
Collect Date: 10/07/2021
Collect Time: 06:32 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1169-03-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	98.2		%	0.2	10/14/2021	AB21-1014-03

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

Aliquot #: 21-1169-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	103		%	1.0	10/28/2021	AB21-1028-02
Arsenic	95		%	1.0	10/28/2021	AB21-1028-02
Barium	113		%	5.0	10/28/2021	AB21-1028-02
Beryllium	102		%	1.0	10/28/2021	AB21-1028-02
Boron	111		%	20.0	10/28/2021	AB21-1028-02
Cadmium	102		%	0.2	10/28/2021	AB21-1028-02
Calcium	113		%	1000.0	10/28/2021	AB21-1028-02
Chromium	105		%	1.0	10/28/2021	AB21-1028-02
Cobalt	105		%	6.0	10/28/2021	AB21-1028-02
Copper	98		%	1.0	10/28/2021	AB21-1028-02
Iron	113		%	20.0	10/28/2021	AB21-1028-02
Lead	82		%	1.0	10/28/2021	AB21-1028-02
Lithium	102		%	10.0	10/28/2021	AB21-1028-02
Magnesium	112		%	1000.0	10/28/2021	AB21-1028-02
Molybdenum	92		%	5.0	10/28/2021	AB21-1028-02
Nickel	101		%	2.0	10/28/2021	AB21-1028-02
Potassium	105		%	100.0	10/28/2021	AB21-1028-02
Selenium	91		%	1.0	10/28/2021	AB21-1028-02
Silver	88.6		%	0.2	10/28/2021	AB21-1028-02
Sodium	108		%	1000.0	10/28/2021	AB21-1028-02
Thallium	87		%	2.0	10/28/2021	AB21-1028-02
Vanadium	86		%	2.0	10/28/2021	AB21-1028-02
Zinc	110		%	10.0	10/28/2021	AB21-1028-02

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

Aliquot #: 21-1169-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	106		%	1000.0	10/14/2021	AB21-1014-08
Fluoride	92		%	1000.0	10/14/2021	AB21-1014-08
Sulfate	105		%	1000.0	10/14/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1169-03-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	98.0		%	10000.0	10/14/2021	AB21-1014-10

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Analytical Report

Report Date: 10/31/21

Sample Site:	**DEK Bottom Ash Pond & Lined Impoundment**	Laboratory Project:	**21-1169**
Field Sample ID:	**DEK-MW-18001 MSD**	Collect Date:	10/07/2021
Lab Sample ID:	21-1169-04	Collect Time:	06:32 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1169-04-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	110		%	0.2	10/14/2021	AB21-1014-03

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

Aliquot #: 21-1169-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	103		%	1.0	10/28/2021	AB21-1028-02
Arsenic	86		%	1.0	10/28/2021	AB21-1028-02
Barium	96		%	5.0	10/28/2021	AB21-1028-02
Beryllium	105		%	1.0	10/28/2021	AB21-1028-02
Boron	112		%	20.0	10/28/2021	AB21-1028-02
Cadmium	99.7		%	0.2	10/28/2021	AB21-1028-02
Calcium	111		%	1000.0	10/28/2021	AB21-1028-02
Chromium	107		%	1.0	10/28/2021	AB21-1028-02
Cobalt	103		%	6.0	10/28/2021	AB21-1028-02
Copper	99		%	1.0	10/28/2021	AB21-1028-02
Iron	103		%	20.0	10/28/2021	AB21-1028-02
Lead	81		%	1.0	10/28/2021	AB21-1028-02
Lithium	103		%	10.0	10/28/2021	AB21-1028-02
Magnesium	116		%	1000.0	10/28/2021	AB21-1028-02
Molybdenum	94		%	5.0	10/28/2021	AB21-1028-02
Nickel	103		%	2.0	10/28/2021	AB21-1028-02
Potassium	107		%	100.0	10/28/2021	AB21-1028-02
Selenium	94		%	1.0	10/28/2021	AB21-1028-02
Silver	85.5		%	0.2	10/28/2021	AB21-1028-02
Sodium	110		%	1000.0	10/28/2021	AB21-1028-02
Thallium	85		%	2.0	10/28/2021	AB21-1028-02
Vanadium	87		%	2.0	10/28/2021	AB21-1028-02
Zinc	109		%	10.0	10/28/2021	AB21-1028-02

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

Aliquot #: 21-1169-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	106		%	1000.0	10/14/2021	AB21-1014-08
Fluoride	92		%	1000.0	10/14/2021	AB21-1014-08
Sulfate	103		%	1000.0	10/14/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1169-04-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	97.5		%	10000.0	10/14/2021	AB21-1014-10

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Analytical Report

Report Date: 10/31/21

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-1169

Inspection Date: 10/8/21 **Inspection By:** CWH

Sample Origin/Project Name: DEK BAP + LI

Shipment Delivered By: Enter the type of shipment carrier

Pony _____ FedEx _____ UPS _____ USPS _____ Airborne _____

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

Tracking Number _____ Shipping Form Attached. Yes _____ No _____

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

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

Loose/Unpackaged Containers _____ Other _____

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

Damaged Shipment Observed. None ✓ Dented _____ Leaking _____

Other _____

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

Shipping Containers Received Opened _____ Sealed ✓

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

CoC ✓ Work Request _____ Air Data Sheet _____ Other _____

Temperature of Containers: Measure the temperature of several sample containers

As-Received Temperature Range 2.4 - 5.3°C Samples Received on Ice: Yes X No _____

M&TE # and Expiration 015402 | 6.3.22

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

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

PG. 2 of 2 not needed

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SAMPLING SITE: **DEK Bottom Ash Pond & LI – 2021 Q4**

PROJECT NUMBER: **21-1169**

SAMPLING TEAM

DATE SHIPPED

SITE SKETCHED ATTACHED? CIRCLE ONE YES NO

ANALYSIS REQUESTED

SEND REPORT TO: CDBatts; HD Register, TRC

PHONE

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity					REMARKS
21-1169-01	10/7/21	0737	GW	DEK-MW-15003		5	x	x	x	x					
-02	"	0632	GW	DEK-MW-18001		5	x	x	x	x					
-03	"	0633	GW	DEK-MW-18001 MS		5	x	x		x					
-04	"	0634	GW	DEK-MW-18001 MSD		5	x	x		x					

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	COMMENTS
	10/7/21 1530		2.4°C - 5.3°C #015402
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	

ORIGINAL TO LAB COPY TO CUSTOMER

Appendix B
Field Notes

TRC

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Compliance
PROJECT NUMBER:	418425.0001.0000
PROJECT MANAGER:	Darby Litz
SITE LOCATION:	2742 Weadock Hwy Essexville, MI 48732
DATES OF FIELDWORK:	TO
PURPOSE OF FIELDWORK:	2nd Semi Annual Sampling event
WORK PERFORMED BY:	Andrew WhaleyJake Krenz, Javier Jasso

SIGNED 10-20-21 DATE

CHECKED BY Whalley 10.29.21 DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC Karn LF: 2021 GW Compliand	DATE: 10-4-21	TIME ARRIVED: 0800
PROJECT NUMBER:	418425.0000.0000	AUTHOR: S. Krentz	TIME LEFT: 1800

WEATHER

TEMPERATURE: 64 °F WIND: 20 MPH VISIBILITY: Rain / cloudy

WORK / SAMPLING PERFORMED

A. Whaley recieved site training

collected samples from MW-01, MW-03, MW-06, MW-08, MW-10, MW-12, DUP-Perimeter Dike, MW-03 Field MS, MW-03 Field MSD

collected all samples from Karn BAP wells as well as QA/QC samples.

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NA	NA

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Butts	CEC	Site training / ~~sign~~ Sing in and out

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
purge water	1DNM	purged to ground

[signature] 10-20-21
SIGNED DATE

AW 10.29.21
CHECKED BY DATE

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME:	CEC Karn LF: 2021 GW Compliand	DATE: 10-6-21	TIME ARRIVED: 7:15
PROJECT NUMBER:	418425.0000.0000	AUTHOR: AW / JK	TIME LEFT: 5:30

WEATHER

TEMPERATURE: 62 °F WIND: 10W MPH VISIBILITY: 10W

WORK / SAMPLING PERFORMED

Finished perimeter dike wells
Lt Hg dirty hand - clean hand wells

Interior Landfill wells
Background wells

collected Karn Influent, SW-Ditch, KLI-SCS, and KLI-PCS samples
collected Samples from MW-18 and MW-19

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
—	—

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
Jake	TRC	Clean Hand / Dirty hand
C. Botts	CEC	check in/out (JK)

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
—	—	—

AW 10-21-21
SIGNED DATE

CHECKED BY 10-20-21
DATE

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Comp	DATE: 10-7-21	TIME ARRIVED: 07:15
PROJECT NUMBER:	418425.0001.0000	AUTHOR: Andrew Whaley, Jake Krer	TIME LEFT: ~~1:00~~ 1300

WEATHER

TEMPERATURE: 68 °F WIND: Low MPH VISIBILITY: Low

WORK / SAMPLING PERFORMED

Finished Background wells

Picked up bottles that were sent to hotel 103C

Met Javier @ Weadock LF to gather LLHg Clean / Dirty

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
—	—

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
Javier	TRC	Clean Hand / Dirty Hand

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
—	—	—

to Aus 10-29-21
SIGNED DATE

10-20-21
CHECKED BY DATE

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME:	CEC KARN LF 2021 GW SAM	DATE:	10/7/21	TIME ARRIVED:	9:11
PROJECT NUMBER:	418425.0000.0000	AUTHOR:	JJASSO	TIME LEFT:	12:50

WEATHER		
TEMPERATURE: 60 °F	WIND: 15 MPH	VISIBILITY: Cloudy

WORK / SAMPLING PERFORMED
WATER LEVELS
WELLS SAMPLED DPK-MW 18001 MSDMSD, 15003, OW-10, OW-11 OW-12

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NOC	

COMMUNICATION		
NAME	REPRESENTING	SUBJECT / COMMENTS
C. Butts	CEC	check in/out

INVESTIGATION DERIVED WASTE SUMMARY		
WASTE MATRIX	QUANTITY	COMMENTS
~~N/A~~		
purge water	NM	purged to ground

10/14/21
SIGNED DATE

10-20-21
CHECKED BY DATE

TRC

EQUIPMENT SUMMARY

PROJECT NAME:	CEC KARN LF 2021 GW C(	SAMPLER NAME:	JJASSO / J. Krenz / A. Whaley
PROJECT NO.:	418425.0000.0000		

WATER LEVEL MEASUREMENTS COLLECTED WITH:

HERON DIPPER-T	TRC A2
NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)

PRODUCT LEVEL MEASUREMENTS COLLECTED WITH:

HERON	TRC A2
NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)

DEPTH TO BOTTOM OF WELL MEASUREMENTS COLLECTED WITH:

HERON DIPPER-T	TRC A2
NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)

PURGING METHOD

PERISTALTIC PUMP / Bladder pump (Rental)	TRC A2
NAME AND MODEL OF PUMP OR TYPE OF BAILER	SERIAL NUMBER (IF APPLICABLE)

SAMPLING METHOD

PERISTALTIC PUMP	TRC A2
NAME AND MODEL OF PUMP OR TYPE OF BAILER	SERIAL NUMBER (IF APPLICABLE)
Geotech Disposable Filter ~~NA~~ (5K)	.45 micron ~~NA~~ (5K)
NAME AND MODEL OF FILTERATION DEVICE	FILTER TYPE AND SIZE

DEDICATED POLY TUBING — TUBING TYPE

☑ LOW-FLOW SAMPLING EVENT

PURGE WATER DISPOSAL METHOD

☑ GROUND ☐ DRUM ☐ POTW ☐ POLYTANK ☐ OTHER _____

DECONTAMINATION AND FIELD BLANK WATER SOURCE

LABORATORY PROVIDED	LABORATORY PROVIDED
POTABLE WATER SOURCE	DI WATER SOURCE
SIGNED 10/14/21 DATE	CHECKED BY 10-20-21 DATE

REVISED 04/2019

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Compliance	MODEL: YSI Pro DSS	SAMPLER: AW, JJ, (JK)
PROJECT NO.:	418425.0000.0000	SERIAL #: Rental	DATE: 10-4-21

PH CALIBRATION CHECK

pH 7 (LOT #): 16D360 (EXP. DATE): APR/20 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 16D680 (EXP. DATE): APR/21 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
7.01 / 7.01	4.001 / 4.00	☒ WITHIN RANGE	1050
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 16D700 (EXP. DATE): APR/22 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1374 / 1374	24.4	☒ WITHIN RANGE	1045
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 19E100362 (EXP. DATE): 11/22 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
215.5 / 215.5	19.9	☒ WITHIN RANGE	1052
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
8.74 / 8.74	19.6	☒ WITHIN RANGE	1054
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): DI water (EXP. DATE): POST-CAL. READING / STANDARD	(LOT #): P1007 (EXP. DATE): Jan/23 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0.0 / 0.0	100.0 / 100.0	☒ WITHIN RANGE	1055
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

☐ AUTOCAL SOLUTION
(LOT #):
(EXP. DATE):

☑ STANDARD SOLUTION (S)
LIST LOT NUMBERS AND EXPIRATION DATES UNDER CALIBRATION CHECK

CALIBRATED PARAMETERS		CALIBRATION RANGES [1]	
☐	pH	pH:	+/- 0.2 S.U.
☐	COND	COND:	+/- 1% OF CAL. STANDARD
☐	ORP	ORP:	+/- 25 mV
☐	D.O.	D.O.:	VARIES
☐	TURB	TURB:	+/- 5% OF CAL. STANDARD
☐	_____	[1] CALIBRATION RANGES ARE SPECIFIC TO THE MODEL OF THE WATER QUALITY METER	
☐	_____		

NOTES

5

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS
—	—

SIGNED [signature] 10-20-21 DATE

CHECKED BY AW 10.29.21 DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Compliance	MODEL: YSI Pro DSS	SAMPLER: ~~AW~~, JK, ~~JJ~~
PROJECT NO.:	418425.0001.0000	SERIAL #: ~~TRGA2~~ Rental	DATE: 10-6-21

PH CALIBRATION CHECK

pH 7 (LOT #): 16D360 (EXP. DATE): APR/23 — POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 16D680 (EXP. DATE): APR/23 — POST-CAL. READING / STANDARD	CAL. RANGE	TIME
7.01 / 7.01	4.00 / 4.00	☒ WITHIN RANGE	0743
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 16J700 (EXP. DATE): APR/22 — POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1374 / 1374	24.4	☒ WITHIN RANGE	0740
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 19E100369 (EXP. DATE): 11/22 — POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
215.7 / 215.7	20.0	☒ WITHIN RANGE	0746
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING — POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
8.81 / 8.81	19.8	☒ WITHIN RANGE	0750
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): DI water (EXP. DATE): — POST-CAL. READING / STANDARD	CALIBRATION READING (NTU) (LOT #): P1007 (EXP. DATE): Jan/23 — POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0.0 / 0.0	100.0 / 100.0	☒ WITHIN RANGE	0753
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

☐ AUTOCAL SOLUTION
(LOT #):
(EXP. DATE):

☑ STANDARD SOLUTION (S)
LIST LOT NUMBERS AND EXPIRATION DATES UNDER CALIBRATION CHECK

CALIBRATED PARAMETERS		CALIBRATION RANGES (1)	
☐	pH	pH:	+/- 0.2 S.U.
☐	COND	COND:	+/- 1% OF CAL. STANDARD
☐	ORP	ORP:	+/- 25 mV
☐	D.O.	D.O.:	VARIES
☐	TURB	TURB:	+/- 5% OF CAL. STANDARD
☐	_____	(1) CALIBRATION RANGES ARE SPECIFIC TO THE MODEL OF THE WATER QUALITY METER	
☐	_____		

NOTES

PROBLEMS ENCOUNTERED / CORRECTIVE ACTIONS

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

SIGNED — DATE: 10-20-21

CHECKED BY: AW — DATE: 10.29.21

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Compliance	MODEL: YSI Pro DSS	SAMPLER: AW, JJ, JK
PROJECT NO.:	418425.0000.0000	SERIAL #: Rental	DATE: 10-6-21

PH CALIBRATION CHECK

pH 7 (LOT #): 1GD360 (EXP. DATE): APR 6 19	pH 4 / 10 (LOT #): 1GB680 (EXP. DATE): APR 23	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
7.03 / 7.03	4.00 / 4.00	☒ WITHIN RANGE	0630
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 1GE263 (EXP. DATE): May 22	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING / STANDARD			
1413 / 1413	18.6	☒ WITHIN RANGE	0650
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 19E100562 (EXP. DATE): 7/27/22	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING / STANDARD			
212.5 / 212.5	17.9	☒ WITHIN RANGE	0640
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING /SATURATED AIR			
8.74 / 8.74	19.6	☒ WITHIN RANGE	0655
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): — (EXP. DATE): —	(LOT #): A1CC7 (EXP. DATE): Jun 23	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
0.00 / 0.00	100.0 / 100.0	☒ WITHIN RANGE	0645
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

☐ AUTOCAL SOLUTION
(LOT #):
(EXP. DATE):

☑ STANDARD SOLUTION (S)
LIST LOT NUMBERS AND EXPIRATION DATES UNDER CALIBRATION CHECK

Standard Solutions used SK

CALIBRATED PARAMETERS	CALIBRATION RANGES [1]
☐ pH	pH: +/- 0.2 S.U.
☐ COND	COND: +/- 1% OF CAL. STANDARD
☐ ORP	ORP: +/- 25 mV
☐ D.O.	D.O.: VARIES
☐ TURB	TURB: +/- 5% OF CAL. STANDARD
☐ _____	[1] CALIBRATION RANGES ARE SPECIFIC TO THE MODEL OF THE WATER QUALITY METER
☐ _____	

NOTES

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PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS
—	—

SIGNED [signature] DATE 10-6-21

CHECKED BY [signature] DATE 10-20-21

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Compliance	MODEL: YSI PRO DSS	SAMPLER: (AW) JJ, JK
PROJECT NO.:	418425.0000.0000	SERIAL #: Rental	DATE: 10-7-21

PH CALIBRATION CHECK

pH 7 (LOT #): 1G360 (EXP. DATE): APR23 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 1GD380 (EXP. DATE): APR.23 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
7.02 / 7.02	4.00 / 4.00	☒ WITHIN RANGE	0630
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 1GE203 (EXP. DATE): May23 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1415 / 1415	18.1	☒ WITHIN RANGE	0645
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 19E 100362 (EXP. DATE): 11/27/22 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
213.1 / 213.1	18.0	☒ WITHIN RANGE	0635
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
8.70 / 8.70	19.6	☒ WITHIN RANGE	0650
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): NA (EXP. DATE):	(LOT #): A1007 (EXP. DATE): Jan/23	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
0.00 / 0.00	100.00 / 100.0	☒ WITHIN RANGE	0640
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

☐ AUTOCAL SOLUTION
(LOT #):
(EXP. DATE):

☑ STANDARD SOLUTION (S)
LIST LOT NUMBERS AND EXPIRATION DATES UNDER CALIBRATION CHECK

CALIBRATED PARAMETERS		CALIBRATION RANGES [1]	
☐	pH	pH:	+/- 0.2 S.U.
☐	COND	COND:	+/- 1% OF CAL. STANDARD
☐	ORP	ORP:	+/- 25 mV
☐	D.O.	D.O.:	VARIES
☐	TURB	TURB:	+/- 5% OF CAL. STANDARD
☐	_____	[1] CALIBRATION RANGES ARE SPECIFIC TO THE MODEL OF THE WATER QUALITY METER	
☐	_____		

NOTES

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PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS
—	—

AW — 10.29.21
SIGNED — DATE

CHECKED BY — 10-20-21
DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC KARN LF 2021 GW COMPL	MODEL: ~~YSI 556~~ YSI Pro DSS	SAMPLER: JJASSO
PROJECT NO.:	418425.0000.0000	SERIAL #: TRC A2	DATE: 10/7/21

PH CALIBRATION CHECK

pH 7 (LOT #): 10D366 (EXP. DATE): 4/23	pH 4 / 10 (LOT #): 10D640 (EXP. DATE): 4/22	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
700 / 700	400 / 400	☑ WITHIN RANGE	0505
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 16F263 (EXP. DATE): 5/22	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING / STANDARD			
1413 / 1413	NA	☑ WITHIN RANGE	0511
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 20B180028 (EXP. DATE): 2/25	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING / STANDARD			
220 / 220	22.0	☑ WITHIN RANGE	0511
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING /SATURATED AIR			
8.51 / 8.51	22.0	☑ WITHIN RANGE	0511
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A1007 (EXP. DATE): 1/23	(LOT #): (EXP. DATE):	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
0 / 0	/	☑ WITHIN RANGE	0511
100 / 100	/	☑ WITHIN RANGE	0511
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

☐ AUTOCAL SOLUTION	☒ STANDARD SOLUTION (S)
(LOT #): (EXP. DATE):	LIST LOT NUMBERS AND EXPIRATION DATES UNDER CALIBRATION CHECK
CALIBRATED PARAMETERS	CALIBRATION RANGES [1]
☐ pH	pH: +/- 0.2 S.U.
☐ COND	COND: +/- 1% OF CAL. STANDARD
☐ ORP	ORP: +/- 25 mV
☐ D.O.	D.O.: VARIES
☐ TURB	TURB: +/- 5% OF CAL. STANDARD
☐ ______	[1] CALIBRATION RANGES ARE SPECIFIC TO THE MODEL OF THE WATER QUALITY METER
☐ ______	

NOTES

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

SIGNED [signature] DATE 10/14/21

CHECKED BY [signature] DATE 10-20-21

REVISED 04/2019

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Compliance	DATE:	
PROJECT NUMBER:	418425.0001.0000	AUTHOR:	Andrew WhaleyJake Krenz, Ja

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
DE Karn Bottom Ash Pond						
DEK-MW-15002	0928	TOC	6.38	15.75		
DEK-MW-15004	1001	↓	27.88	41.80		
DEK-MW-15005	0934	↓	8.81	22.23		
DEK-MW-15006	0936	↓	~~8.86~~8.28	21.50		
DE Karn Bottom Ash Pond and Lined Impoundment						
DEK-MW-18001	0940	TOC	8.43	19.65		
DEK-MW-15003	0952	TOC	16.50	27.87		
Karn Lined Impoundment						
OW-10		TOC				
OW-11		↓				
OW-12		↓				
Background						
MW-15002	0845	TOC	6.68	19.95		
MW-15008	0807	↓	4.28	17.40		
MW-15016	0852	↓	3.85	8.10		
MW-15019	0832	↓	5.20	16.85		

ALL WATER LEVELS MUST INCLUDE REFERENCE POINT AND TAPE CORRECTION FACTOR (E.G., 1.1 + 0.00 T/PVC).

SIGNED — 10-20-21 DATE

CHECKED — AW — 10.29.21 DATE

REVISED 04/2019

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Compl	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0000.0000	BY: AW JJ, JK	DATE: 10-6-21	BY: JK	DATE: 10-20-21

SAMPLE ID: MW-1500S | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1542	DATE: 10-6-21	SAMPLE	TIME: 1602	DATE: 10-6-21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 9.30 T/ PVC

DEPTH TO BOTTOM: 17.40 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 4 ☒ LITERS ☐ GALLONS

COLOR: Clear ODOR: —

TURBIDITY ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

PH: 6.62 SU | CONDUCTIVITY: 1202 umhos/cm

ORP: -93.6 mV | DO: 0.46 mg/L

TURBIDITY: 10.70 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 16.0 °C | OTHER: —

COLOR: Clear | ODOR: —

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: | FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS: —

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1542	200	6.99	966	-103.3	2.10	3.63	17.15	9.30	INITIAL
1547	200	6.72	1057	-98.1	0.76	3.41	16.0	4.34	1
1552	200	6.65	1184	-92.1	0.54	7.86	15.8	4.34	2
1557	200	6.63	1192	-92.9	0.49	12.4	15.8	4.34	3
1602	200	6.62	1202	-93.6	0.46	10.70	16.0	4.34	4

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 mv D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60 mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
2	1000 mL	plastic	B	☐ Y ☒ N					☐ Y ☐ N
1	125 mL	plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125 mL	plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	200 mL	plastic	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Lab Drop off	DATE SHIPPED:	10-7-21	AIRBILL NUMBER:	—
COC NUMBER:	—	SIGNATURE:	AW	DATE SIGNED:	10-29-21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Compl	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0000.0000	BY: AW, JJ, JK	DATE: 10-7-21	BY: JK	DATE: 10-20-21

SAMPLE ID: MW 15019 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 0750	DATE: 10-7-21	SAMPLE	TIME: 0810	DATE: 10-7-21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.44 SU	CONDUCTIVITY: 1829	umhos/cm
			ORP: -72.2 mV	DO: 0.48	mg/L
DEPTH TO WATER:	5.13 T/ PVC		TURBIDITY: 1.22 NTU		
DEPTH TO BOTTOM:	16.85 T/ PVC		☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS		TEMPERATURE: 15.2 °C	OTHER: —	
VOLUME REMOVED:	4 ☒ LITERS ☐ GALLONS		COLOR: Clear	ODOR: —	
COLOR:	Clear ODOR: —		FILTRATE (0.45 um) ☐ YES	☒ NO	
TURBIDITY			FILTRATE COLOR: —	FILTRATE ODOR: —	
☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD	☒ DUP- 04	
DISPOSAL METHOD:	☒ GROUND ☐ DRUM ☐ OTHER		COMMENTS:	DEK SCW Background	

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
0750	200	6.23	1841	-40.1	1.95	1.02	14.8	5.13	INITIAL
0755	200	6.39	1816	-43.6	0.70	1.17	15.0	5.13	1
0800	200	6.42	1822	-62.4	0.54	1.25	15.2	5.13	2
0805	200	6.43	1828	-69.9	0.49	1.06	15.2	5.13	3
0810	200	6.44	1829	-72.2	0.48	1.22	15.2	5.13	4

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	60	VOA	A	☐ Y ☒ N					☐ Y ☐ N
2	125	plastic	A	☐ Y ☒ N					☐ Y ☐ N
2	250	plastic	A	☐ Y ☒ N					☐ Y ☐ N
2	125	plastic	B	☐ Y ☒ N					☐ Y ☐ N
2	1000	plastic	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Lab Drop off	DATE SHIPPED:	10-7-21	AIRBILL NUMBER:	—
COC NUMBER:	—	SIGNATURE:	AW	DATE SIGNED:	10.29.21

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Compl	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0000.0000	BY: AW, JJ, JK	DATE: 10-7-21	BY: SK	DATE: 10-20-21

SAMPLE ID: MW 1500 2 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 0818	DATE: 10-7-21	SAMPLE	TIME: 0908	DATE: 10-7-21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.00 SU	CONDUCTIVITY: 919 umhos/cm	
			ORP: -106.9 mV	DO: 0.50 mg/L	
DEPTH TO WATER:	6.64 T/ PVC		TURBIDITY: 3.23 NTU		
DEPTH TO BOTTOM:	19.95 T/ PVC		☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS		TEMPERATURE: 16.5 °C	OTHER: —	
VOLUME REMOVED:	4 ☒ LITERS ☐ GALLONS		COLOR: Clear	ODOR: —	
COLOR:	Clear ODOR: —		FILTRATE (0.45 um) ☐ YES	☒ NO	
TURBIDITY			FILTRATE COLOR: —	FILTRATE ODOR: —	
☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD	☒ DUP- 04	
DISPOSAL METHOD:	☒ GROUND ☐ DRUM ☐ OTHER		COMMENTS:	Radon Samples	

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
0818	200	7.04	1090	-96.1	18.0	9.38	16.6	6.64	INITIAL
0853	200	7.02	972	-84.2	0.67	7.92	16.6	6.90	1
0858	200	7.01	933	-95.2	0.57	2.50	16.6	6.90	2
0903	200	7.01	922	-99.1	0.54	1.78	16.6	6.90	3
0908	200	7.00	919	-106.9	0.50	3.23	16.5	6.90	4

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60	VOA	A	☐ Y ☒ N	1	125	plastic	A	☐ Y ☒ N
1	125	plastic	A	☐ Y ☒ N	1	125	plastic	B	☐ Y ☒ N
1	125	↓	B	☐ Y ☒ N		↑			☐ Y ☐ N
1	250		A	☐ Y ☒ N		F B			☐ Y ☐ N
4	1000		B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Lab Drop off	DATE SHIPPED:	10-7-21	AIRBILL NUMBER:	—
COC NUMBER:	—	SIGNATURE:	AW	DATE SIGNED:	10.29.21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn LF: 2021 GW Compl	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0000.0000	BY: (AW), JJ, JK	DATE: 10-7-21	BY: JK	DATE: 10-20-21

SAMPLE ID: MW-1501G | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 0945	DATE: 10-7-21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 4.12 T/ PVC

DEPTH TO BOTTOM: 8.10 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 5 ☒ LITERS ☐ GALLONS

COLOR: Clear ODOR: —

TURBIDITY ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1010	DATE: 10-7-21

PH: 6.93 SU CONDUCTIVITY: 1498 umhos/cm

ORP: -71.2 mV DO: 0.54 mg/L

TURBIDITY: 1.47 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 17.4 °C OTHER: —

COLOR: Clear ODOR: —

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: — FILTRATE ODOR: —

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS: —

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
0945	200	6.94	1548	16.9	1.40	14.02	17.5	4.12	INITIAL
0950	200	6.93	1495	-37.0	0.69	4.36	17.5	4.12	1
0955	200	6.93	1494	-55.7	0.58	3.13	17.5	4.12	2
1000	200	6.93	1500	-63.5	0.54	1.71	17.5	4.41	3
1005	200	6.93	1498	-68.2	0.54	1.81	17.4	4.41	4
1010	200	6.93	1498	-71.2	0.54	1.47	17.4	4.41	5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125	↓	B	☐ Y ☒ N					☐ Y ☐ N
1	250		A	☐ Y ☒ N					☐ Y ☐ N
2	1000		B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Lab Drop off	DATE SHIPPED:	10-7-21	AIRBILL NUMBER:	—
COC NUMBER:	—	SIGNATURE:	AW	DATE SIGNED:	10.29.21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW Cc	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: ~~AW~~ JR, ~~JJ~~	DATE: 10-6-21	BY: AWS	DATE 10.29.21

SAMPLE ID: SW-Ditch — WELL DIAMETER: ~~☑ 2"~~ ☐ 4" ☐ 6" ☒ OTHER NA

WELL MATERIAL: ~~☑ PVC~~ ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☒ OTHER NA

SAMPLE TYPE: ~~☑ GW~~ ☐ WW ☒ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME:	DATE:

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: ____ T/ PVC

DEPTH TO BOTTOM: ____ T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: ____ ☐ LITERS ☐ GALLONS

COLOR: ____ ODOR: ____

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0814	DATE: 10-6-21

PH: 2.59 SU — CONDUCTIVITY: 2406 umhos/cm

ORP: 460.6 mV — DO: 7.14 mg/L

TURBIDITY: 8.60 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 30.2 °C — OTHER: ~~

COLOR: clear — ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: ~~ — FILTRATE ODOR: ~~

QC SAMPLE: ☐ MS/MSD ☐ DUP- ____

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
0814	NA	2.59	2408	460.6	7.14	8.60	30.2	NA	INITIAL

~~NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUGGESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:~~

~~•pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or +/- 10 TEMP.: +/-~~

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - ____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	Plastic	B	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	A	☐ Y ☒ N					☐ Y ☐ N
1	250mL	↓	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Lab Drop off	DATE SHIPPED:	10-7-21	AIRBILL NUMBER:	~~
COC NUMBER:	~~	SIGNATURE:		DATE SIGNED:	10-20-21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: ~~AW~~ JR ~~JJ~~	DATE: 10-6-21	BY: Aes	DATE: 10.29.21

SAMPLE ID: KLI - PCS	WELL DIAMETER: ~~☑ 2"~~ ☐ 4" ☐ 6" ☒ OTHER	NA			
WELL MATERIAL: ~~☑ PVC~~ ☐ SS ☐ IRON ☐ GALVANIZED STEEL	☒ OTHER	NA			
SAMPLE TYPE: ~~☑ GW~~ ☐ WW ☒ SW ☐ DI ☐ LEACHATE	☐ OTHER				

PURGING	TIME:	DATE:	SAMPLE	TIME: 0836	DATE: 10-6-21
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 8.50 SU	CONDUCTIVITY: 593 umhos/cm	
			ORP: 313.4 mV	DO: 7.95 mg/L	
DEPTH TO WATER: ____ TOC PVC			TURBIDITY: 23.25 NTU		
DEPTH TO BOTTOM: ____ TOC PVC			☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 23.25 °C	OTHER: ~	
VOLUME REMOVED: ____ ☐ LITERS ☐ GALLONS			COLOR: Clear	ODOR: none	
COLOR: Clear ODOR: none			FILTRATE (0.45 um) ☐ YES ☒ NO		
TURBIDITY			FILTRATE COLOR: ~	FILTRATE ODOR: ~	
~~☒ NONE~~ ☒ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD ☐ DUP- ____		
DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER			COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
0836	NA	8.50	593	313.4	7.95	23.25	23.7	NA	INITIAL

~~NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:~~

~~pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-~~

BOTTLES FILLED		PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - ____							
NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	Plastic	B	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	A	☐ Y ☒ N					☐ Y ☐ N
1	250mL	↓	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: Lab Drop off	DATE SHIPPED: 10-7-21	AIRBILL NUMBER: ~			
COC NUMBER: ~	SIGNATURE: [signature]	DATE SIGNED: 10-20-21			

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn BAP/LI: 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418425.0001.0000	BY: ~~AW~~ JR ~~JJ~~	DATE: 10-6-21	BY: ACS	DATE: 10.29.21

SAMPLE ID: KLI - SCS | WELL DIAMETER: ~~☑ 2"~~ ☐ 4" ☐ 6" ☒ OTHER NA

WELL MATERIAL: ~~☑ PVC~~ ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☒ OTHER NA

SAMPLE TYPE: ~~☑ GW~~ ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☒ OTHER Secondary Sump

PURGING	TIME:	DATE:

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: ____ T/ PVC

DEPTH TO BOTTOM: ____ T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: ____ ☐ LITERS ☐ GALLONS

COLOR: Clear ODOR: none

TURBIDITY

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0844	DATE: 10-6-21

PH: 7.20 SU | CONDUCTIVITY: 1759 umhos/cm

ORP: 158.3 mV | DO: 2.21 mg/L

TURBIDITY: 0.77 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 20.2 °C | OTHER: ____

COLOR: clear | ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: — | FILTRATE ODOR: —

QC SAMPLE: ☐ MS/MSD ☐ DUP- ____

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
0844	NA	7.20	1759	158.3	2.21	0.77	20.2	NA	INITIAL

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - ____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	B	☐ Y ☒ N					☐ Y ☐ N
1	250mL	↓	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Lab Drop off	DATE SHIPPED:	10-7-21	AIRBILL NUMBER:	—
COC NUMBER:	—	SIGNATURE:		DATE SIGNED:	10-20-21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC KARN LF 2021 GW COM	PREPARED	CHECKED
PROJECT NUMBER: 418425.0000.0000	BY: JJASSO DATE: 10/14/21	BY: AW DATE: 10.29.21

DEK-MW-18001

SAMPLE ID: ~~DEK18001~~ WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 0607	DATE: 10/7/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 8.43 T/ PVC

DEPTH TO BOTTOM: 19.61 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 5 ☑ LITERS ☐ GALLONS

COLOR: Clear ODOR: NONE

TURBIDITY ☐ NONE ☒ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0638	DATE: 10/7/21

PH: 7.35 SU CONDUCTIVITY: 850 umhos/cm

ORP: -158.5 mV DO: 0.24 mg/L

TURBIDITY: 2.24 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 14.3 °C OTHER:

COLOR: Clear ODOR: NONE

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☑ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
0607	200	4.0	446	-9.4	9.0	22.0	12.1	850	INITIAL
0612		7.20	872	-124.3	0.81	22.5	14.1	860	1
0617		7.33	854	-145.0	0.43	2.14	14.4	860	2
0622		7.31	861	-158.0	0.36	2.48	14.1	860	3
0627		7.31	8.51	-158.0	0.30	2.25	14.3	860	4
0632		7.35	8.50	-158.5	0.29	2.24	14.3	860	5
									~~6~~
									7

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- ~~10%~~ 3% ORP: +/- ~~10%~~ 10 MV D.O.: +/- ~~10%~~ 1.3 TURB: +/- 10 % or </= .5 10 TEMP.: ~~+/- 0.5°C~~

BOTTLES FILLED		PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____							
NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
6	125 mL	VOA	A	☐ Y ☑ N					☐ Y ☐ N
3	125 mL	PLASTIC	A	~~☑ Y~~ ☑ N					☐ Y ☐ N
3	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
6	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	250	P	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: N/A AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: 10/14/21 DATE SIGNED: 10/14/21

IRC

WATER SAMPLE LOG

PROJECT NAME: CEC KARN LF 2021 GW COM	PREPARED	CHECKED
PROJECT NUMBER: 418425.0000.0000	BY: JJASSO DATE: 10/14/21	BY: JR DATE: 10-20-21

DEK-MW-15003 →

SAMPLE ID: ~~DEK1503~~ WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 0707	DATE: 10/7/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 16.50 T/ PVC

DEPTH TO BOTTOM: 27.87 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 2 ☑ LITERS ☐ GALLONS

COLOR: Clear ODOR: None

TURBIDITY ☐ NONE ☑ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0727	DATE: 10/7/21

PH: 8.31 SU CONDUCTIVITY: 461 umhos/cm

ORP: -210.1 mV DO: 057 mg/L

TURBIDITY: 1.91 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 20.8 °C OTHER:

COLOR: Clear ODOR: None

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
0707	100	8.0	475	-105.7	9.0	6.40	20.6	16.50	INITIAL
0712		8.33	456	-193.5	1.00	1.85	20.8	17.68	.5
0717		8.32	457	-210.0	078	20	20.8	17.95	1
0722		8.31	459	-210.1	060	1.85	20.8	18.11	1.5
0727		8.31	461	~~-210.3~~	057	1.91	20.8	18.70	2
									~~2.5~~
									~~3~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- ~~10 %~~ 30 ORP: +/- ~~10 %~~ 10mV D.O.: +/- ~~10 %~~ 0.3 TURB: +/- 10 % or </= ~~5~~ 10 TEMP.: ~~+/- 0.5°C~~

BOTTLES FILLED	PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F -								
NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125 mL	VOA	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	A	~~☑~~ ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
2	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: NA AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: DATE SIGNED: 10/18/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC KARN LF 2021 GW COM	PREPARED	CHECKED
PROJECT NUMBER:	418425.0000.0000	BY: JJASSO DATE: 10/14/21	BY: JK DATE: 10-20-21

SAMPLE ID: OW-10 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 0805	DATE: 10/7/21	SAMPLE	TIME: 0850	DATE: 10/7/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 6.40 T/ PVC

DEPTH TO BOTTOM: 17.95 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 11.5 ☑ LITERS ☐ GALLONS

COLOR: clear ODOR: non

TURBIDITY ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 7.04 SU CONDUCTIVITY: 1165 umhos/cm

ORP: -146.3 mV DO: 0.23 mg/L

TURBIDITY: 6.90 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 14.3 °C OTHER:

COLOR: clear ODOR: non

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
0805	100	6.91	1254	-75.1	8.80	8.0	16.8	6.41	INITIAL
0810		6.87	1462	-125.0	086	7.79	14.5	7.40	.5
0815		6.95	1370	-132.0	050	18.20	14.4	7.65	1
0820		6.98	1330	-139.0	034	25.0	14.3	7.76	1.5
0825		7.00	1310	-134.5	033	22.0	14.3	7.85	2
0830		7.00	1271	-132.5	036	19.0	14.3	7.90	2.5
0835		7.02	1242	-139.5	029	10.0	14.3	7.90	3
0840		7.04	1212	-145.0	026	7.0	14.3	7.92	3.5
0845		7.04	1177	-146.0	025	7.0	14.3	7.93	4
0850		7.04	1165	-146.3	023	6.90	14.3	7.93	4.5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- ~~10%~~ 3% ORP: +/- ~~10%~~ 10mV D.O.: +/- ~~10%~~ .3 TURB: +/- 10 % or </= ~~5~~ 10 TEMP.: ~~+/- 0.5°C~~

BOTTLES FILLED		PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____							
NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125 mL	VOA	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	A	~~☐ Y~~ ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
2	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: NA AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: [signature] DATE SIGNED: 10/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC KARN LF 2021 GW COM	PREPARED	CHECKED
PROJECT NUMBER: 418425.0000.0000	BY: JJASSO DATE: 10/14/21	BY: JK DATE: 10-20-21

SAMPLE ID: OW-11 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 0915	DATE: 10/7/21	SAMPLE	TIME: 0950	DATE: 10/7/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 21.69 T/ PVC

DEPTH TO BOTTOM: 25.47 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 3.5 ☑ LITERS ☐ GALLONS

COLOR: Dark gray ODOR: non

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 9.53 SU CONDUCTIVITY: 470 umhos/cm

ORP: -137.5 mV DO: 0.07 mg/L

TURBIDITY: 4.0 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 12.7 °C OTHER:

COLOR: Clear ODOR: non

FILTRATE (0.45 um) ☐ YES ☑ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
0915	100	9.48	300	-101.7	7.0	900	15.0	21.69	INITIAL
0920		9.62	468	-109.3	1.16	535	12.9	22.90	1
0925		9.58	467	-101.7	1.19	42.7	12.8	23.40	1
0930		9.55	466	-114.0	0.96	20.0	12.7	23.40	1.5
0935		9.54	469	-135.1	0.70	20.0	12.7	23.50	2
0940		9.53	470	-137.0	0.07	5.0	12.7	23.60	2.5
0945		9.53	470	-137.5	0.04	4.0	12.7	23.70	3
0950		9.53	470	-137.5	0.05	4.0	12.7	23.80	3.5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- ~~10%~~ 3% ORP: +/- ~~10%~~ 10MV D.O.: +/- ~~10%~~ .3 TURB: +/- 10 % or </= ~~5~~ 10 TEMP: ~~+/- 0.5°C~~

BOTTLES FILLED PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F- _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125 mL	VOA	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	A	~~☑~~ ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
2	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	250	P	A	☐ Y ~~☑~~ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: N/A AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: DATE SIGNED: 10/14/21

IRC

WATER SAMPLE LOG

PROJECT NAME: CEC KARN LF 2021 GW COM	PREPARED	CHECKED
PROJECT NUMBER: 418425.0000.0000	BY: JJASSO DATE: 10/14/21	BY: JK DATE: 10-20-21

SAMPLE ID: OW-12 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1019	DATE: 10/12/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 17.46 T/ PVC

DEPTH TO BOTTOM: 23.41 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 4 ☑ LITERS ☐ GALLONS

COLOR: BROWN ODOR: NOR

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1049	DATE: 10/7/21

PH: 7.18 SU CONDUCTIVITY: 976 umhos/cm

ORP: -140.3 mV DO: 030 mg/L

TURBIDITY: 5.81 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 16.9 °C OTHER:

COLOR: CLEAR ODOR: NONE

FILTRATE (0.45 um) ☐ YES ☑ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1019	200	7.57	926	-131.5	9.0	760	17.3	17.0<	INITIAL
1024		7.17	966	-138.8	086	63.0	16.1	176<	1.0
1029		7.18	967	-135.0	044	17.90	16.8	176<	2.0
1034		7.18	973	-140.0	037	6.0	16.9	176<	3.0
1039		7.18	976	-140.0	031	6.0	17.0	176<	4.0
1044		7.18	976	-140.3	030	5.81	16.9	176<	5.0
~~1044~~								~~176<~~	~~5.0~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- ~~10 %~~ 3% ORP: +/- ~~10 %~~ 10 mV D.O.: +/- ~~10 %~~ .3 TURB: +/- 10 % or </= ~~5~~ 10 TEMP.: ~~+/- 0.5°C~~

BOTTLES FILLED PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125 mL	VOA	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
2	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	250	DI	D	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: N/A AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: DATE SIGNED: 10/14/21

REVISED 04/2019

TRC WATER SAMPLE LOG

CEC Karn BAP/LI

PROJECT NAME: ~~CEC Karn LF:~~ 2021 GW Compl	PREPARED	CHECKED
PROJECT NUMBER: 418425.~~0000~~0001 0000	BY: ~~AW, JJ,~~ JK DATE: 10-4-21	BY: AW DATE: 10.28.21

SAMPLE ID: DEK-MW-15004 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1419	DATE: 10-4-21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 27.87 T/ PVC

DEPTH TO BOTTOM: 41.80 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 5 ☒ LITERS ☐ GALLONS

COLOR: Clear ODOR: none

TURBIDITY: ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1446	DATE: 10-4-21

PH: 7.12 SU CONDUCTIVITY: 698 umhos/cm

ORP: -125.6 mV DO: 0.49 mg/L

TURBIDITY: 1.36 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 15.6 °C OTHER: ~

COLOR: Clear ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: ~ FILTRATE ODOR: ~

QC SAMPLE: ☐ MS/MSD ☐ DUP- _____

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
~~1432~~ 1421	200	7.45	692	-108.4	2.20	2.31	15.9	28.13	INITIAL
1426	200	7.38	693	-137.1	0.78	2.74	15.6	28.13	1
1431	200	7.23	700	-131.8	0.61	2.59	15.6	28.13	2
1436	200	7.14	697	-128.3	0.51	1.95	15.5	28.13	3
1441	200	7.11	696	-126.0	0.48	1.47	15.5	28.13	4
1446	200	7.12	698	-125.6	0.49	1.36	15.6	28.13	5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	250mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL		B	☐ Y ☒ N					☐ Y ☐ N
2	1L	↓	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD: Fedex	DATE SHIPPED: 10-6-21	AIRBILL NUMBER: ~
COC NUMBER: ~	SIGNATURE: [signature]	DATE SIGNED: 10-20-21

TRC Kern BAP/LI WATER SAMPLE LOG

PROJECT NAME: CEC ~~Karn LF~~ 2021 GW Compl	PREPARED	CHECKED
PROJECT NUMBER: 418425.~~0000~~0001	BY: ~~AW, JJ,~~ JK DATE: 10-4-21	BY: AW DATE: 10.29.21

SAMPLE ID: DEK-MW-15002 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1316	DATE: 10-4-21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 6.32 T/ PVC

DEPTH TO BOTTOM: 15.70 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 4 ☒ LITERS ☐ GALLONS

COLOR: clear ODOR: none

TURBIDITY ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1337	DATE: 10-4-21

PH: 7.11 SU CONDUCTIVITY: 884 umhos/cm

ORP: -116.2 mV DO: 0.41 mg/L

TURBIDITY: 1.64 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 15.6 °C OTHER:

COLOR: clear ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS: Field Blank Collected

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1317	200	7.42	790	-29.3	1.70	2.75	16.3	6.54	INITIAL
1322	200	7.20	904	-94.5	0.55	3.24	15.6	6.54	1
1327	200	7.16	904	-107.8	0.48	5.11	15.7	6.54	2
1332	200	7.14	884	-114.4	0.42	6.95	15.6	6.54	3
1337	200	7.11	884	-116.2	0.41	1.64	15.6	6.54	4

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N	1	125mL	Plastic	B	☐ Y ☒ N
1	250mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	A	☐ Y ☒ N		Field	Blank		☐ Y ☐ N
1	125mL	↓	B	☐ Y ☒ N					☐ Y ☐ N
2	1L	↓	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD: Fedex	DATE SHIPPED: 10-6-21	AIRBILL NUMBER:
COC NUMBER:	SIGNATURE:	DATE SIGNED: 10-20-21

REVISED 04/2019

TRC

WATER SAMPLE LOG

Kern BAP/LI

PROJECT NAME:	CEC ~~Kern LF~~: 2021 GW Compl	PREPARED		CHECKED	
PROJECT NUMBER:	418425.~~0000~~0001	BY: AW, JJ, JK	DATE: 10-4-21	BY: AW	DATE: 10.7.21

SAMPLE ID: DEK-MW-15006	WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER				
WELL MATERIAL:	☑ PVC	☐ SS	☐ IRON	☐ GALVANIZED STEEL	☐ OTHER
SAMPLE TYPE:	☑ GW	☐ WW	☐ SW	☐ DI	☐ LEACHATE ☐ OTHER

PURGING	TIME: 1206	DATE: 10-4-21	SAMPLE	TIME: 1232	DATE: 10-4-21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP		PH: 7.30 SU	CONDUCTIVITY: 925	umhos/cm
	☐ BAILER		ORP: -100.0 mV	DO: 0.35	mg/L
DEPTH TO WATER: 8.17 T/ PVC			TURBIDITY: 3.76 NTU		
DEPTH TO BOTTOM: 21.56 T/ PVC			☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA	☐ LITERS ☐ GALLONS		TEMPERATURE: 14.8 °C	OTHER: —	
VOLUME REMOVED: 5	☒ LITERS ☐ GALLONS		COLOR: clear	ODOR: none	
COLOR: clear	ODOR: none		FILTRATE (0.45 um) ☐ YES ☒ NO		
TURBIDITY			FILTRATE COLOR: —	FILTRATE ODOR: —	
☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD	☒ DUP- DEKBAP	
DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER			COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1207	200	7.32	1048	-71.3	1.78	3.25	15.2	8.25	INITIAL
1212	200	7.41	992	-119.1	0.56	3.54	14.9	8.25	1
1217	200	7.32	954	-106.5	0.45	2.92	14.9	8.25	2
1222	200	7.30	940	-94.2	0.39	3.01	14.9	8.25	3
1227	200	7.38	928	-100.8	0.37	3.08	14.9	8.25	4
1232	200	7.30	925	-100.0	0.35	3.76	14.8	8.25	5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
4	1L	Plastic	B	☐ Y ☒ N					☐ Y ☐ N
2	250mL	↓	A	☐ Y ☒ N					☐ Y ☐ N
2	125mL		B	☐ Y ☒ N					☐ Y ☐ N
2	125mL	↓	A	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	10-6-21	AIRBILL NUMBER:	—
COC NUMBER:	—	SIGNATURE:		DATE SIGNED:	10-20-21

REVISED 04/2019

TRC Kern BAP/LI

WATER SAMPLE LOG

PROJECT NAME:	CEC ~~Kern LF~~: 2021 GW Compl	PREPARED		CHECKED	
PROJECT NUMBER:	418425.~~0000~~ 0001 0000	BY: ~~AW, JJ,~~ (IK)	DATE: 10-4-21	BY: AW	DATE: 10.29.21

SAMPLE ID: DEK-MW-15005 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1123	DATE: 10-4-21	SAMPLE	TIME: 1139	DATE: 10-4-21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 8.78 T/ PVC

DEPTH TO BOTTOM: 22.29 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 3 ☒ LITERS ☐ GALLONS

COLOR: Clear ODOR: none

TURBIDITY ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

PH: 7.06 SU | CONDUCTIVITY: 724 umhos/cm

ORP: -103.7 mV | DO: 0.40 mg/L

TURBIDITY: 1.58 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 14.3 °C | OTHER: —

COLOR: clear | ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: — | FILTRATE ODOR: —

QC SAMPLE: ☐ MS/MSD ☐ DUP- _____

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1124	200	6.65	737	-55.1	11.17	35.21	14.8	9.01	INITIAL
1129	200	7.00	737	-96.5	0.64	2.08	14.4	9.01	1
1134	200	7.05	721	-101.8	0.46	1.94	14.3	9.01	2
1139	200	7.06	724	-103.7	0.40	1.58	14.3	9.01	3

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N					☐ Y ☐ N
1	250mL	Plastic	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL	↓	A	☐ Y ☒ N					☐ Y ☐ N
1	125mL		B	☐ Y ☒ N					☐ Y ☐ N
2	1L	↓	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	10-6-21	AIRBILL NUMBER:	—
COC NUMBER:	—	SIGNATURE:	[signature]	DATE SIGNED:	10-20-21

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251 • FAX (517) 788-2533

-24136

SAMPLING SITE:	PROJECT NUMBER:	ANALYSIS REQUESTED	Page 1 of 1
DEK Bottom Ash Pond – 2021 Q4	21-1168		SEND REPORT TO: CDBatts
SAMPLING TEAM:	DATE SHIPPED: / SITE SKETCHED ATTACHED? CIRCLE ONE: YES NO		HD Register, TRC
			PHONE:

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity					REMARKS
21-1168-01	10-4-21	1337	GW	DEK-MW-15002		5	x	x	x	x					
-02	10-4-21	1446	GW	DEK-MW-15004		5	x	x	x	x					
-03	10-4-21	1139	GW	DEK-MW-15005		5	x	x	x	x					
-04	10-4-21	1232	GW	DEK-MW-15006		5	x	x	x	x					
-05	10-4-21	—	W	DUP-DEK-BAP		5	x	x	x	x					
-06	10-4-21	1337	W	FB-DEK-BAP		1	x								

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	COMMENTS
[signature]	10-6-21 / 1615	Fedex	
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)	
Fed Ex	10-07-21 11:30	[signature]	ORIGINAL TO LAB COPY TO CUSTOMER

30136

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251 • FAX (517) 788-2533

SAMPLING SITE	PROJECT NUMBER	ANALYSIS REQUESTED	Page 1 of 1
DEK Bottom Ash Pond & LI – 2021 Q4	21-1169		SEND REPORT TO CDBatts
SAMPLING TEAM	DATE SHIPPED / SITE SKETCHED ATTACHED? CIRCLE ONE YES NO		HD Register, TRC
			PHONE

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity					REMARKS
21-1169-01	10/7/21	0737	GW	DEK-MW-15003		5	X	X	X	X					
-02	"	0637	GW	DEK-MW-18001		5	X	X	X	X					
-03	"	0637	GW	DEK-MW-18001 MS		5	X	X		X					
-04	"	0637	GW	DEK-MW-18001 MSD		5	X	X		X					

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	COMMENTS
	10/7/21 1530		2.4°C - 5.3°C
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	#015402

ORIGINAL TO LAB COPY TO CUSTOMER

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251 • FAX (517) 788-2533

3150

SAMPLING SITE	PROJECT NUMBER	ANALYSIS REQUESTED	Page 1 of 1
DEK Lined Impoundment – 2021 Q4	**21-1170**		SEND REPORT TO CDBatts
SAMPLING TEAM	DATE SHIPPED / SITE SKETCHED ATTACHED? CIRCLE ONE YES NO		HD Register, TRC PHONE

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity					REMARKS
21-1170-01	10/7/21	0950	GW	OW-10		5	x	x	x	x					
-02	" "	0950	GW	OW-11		5	x	x	x	x					
-03	" "	1049	GW	OW-12		5	x	x	x	x					
-04	10-6-21	0844	GW	KLI-SCS		5	x	x	x	x					
-05	10-6-21	0836	GW	KLI-PCS		5	x	x	x	x					
-06	10-6-21	0814	GW	SW-DITCH		5	x	x	x	x					
-07			GW	DUP-KLI		5	x	x	x	x					Not Collected
-08			W	EB-KLI		1	x								1
-09			W	FB-KLI		1	x								1

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	COMMENTS
	10/7/21 1530		2.4°c to 5.1°c * 015402
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	
			ORIGINAL TO LAB COPY TO CUSTOMER

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

Consumers Energy

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251 • FAX (517) 788-2533

SL1186

SAMPLING SITE:	PROJECT NUMBER:	ANALYSIS REQUESTED	Page 1 of 1
DEK & JCW Background- 2021 Q4	21-1171		SEND REPORT TO: CDBatts
SAMPLING TEAM: Andrew CW.	DATE SHIPPED:	SITE SKETCHED ATTACHED? CIRCLE ONE: YES NO	HD Register, TRC PHONE:

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	TDS	Alkalinity					REMARKS
21-1171-01	10-7-21	0908	GW	MW-15002		5 3	x	x	x	x					
-02	10-6-21	1602	GW	MW-15008		5 3	x	x	x	x					
-03	10-7-21	1010	GW	MW-15016		5 3	x	x	x	x					
-04	10-7-21	0810	GW	MW-15019		5 3	x	x	x	x					
-05	10-7-21		GW	DUP-Background		5 3	x	x	x	x					
-06	10-7-21	0908	W	FB- MW-15002		2 1	x	x							

RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)	COMMENTS
	10/07/21 1530		5.8°C *015402
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)	

ORIGINAL TO LAB COPY TO CUSTOMER

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone: 330-497-9396 Fax: 330-497-0772

0.5/0.6

Chain of Custody Record

MICHIGAN 190

eurofins Environment Testing America

Client Information	Sampler: Jake Krenz	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-87196-29052.1
Client Contact: Jacob Krenz	Phone: 734-395-7804	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:			Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: Δ Yes Δ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD			
Email: JKrenz@trccompanies.com	WO #:			
Project Name: Karn/Weadock CCR DEK Bottom Ash Pond	Project #: 24024154			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	D		
DEK-MW-15002	10-4-21	1337	G	Water	N	N	X	X		
DEK-MW-15004	10-4-21	1446	G	Water	N	N	X	X		
DEK-MW-15005	10-4-21	1139	G	Water	N	N	X	X		
DEK-MW-15006	10-4-21	1232	G	Water	N	N	X	X		
DUP-DEK-BAP	10-4-21	—	G	Water	N	N	X	X		
				Water						

240-157688 Chain of Custody

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

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

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

Special Instructions/QC Requirements:

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

Relinquished by:	Date/Time:	Company	Received by:	Date/Time	Company
	10-7-21 / 1100	TRC		10/7/21 1100	ETA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	10/7/21 1105			10-8-21 8:00	CHA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

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

Ver: 06/08/2021

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

MICHIGAN 190

eurofins Environment Testing America

Client Information	Sampler: Andrew W.	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-87168-33282.1
Client Contact: Jacob Krenz	Phone:	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:			Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: Δ Yes Δ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD			
Email: JKrenz@trccompanies.com	WO #:			
Project Name: Karn/Weadock CCR Background Well	Project #: 24024154			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List	Total Number of containers	Special Instructions/Note:
			Preservation Code:		X	X	D	D	X	
MW-15002	10-7-21	0908	G	Water	X	X			2	
MW-15008	10-6-21	1602	G	Water	X	X			2	
MW-15016	10-7-21	1010	G	Water	X	X			2	
MW-15019	10-7-21	0910	G	Water	X	X			2	
DUP-04	10-7-21		G	Water	X	X			2	
EB-04	10-7-21	1010	G	Water					1	
				Water						

240-157750 Chain of Custody

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

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

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

Special Instructions/QC Requirements:

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

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		10/7/21	TRC		10/7/21 1714	TRC
2	Relinquished by: BY	Date/Time: 10.8.21 1152	Company	Received by:	Date/Time: 10/8/21 1152	Company GS
3	Relinquished by:	Date/Time: 10/8/21 1345	Company ESA	Received by:	Date/Time: 10/9/21 1010	Company ESA

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

35/36

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

MICHIGAN
190

eurofins Environment Testing America

Client Information	Sampler: Javier J Assc	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-87198-29054.1
Client Contact: Jacob Krenz	Phone: 734 904 3316	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:	Analysis Requested		Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: ∆ Yes ∆ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD			
Email: JKrenz@trccompanies.com	WO #:			
Project Name: Karn/Weadock CCR Karn Lined Impoundment	Project #: 24024154			
Site:	SSOW#:			

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List	Total Number of containers	Special Instructions/Note:
				Preservation Code:			D	D		
OW-10	10/6/21	0812	G	Water	N	N	+	+	2	
OW-11	" "	0912	G	Water	N	N	+	+	2	
OW-12	" "	1044	G	Water	N	N	+	+	2	
KLI-DUP				Water						
EB-KLI				Water						
KLI-SCS	10-6-21	0844	G	Water	N	N	X	X	2	

240-157745 Chain of Custody

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

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

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

Special Instructions/QC Requirements:

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

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
[signature]	10/7/21 1700	TRC	[signature]	10/7/21 1700	TRC
[signature] BY	10.8.21 1152	TRC	[signature]	10/8/21 1152	[illegible]
[signature]	10/8/21 1345	ETA	[signature]	10/9/21 1010	ETA

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

Ver: 06/08/2021

36/36

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

MICHIGAN
190

eurofins Environment Testing America

Client Information	Sampler: JAUS JASS	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-87197-29053.1
Client Contact: Jacob Krenz	Phone: 734 904 3710	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:			Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: Δ Yes Δ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD			
Email: JKrenz@trccompanies.com	WO #:			
Project Name: Karn/Weadock CCR DEK Bottom Ash Pond & I	Project #: 24024154			
Site:	SSOW#:			

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List	Total Number of containers	Special Instructions/Note:
				Preservation Code:			D	D		
DEK-MW-15003	10/7/21	0727		Water						
DEK-MW-18001	10/7/21	0623	G	Water	N	N	✓	✓	2	
~~DEK-MW-18001 MS/MSD~~	~~10/7/21~~	~~0623~~	~~C~~	~~Water~~	~~N~~	~~Y~~	~~✓~~	~~✓~~	~~4~~	[illegible, scribbled out]

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

240-157754 Chain of Custody

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

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

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

Special Instructions/QC Requirements:

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

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
[signature]	10/7/21 1700	TRC	[signature]	10/7/21 1700	TRC
BY	10.8.21 1152	TRC	[signature]	10/8/21 [illegible]	[illegible]
[signature]	10/8/21 1345	GTA	[signature]	10/9/21 1010	[illegible]

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

Ver: 06/08/2021

Appendix C
Data Quality Reviews

Laboratory Data Quality Review
Groundwater Monitoring Event October 2021
DE Karn Bottom Ash Pond and Lined Impoundment

Groundwater samples were collected by TRC for the October 2021 sampling event. Samples were analyzed for total metals, anions, total dissolved solids, and alkalinity by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The radium analyses were subcontracted to Eurofins-TestAmerica in St. Louis, Missouri (Eurofins TA – St. Louis). The laboratory analytical results were reported in laboratory sample delivery groups (SDGs) 21-1169 and 240-157754-1.

During the October 2021 sampling event, a groundwater sample was collected from each of the following wells:

- DEK-MW-15003
- DEK-MW-18001

Each sample was analyzed for one or more of 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
Alkalinity (Bicarbonate, Carbonate, and Total)	SM 2320B
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 USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review (USEPA, 2020) and 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, 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. 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, TDS, and alkalinity 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, and additional Part 115 constituents 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 method blank was analyzed with each analytical batch for radium. Radium was not detected in the method blanks.
- A field blank was not collected with this data set.
- An equipment blank was not collected with this data set.
- The LCS/LCSD recoveries and relative percent differences (RPDs) for the radium analyses were within QC limits with the following exception. The percent recovery for radium 228

(127%) in LCS 160-531998/1-A was above the acceptance criteria (75-125%); therefore, the positive detection of radium 228 in sample DEK-MW-18001 is potentially biased high as summarized in the attached table, attachment 1.

- MS and MSD analyses were performed on sample DEK-MW-18001 for total metals, anions, and alkalinity. The recoveries were within the acceptance limits. RPDs were not provided by the laboratory (CE) and therefore were not evaluated; further, 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 a sample from this data set.
- Carrier recoveries, where applicable, were within 40-110%.

Attachment 1
Summary of Data Non-Conformances for Groundwater Analytical Data
DE Karn Bottom Ash Pond and Lined Impoundment– RCRA CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
DEK-MW-18001	10/7/2021	Radium 228	Percent recovery in LCS above criteria; result is potentially biased high.

Laboratory Data Quality Review
Groundwater Monitoring Event October 2021
DE Karn Lined Impoundment

Groundwater, water, and surface water samples were collected by TRC for the October 2021 sampling event. Samples were analyzed for total metals, anions, total dissolved solids, and alkalinity by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The radium analyses were subcontracted to Eurofins-TestAmerica in St. Louis, Missouri (Eurofins TA – St. Louis). The laboratory analytical results were reported in laboratory sample delivery groups (SDGs) 21-1170 and 240-157745-1.

During the October 2021 sampling event, a groundwater sample was collected from each of the following wells:

- OW-10
- OW-11
- OW-12

During the October 2021 sampling event, the following water/surface water samples were collected:

- KLI-SCS
- KLI-PCS
- SW-DITCH

Each sample was analyzed for one or more of 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
Alkalinity (Bicarbonate, Carbonate, and Total)	SM 2320B
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 USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review (USEPA, 2020) and 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. 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.

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, TDS, and alkalinity 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, and additional Part 115 constituents will be utilized for the purposes of the detection monitoring program.
- Data are usable for the purposes of the detection monitoring program.
- When the data are evaluated through a detection or monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- A method blank was analyzed with each analytical batch for radium. Radium was not detected in the method blanks.
- A field blank was not collected with this data set. Total metals were not detected in the blank sample collected during the same event at an adjacent unit (FB-DEK-BAP).
- An equipment blank was not collected with this data set. Total metals were not detected in the blank sample collected during the same event at an adjacent unit (EB-JCW-BAP).

- The LCS/LCSD recoveries and relative percent differences (RPDs) for the radium analyses were within QC limits with the following exception. The percent recovery for radium 228 (127%) in LCS 160-531998/1-A was above the acceptance criteria (75-125%); therefore, positive detections for radium 228 in groundwater samples are potentially biased high as summarized in the attached table, attachment 1.
- MS and MSD analyses were not performed on a sample from this data set.
- A field duplicate pair was not collected with this data set.
- Laboratory duplicate analyses were not performed on a sample from this data set.
- Carrier recoveries, where applicable, were within 40-110%.

Attachment 1
Summary of Data Non-Conformances for Groundwater Analytical Data
DE Karn Lined Impoundment – RCRA CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
OW-10	10/6/2021	Radium 228	Percent recovery in LCS above criteria; results are potentially biased high.
OW-12	10/6/2021		

Appendix D
Statistical Analysis

Appendix D
Statistical Summary for DE Karn Lined Impoundment
Fourth Quarter 2021
Data from March 2020 to October 2021

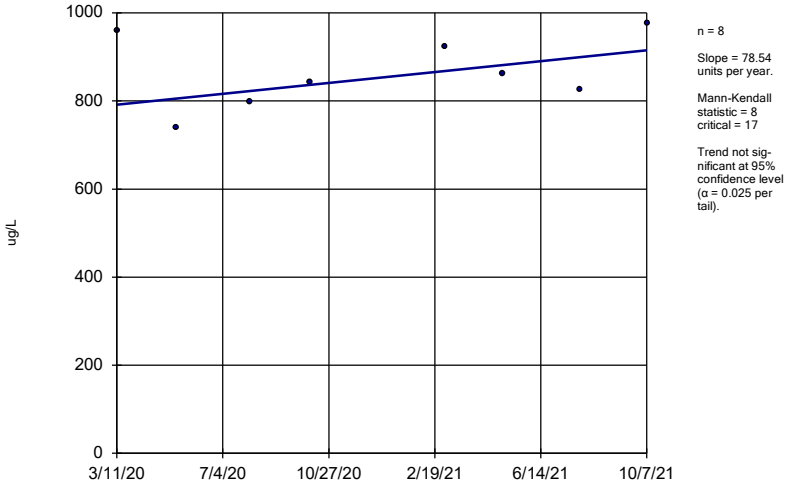
Karn Lined Impoundment Wells						
PARAMETER	**Range, Test, or Limit**	**DEK-MW-15003**	**DEK-MW-18001**	**OW-10**	**OW-11**	**OW-12**
Boron	Trend	O	O	O	↑ ASD	O
Calcium	Trend	↓	O	↑ ASD	↓	O
Chloride	Trend	↑*	O	↑*	O	O
Fluoride	Trend	O*	O	O*	O	O*
Iron	Trend	O	O	O	O	O
pH	Trend	O	O	O	↑ ASD	O
Sulfate	Trend	O	↑ ASD	O	O	O
Total Dissolved Solids	Trend	O	O	↑*	↓	O

Notes:

O* = Non-detect
O = No trend
↑ = Upward trend, continuous
↑* = Upward trend, new
↑ = Upward trend, confirmed
↓ = Downward trend, continuous
↓* = Downward trend, new
↑ ASD = Alternate Source Demonstration (Second Quarter 2021 Hydrogeological Monitoring Report for the Karn Lined Impoundment CCR Unit, TRC, July 2021.)

Boron, Total

DEK-MW-15003



n = 8

Slope = 78.54 units per year.

Mann-Kendall statistic = 8 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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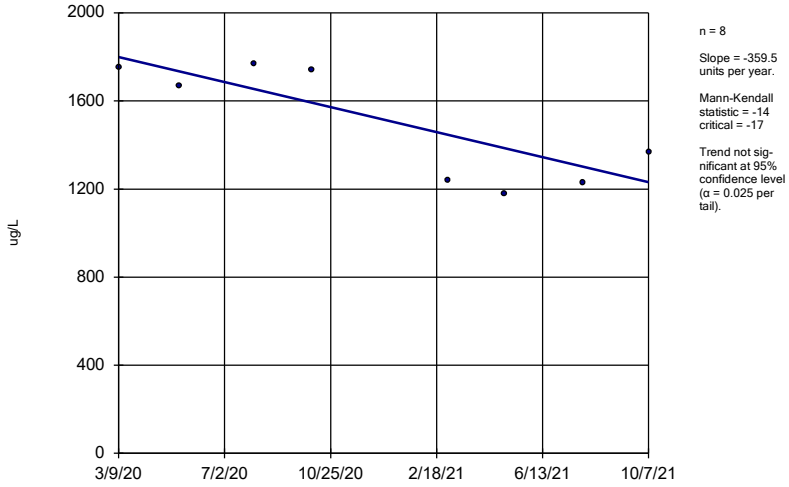
Boron, Total

DEK-MW-18001



n = 8

Slope = -359.5 units per year.

Mann-Kendall statistic = -14 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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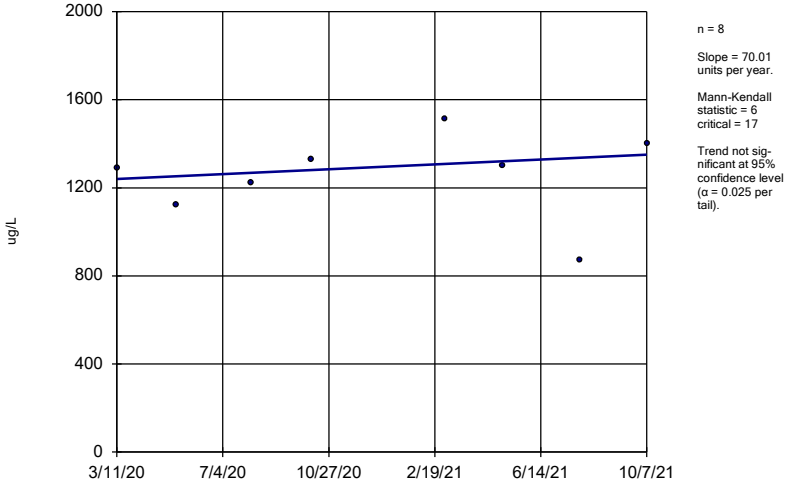
Boron, Total

OW-10



n = 8

Slope = 70.01 units per year.

Mann-Kendall statistic = 6 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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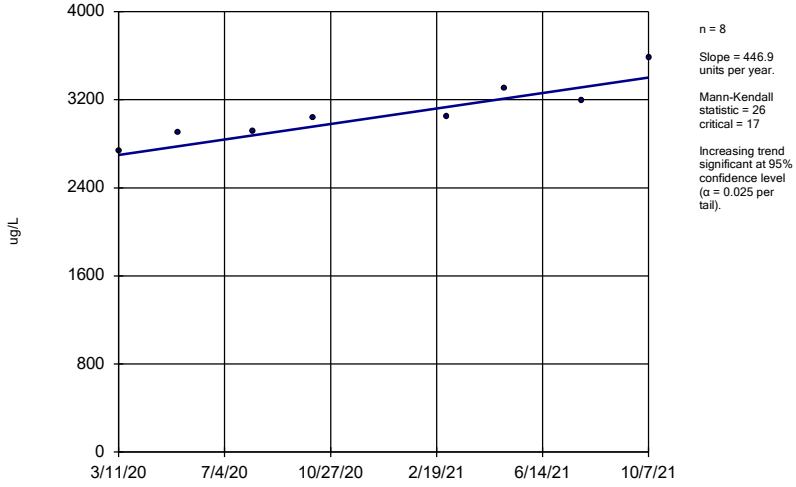
Boron, Total

OW-11



n = 8

Slope = 446.9 units per year.

Mann-Kendall statistic = 26 critical = 17

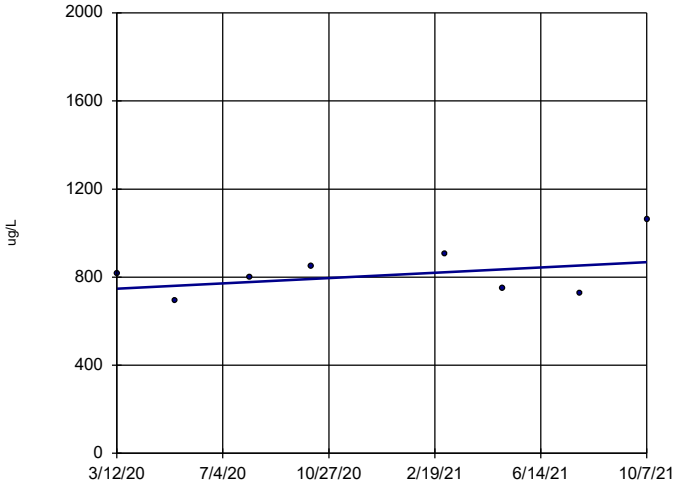
Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Boron, Total

OW-12



n = 8

Slope = 76.68 units per year.

Mann-Kendall statistic = 6 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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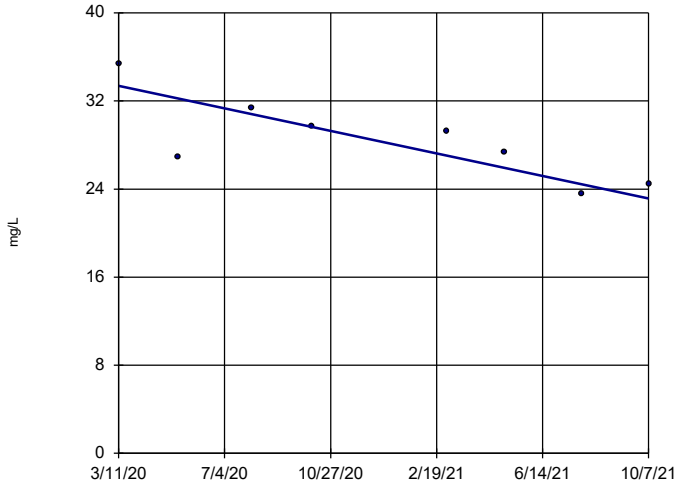
Calcium, Total

DEK-MW-15003



n = 8

Slope = -6.498 units per year.

Mann-Kendall statistic = -18 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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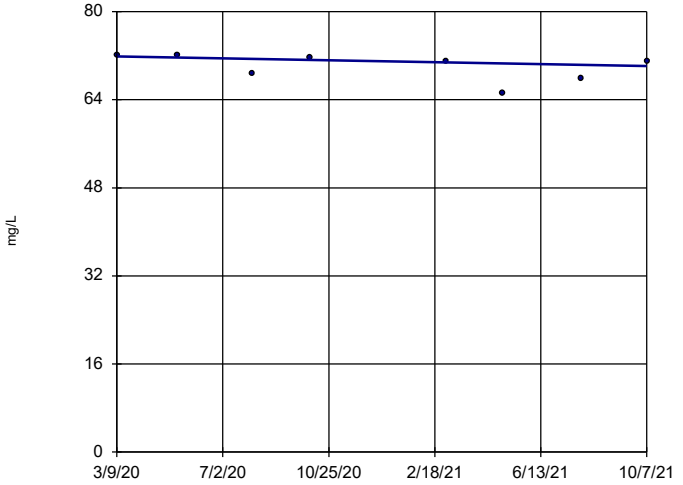
Calcium, Total

DEK-MW-18001



n = 8

Slope = -1.115 units per year.

Mann-Kendall statistic = -15 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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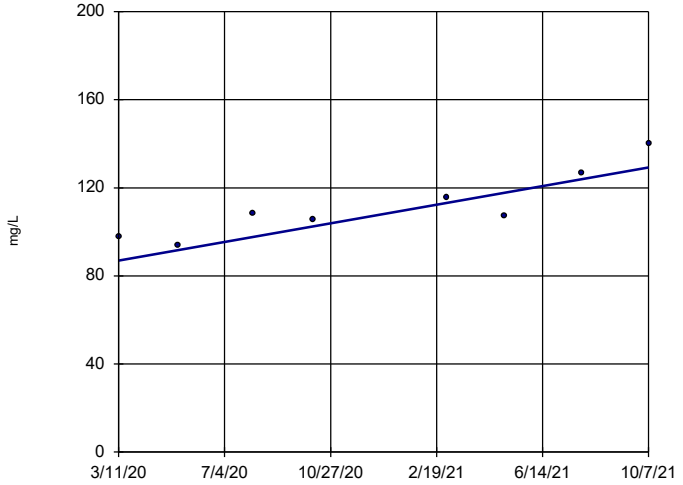
Calcium, Total

OW-10



n = 8

Slope = 26.84 units per year.

Mann-Kendall statistic = 20 critical = 17

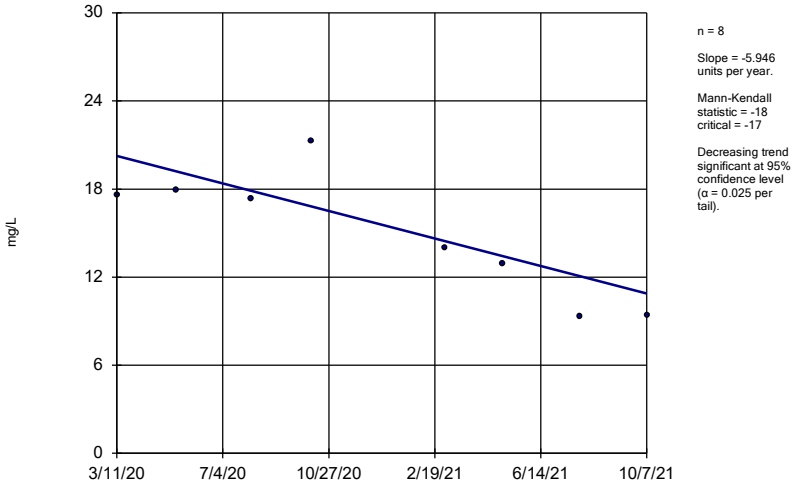
Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Calcium, Total

OW-11



n = 8

Slope = -5.946 units per year.

Mann-Kendall statistic = -18
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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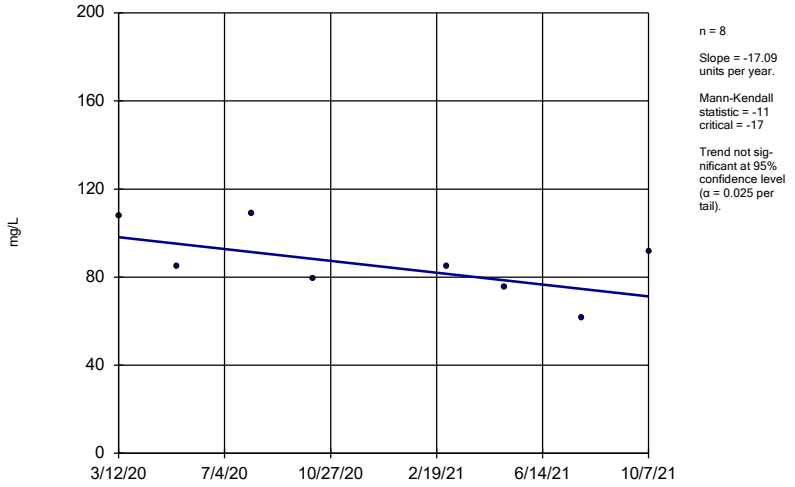
Calcium, Total

OW-12



n = 8

Slope = -17.09 units per year.

Mann-Kendall statistic = -11
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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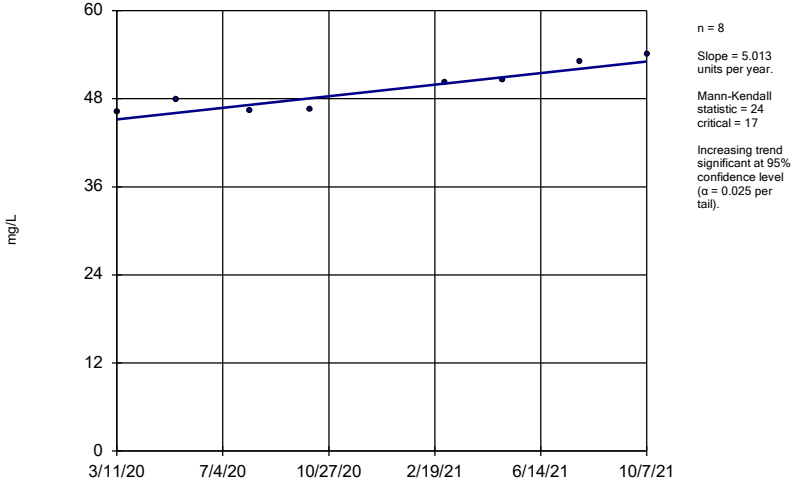
Chloride

DEK-MW-15003



n = 8

Slope = 5.013 units per year.

Mann-Kendall statistic = 24
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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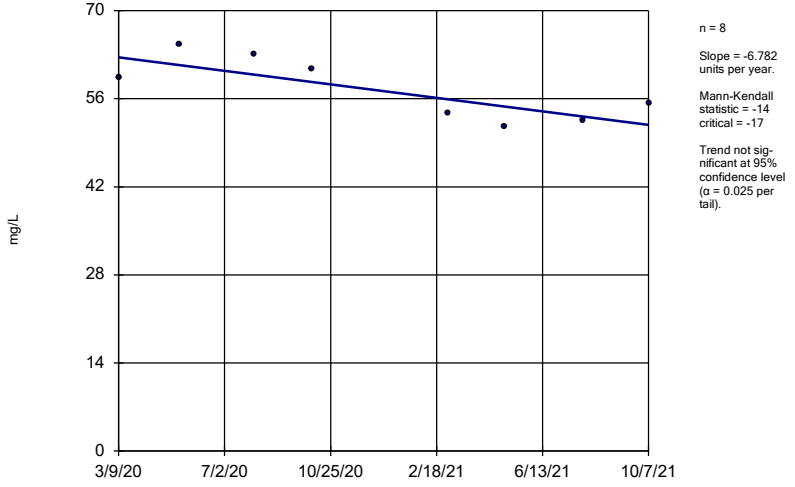
Chloride

DEK-MW-18001



n = 8

Slope = -6.782 units per year.

Mann-Kendall statistic = -14
critical = -17

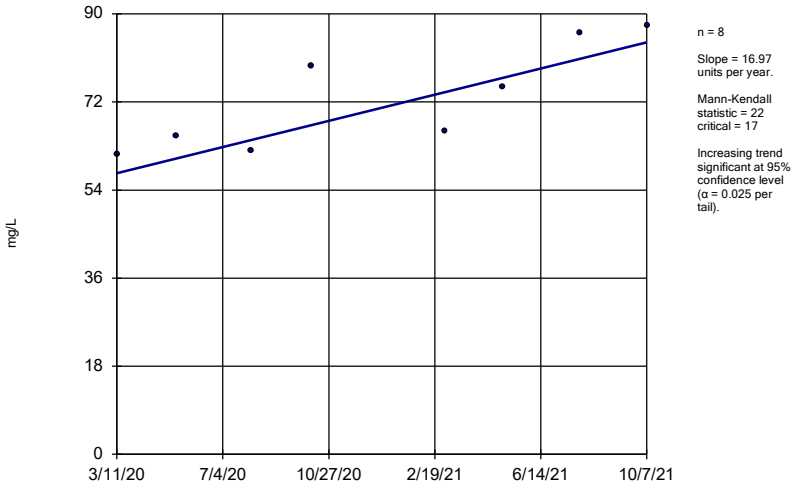
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Chloride

OW-10



n = 8

Slope = 16.97 units per year.

Mann-Kendall statistic = 22
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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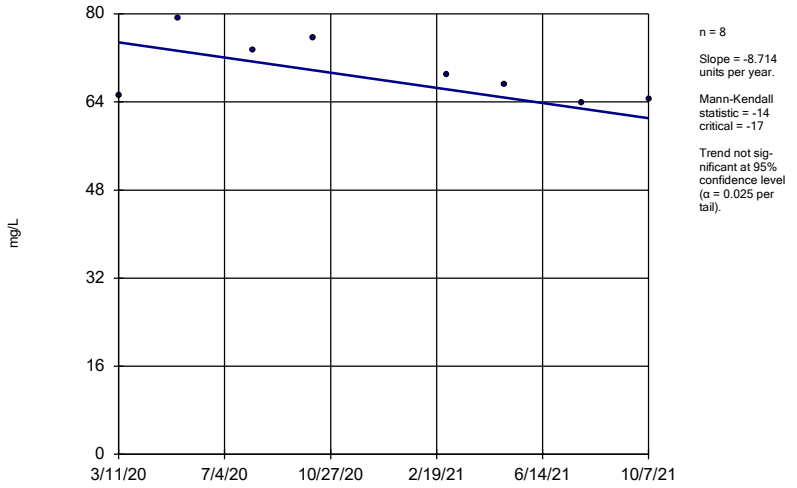
Chloride

OW-11



n = 8

Slope = -8.714 units per year.

Mann-Kendall statistic = -14
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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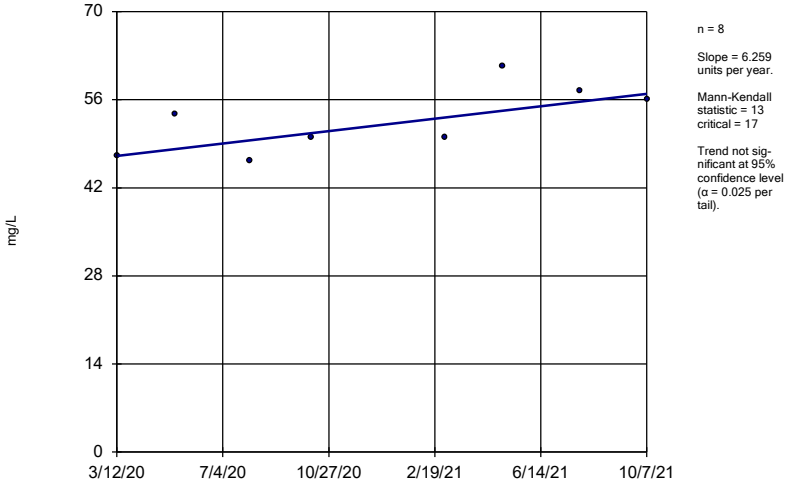
Chloride

OW-12



n = 8

Slope = 6.259 units per year.

Mann-Kendall statistic = 13
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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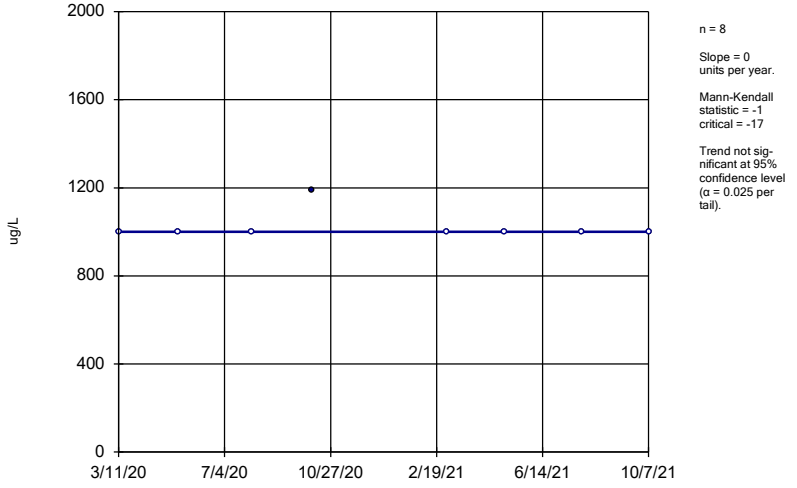
Hollow symbols indicate censored values.

Fluoride

DEK-MW-15003



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -1
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

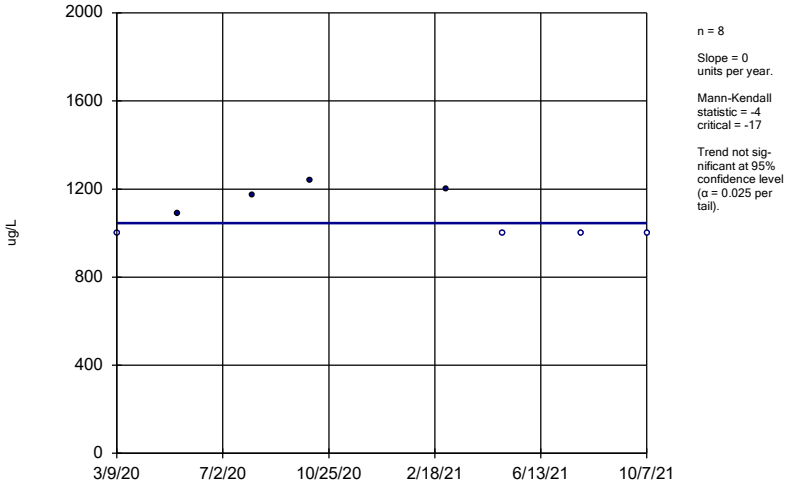
Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

DEK-MW-18001



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -4
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

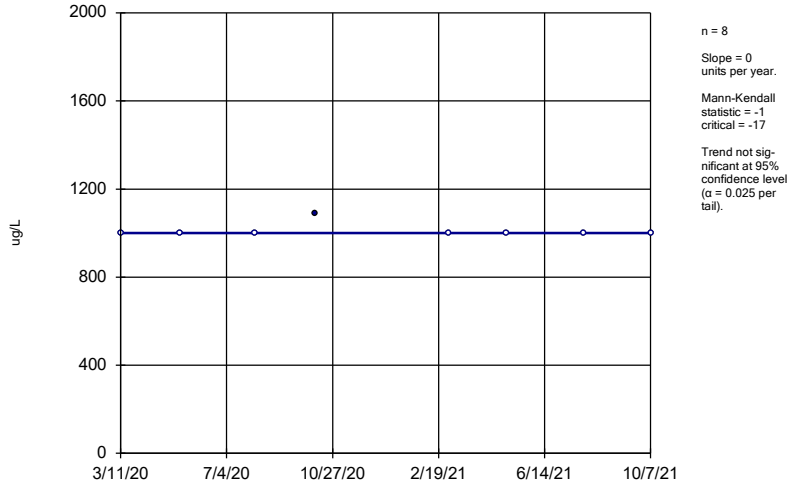
Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

OW-10



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -1
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

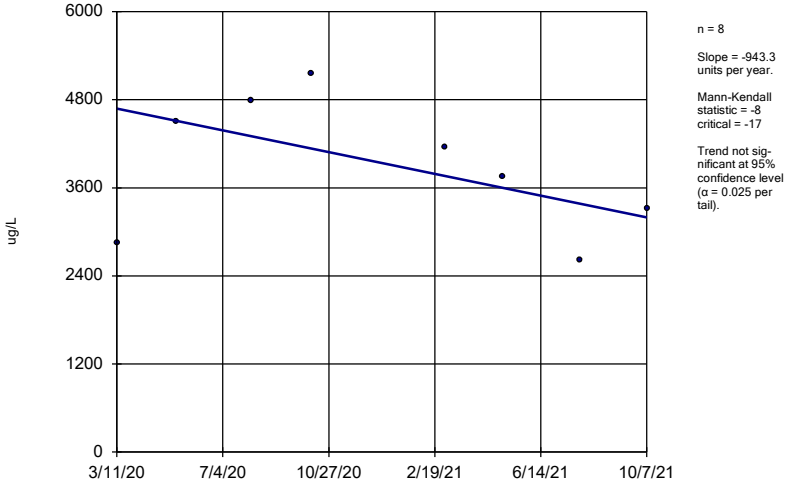
Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Fluoride

OW-11



n = 8

Slope = -943.3 units per year.

Mann-Kendall statistic = -8
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

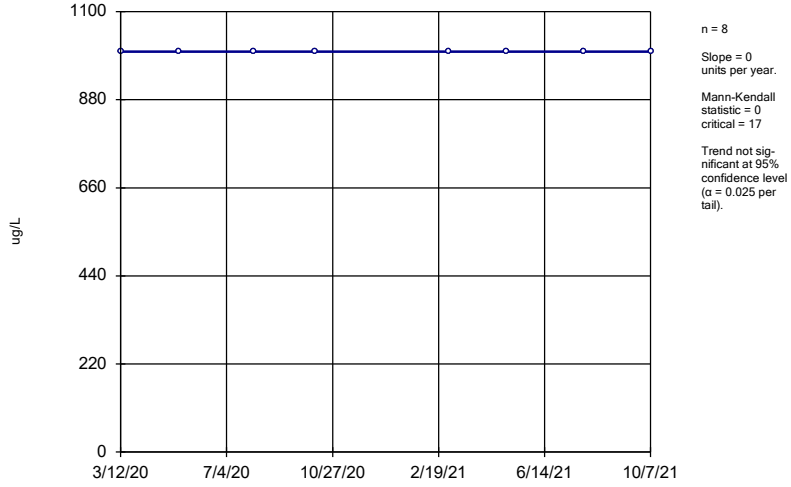
Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

OW-12



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0
critical = 17

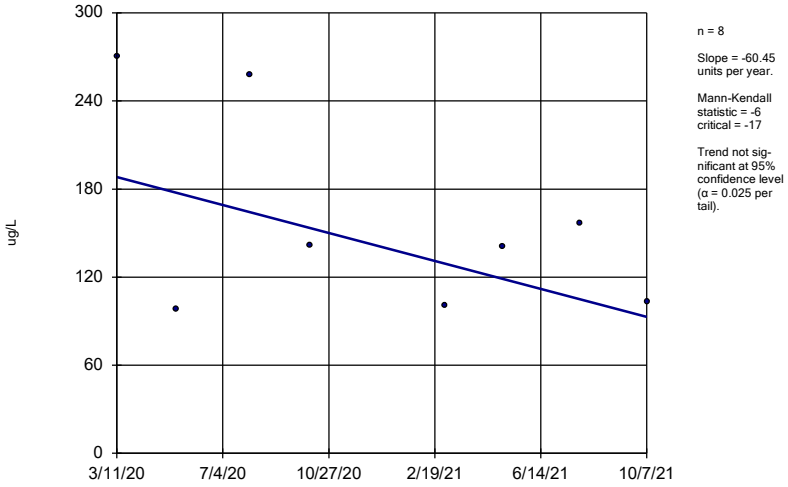
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Iron, Total

DEK-MW-15003



n = 8

Slope = -60.45 units per year.

Mann-Kendall statistic = -6 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

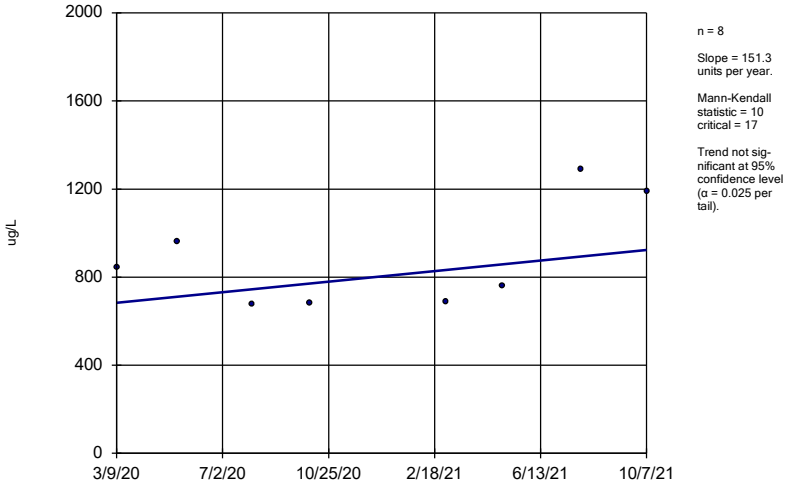
Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

DEK-MW-18001



n = 8

Slope = 151.3 units per year.

Mann-Kendall statistic = 10 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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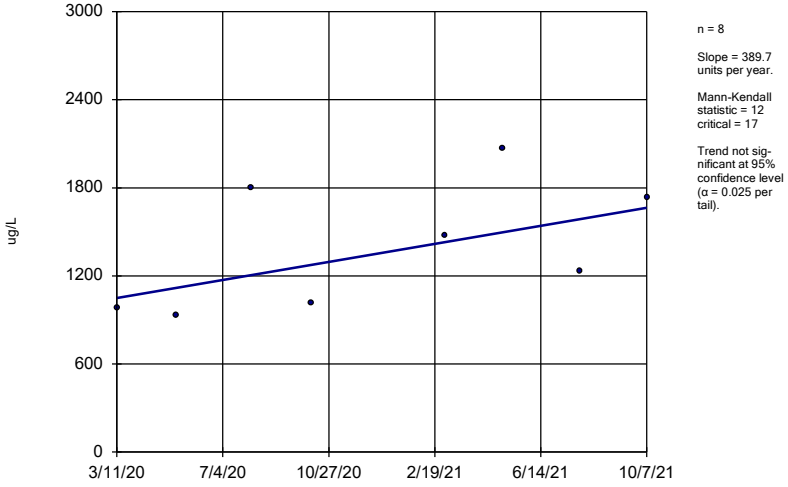
Iron, Total

OW-10



n = 8

Slope = 389.7 units per year.

Mann-Kendall statistic = 12 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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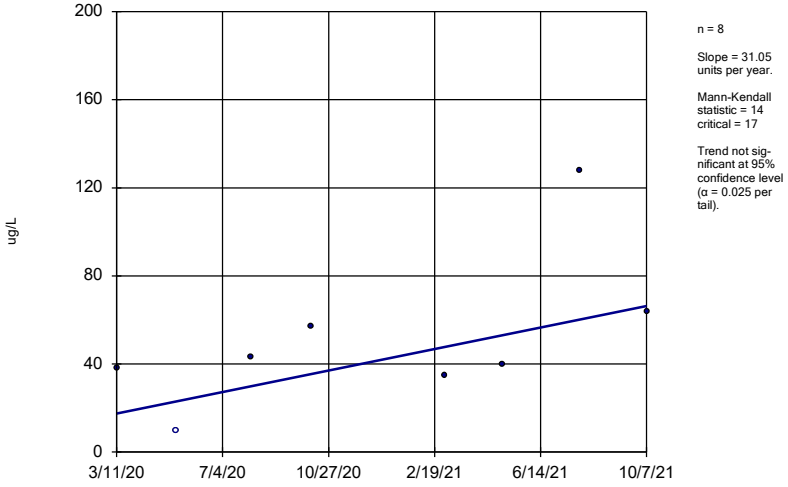
Hollow symbols indicate censored values.

Iron, Total

OW-11



n = 8

Slope = 31.05 units per year.

Mann-Kendall statistic = 14 critical = 17

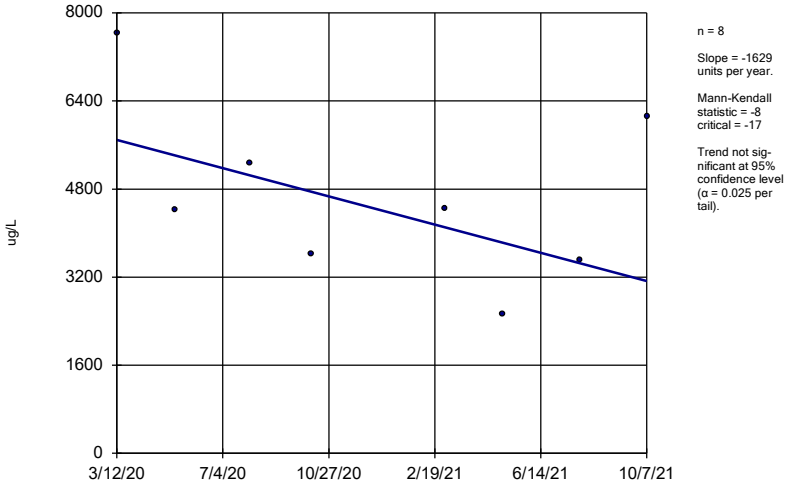
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Iron, Total

OW-12



n = 8

Slope = -1629 units per year.

Mann-Kendall statistic = -8 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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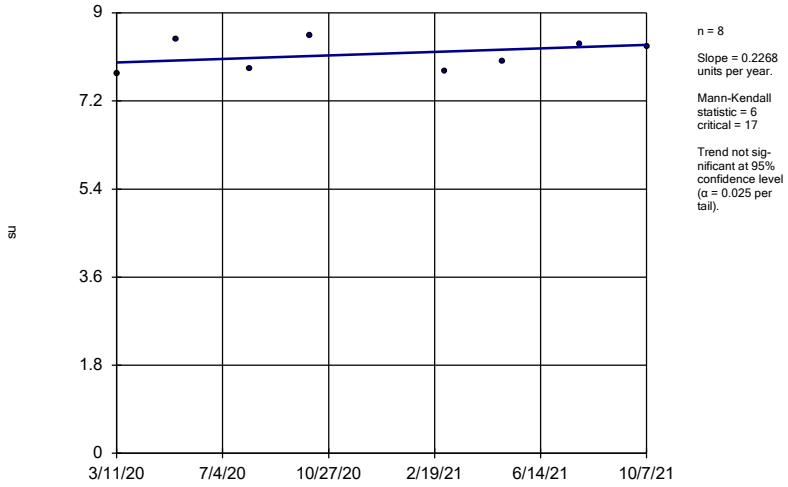
pH, Field

DEK-MW-15003



n = 8

Slope = 0.2268 units per year.

Mann-Kendall statistic = 6 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

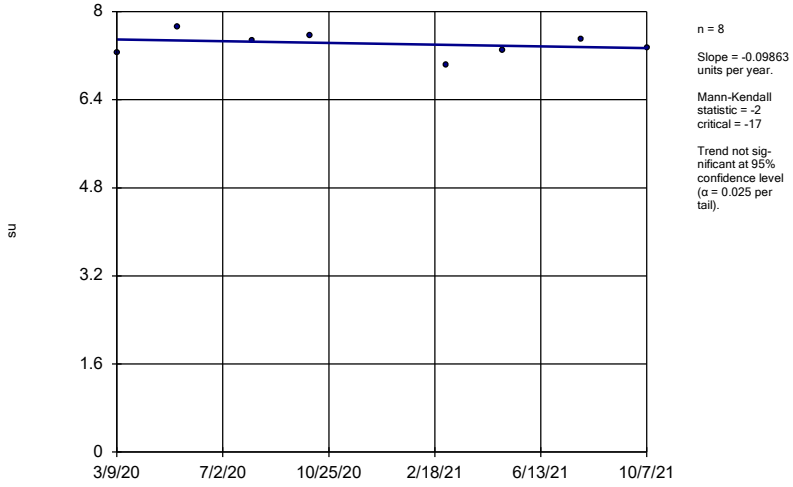
Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

DEK-MW-18001



n = 8

Slope = -0.09863 units per year.

Mann-Kendall statistic = -2 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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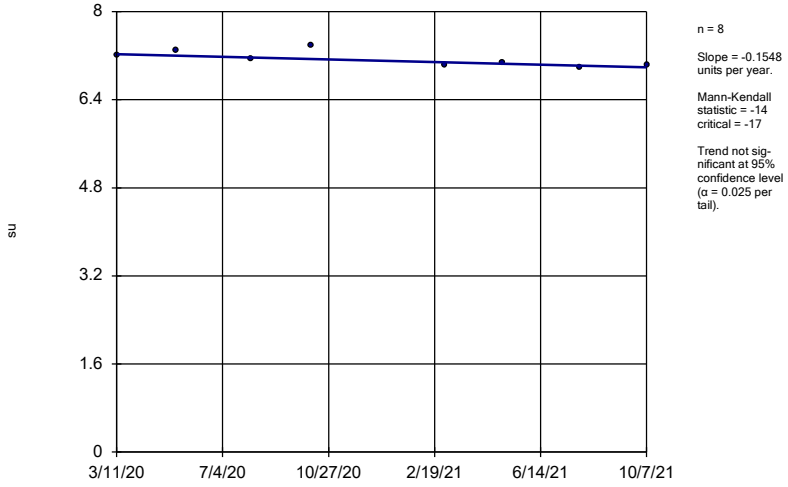
pH, Field

OW-10



n = 8

Slope = -0.1548 units per year.

Mann-Kendall statistic = -14 critical = -17

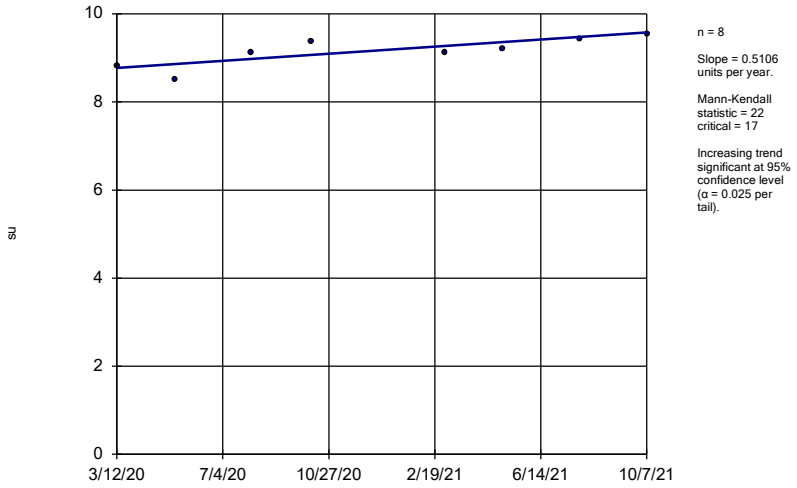
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:43 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

pH, Field

OW-11



n = 8

Slope = 0.5106 units per year.

Mann-Kendall statistic = 22
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:44 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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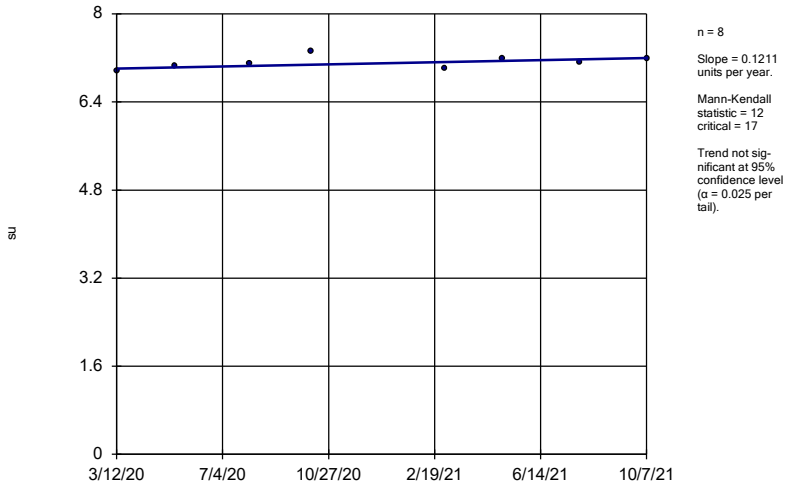
pH, Field

OW-12



n = 8

Slope = 0.1211 units per year.

Mann-Kendall statistic = 12
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:44 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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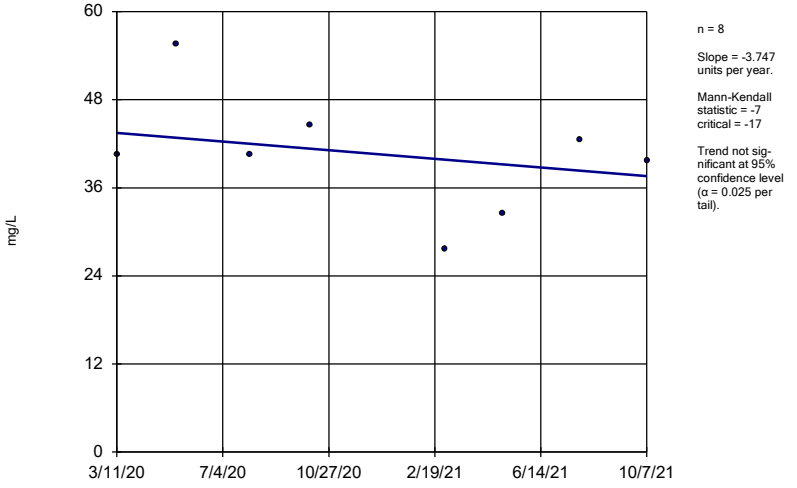
Sulfate

DEK-MW-15003



n = 8

Slope = -3.747 units per year.

Mann-Kendall statistic = -7
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

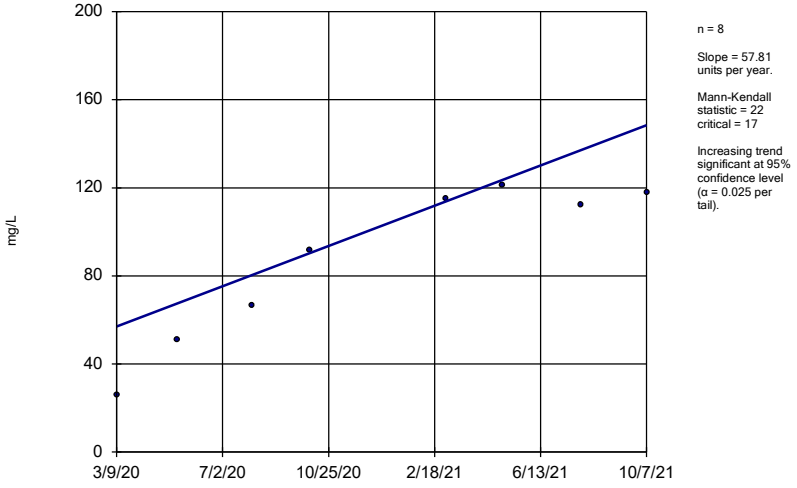
Sen's Slope Estimator Analysis Run 12/9/2021 11:44 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

DEK-MW-18001



n = 8

Slope = 57.81 units per year.

Mann-Kendall statistic = 22
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

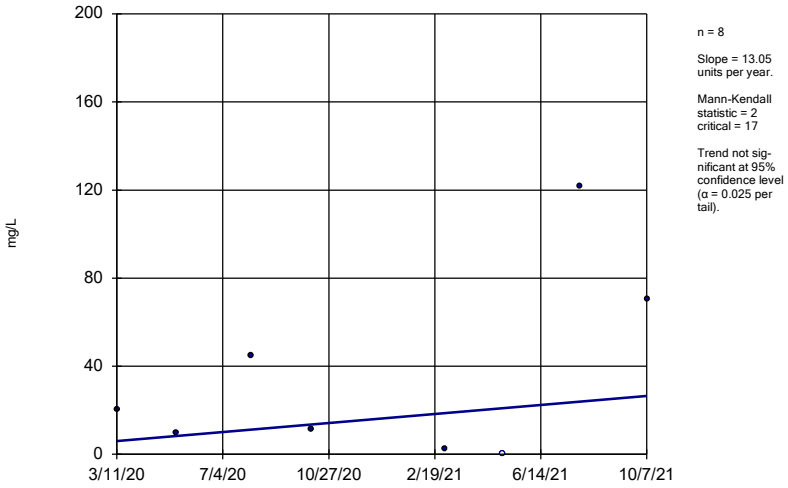
Sen's Slope Estimator Analysis Run 12/9/2021 11:44 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Hollow symbols indicate censored values.

Sulfate

OW-10



n = 8

Slope = 13.05 units per year.

Mann-Kendall statistic = 2
critical = 17

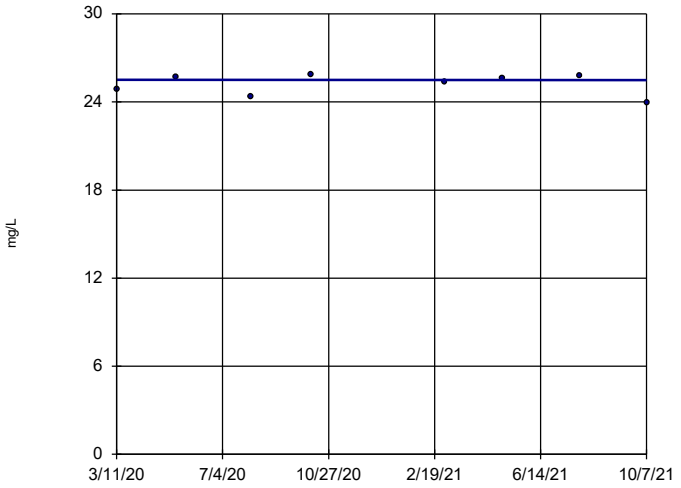
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:44 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Sulfate

OW-11



n = 8

Slope = -0.009837 units per year.

Mann-Kendall statistic = 0
critical = 17

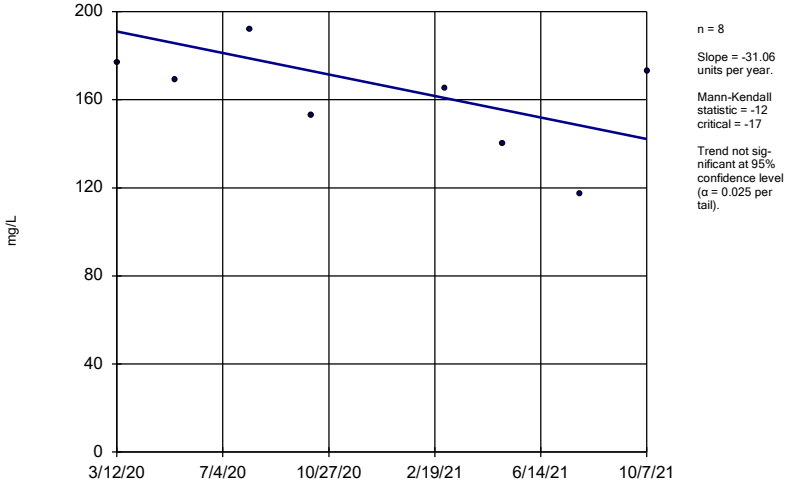
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:44 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Sulfate

OW-12



n = 8

Slope = -31.06 units per year.

Mann-Kendall statistic = -12
critical = -17

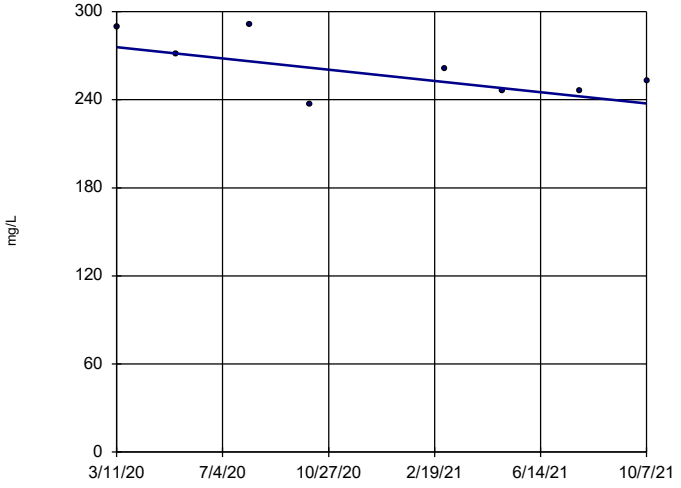
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:44 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Total Dissolved Solids

DEK-MW-15003



n = 8

Slope = -24.47 units per year.

Mann-Kendall statistic = -11
critical = -17

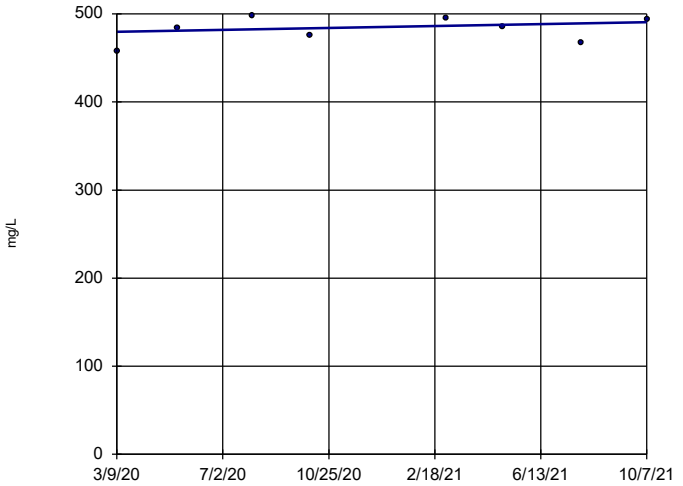
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:44 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Total Dissolved Solids

DEK-MW-18001



n = 8

Slope = 6.824 units per year.

Mann-Kendall statistic = 4
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:44 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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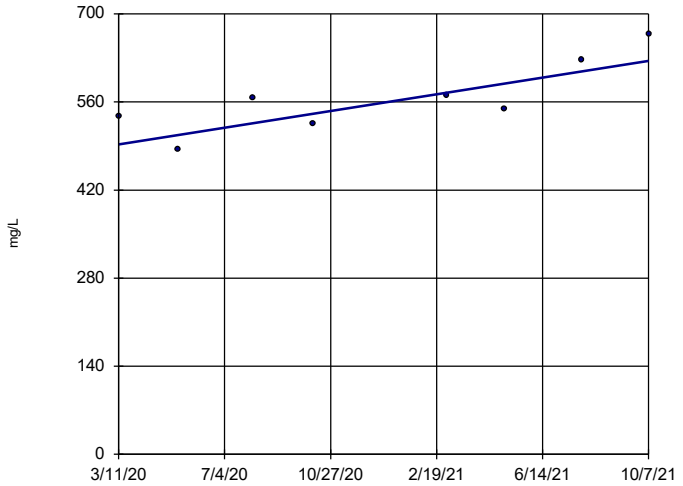
Total Dissolved Solids

OW-10



n = 8

Slope = 84.23 units per year.

Mann-Kendall statistic = 18
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

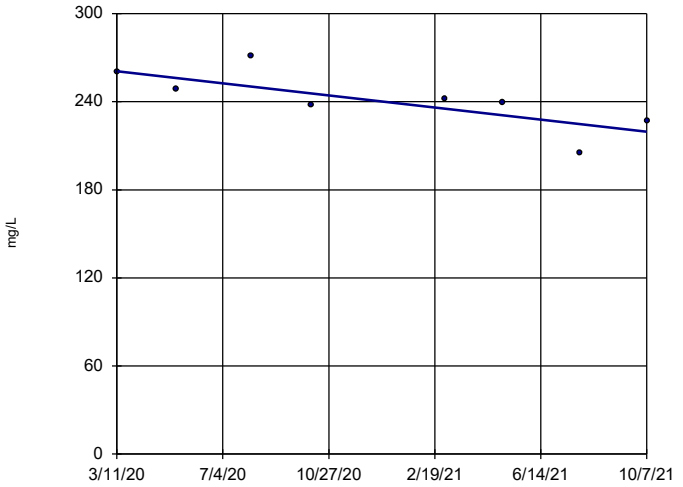
Sen's Slope Estimator Analysis Run 12/9/2021 11:44 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

OW-11



n = 8

Slope = -26.16 units per year.

Mann-Kendall statistic = -18
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 12/9/2021 11:44 AM

Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

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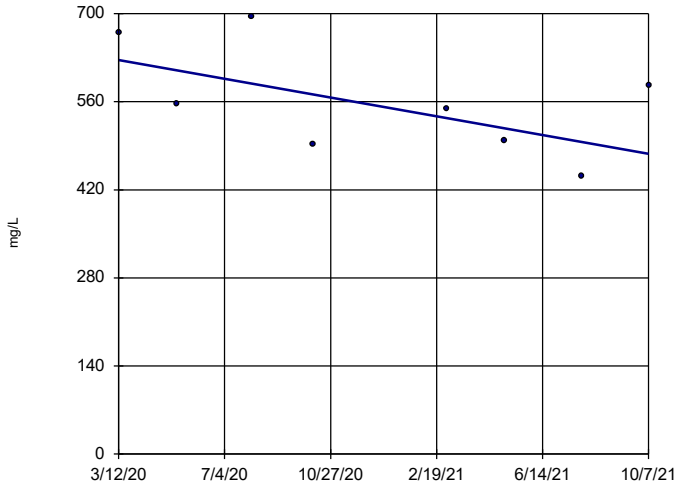
Total Dissolved Solids

OW-12



n = 8

Slope = -94.92 units per year.

Mann-Kendall statistic = -10
critical = -17

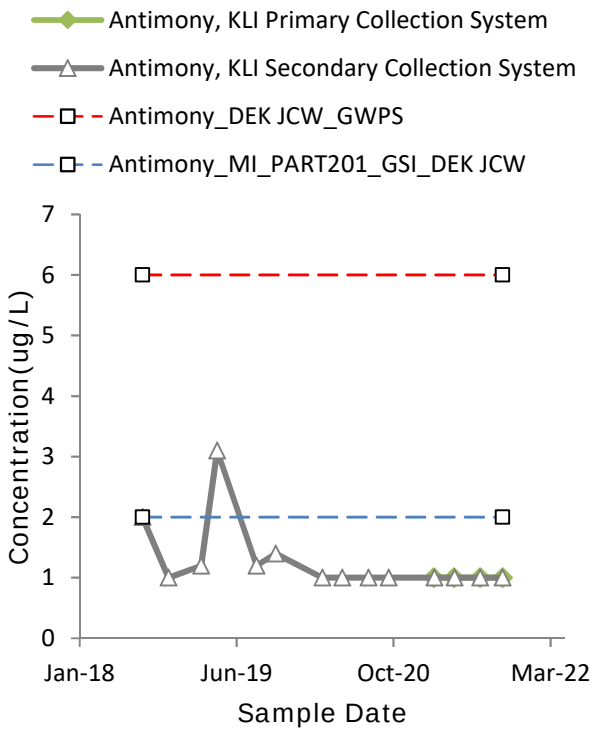
Trend not significant at 95% confidence level (α = 0.025 per tail).

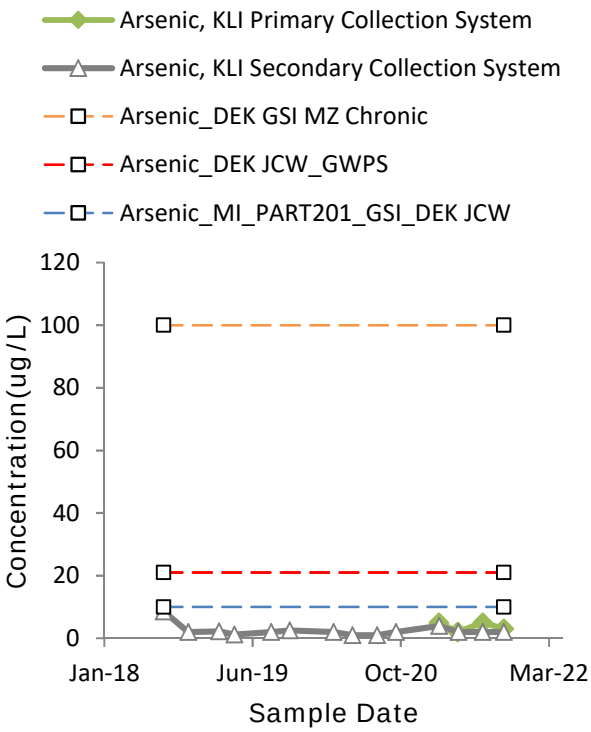
Sen's Slope Estimator Analysis Run 12/9/2021 11:44 AM

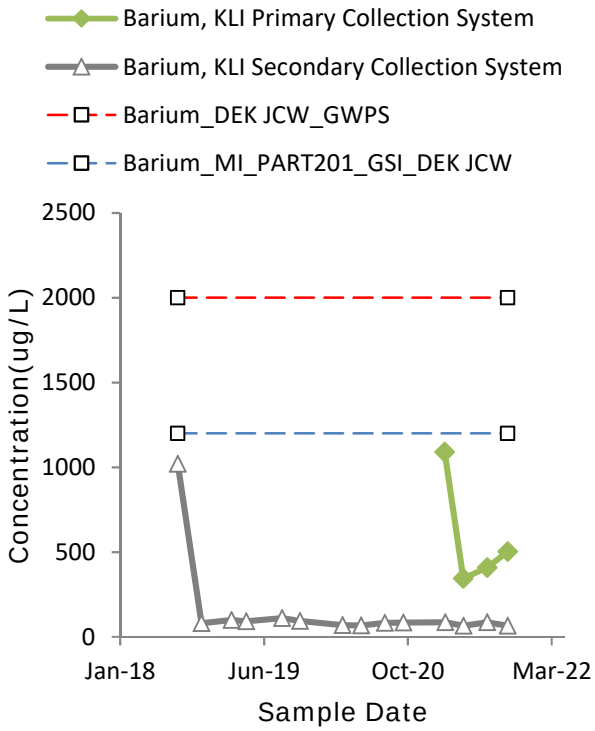
Client: Consumers Energy Data: DEK_HMPCCR_Sanitas_21Q4

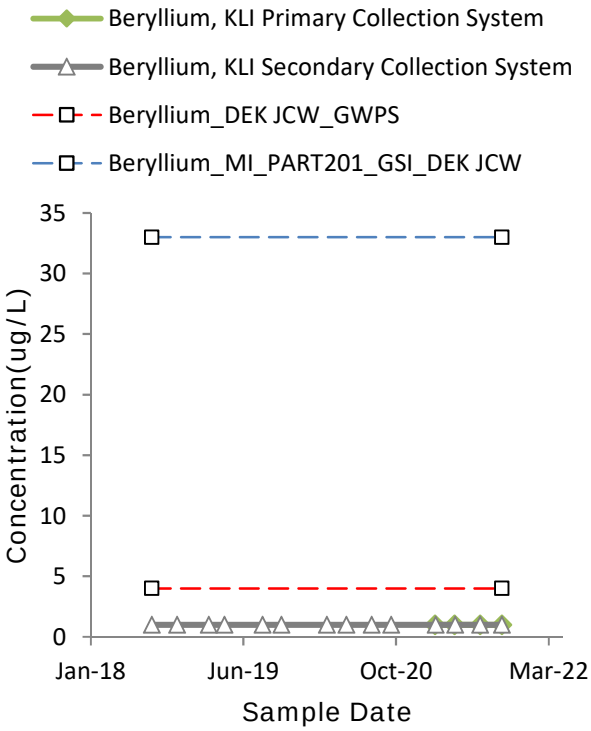
Appendix E
Secondary Leachate Collection System Monitoring

Water Quality Time Series

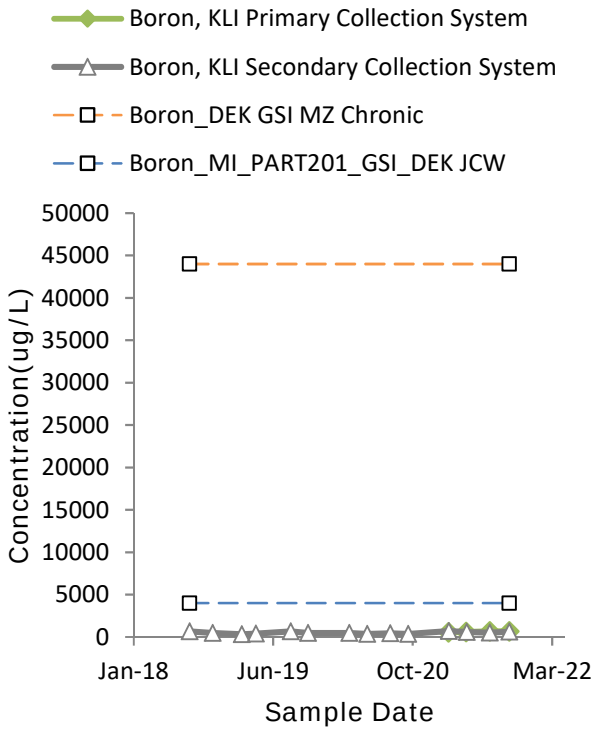


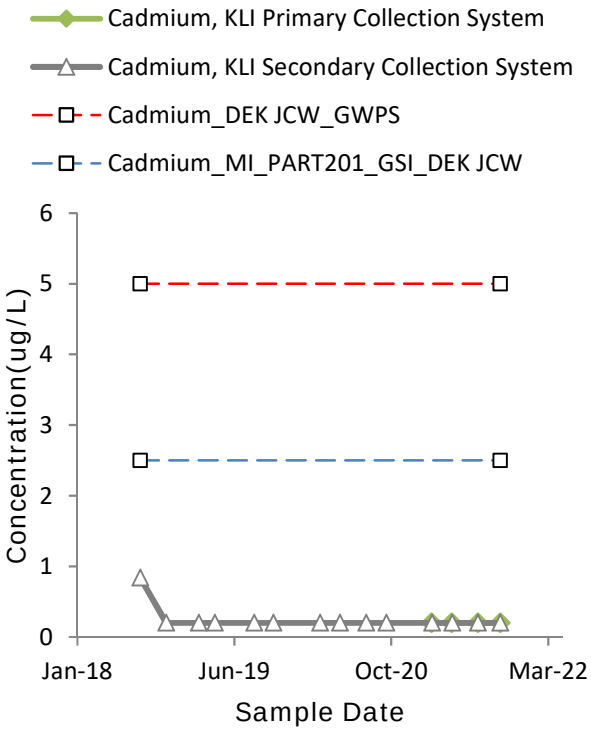


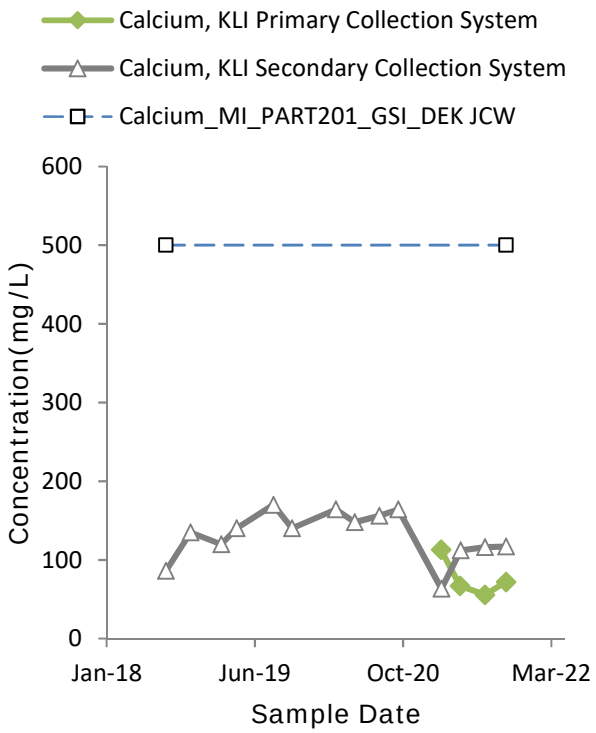


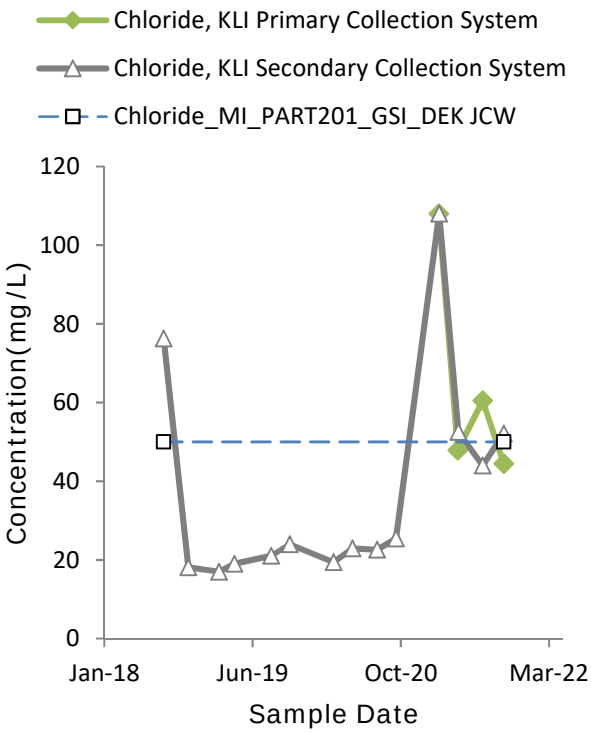


Water Quality Time Series

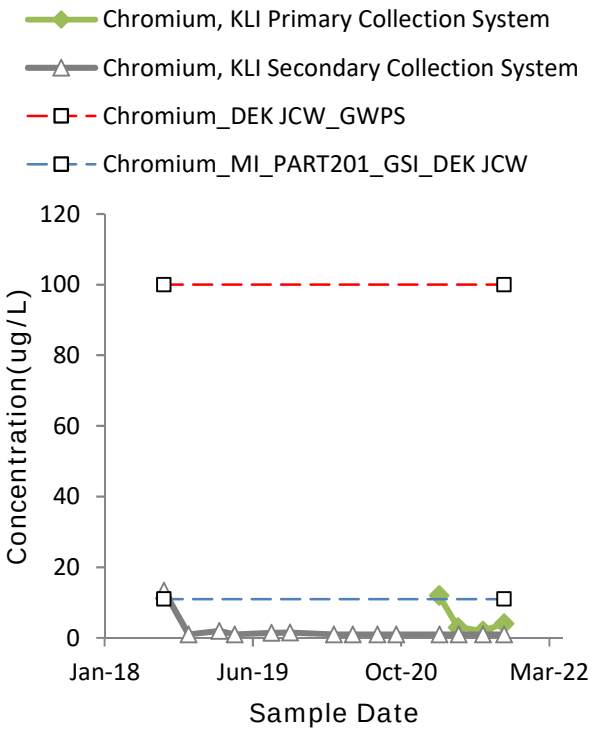


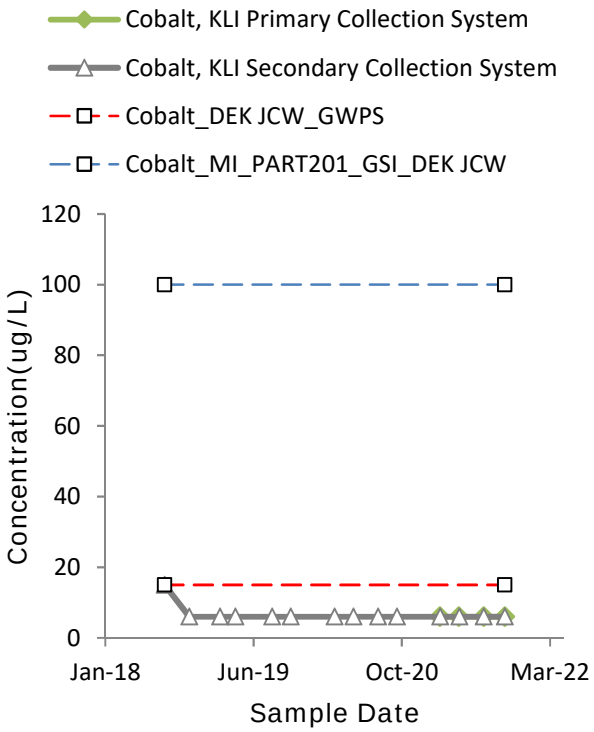


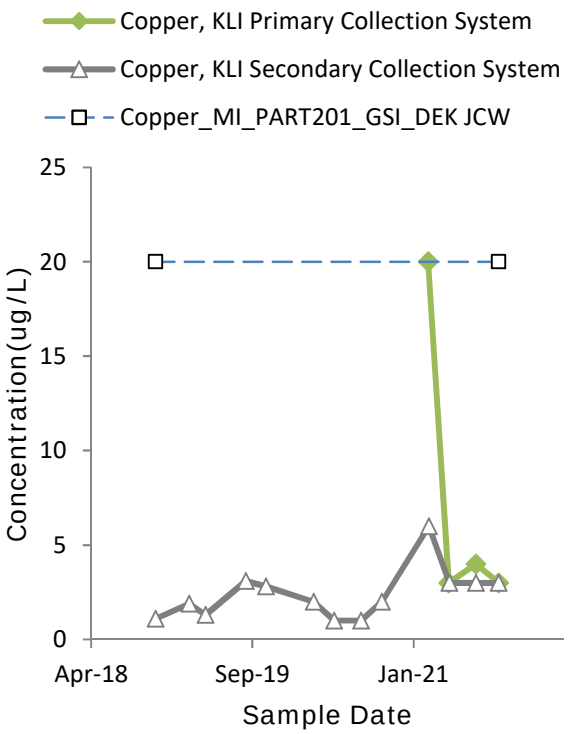


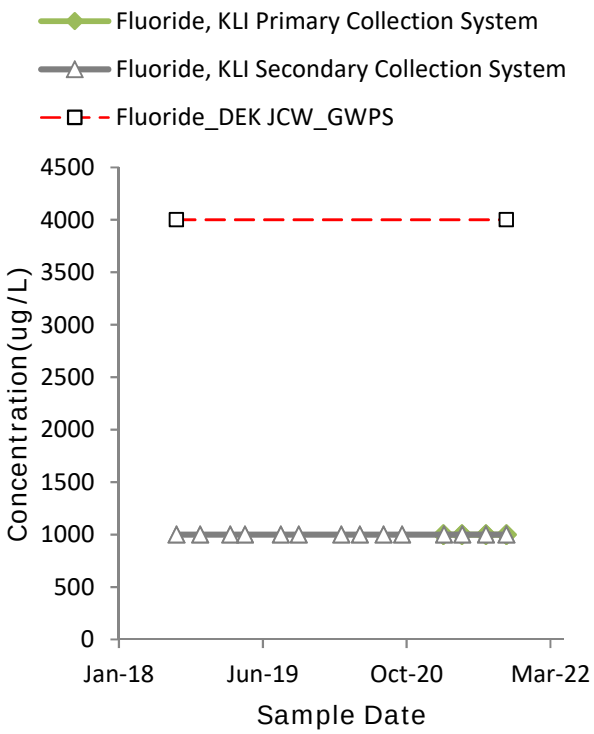


Water Quality Time Series

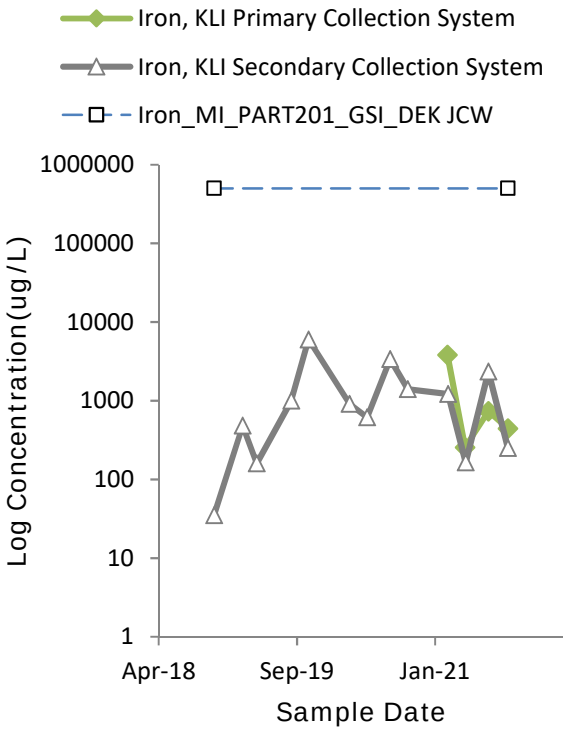


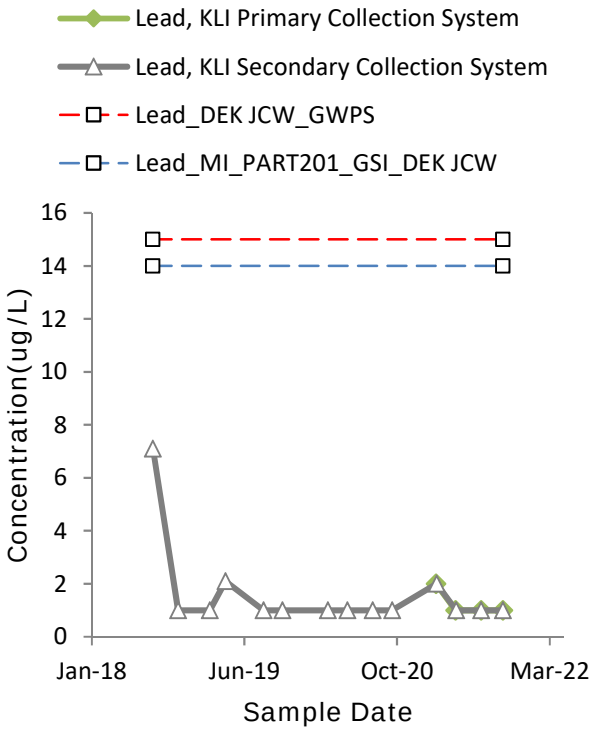


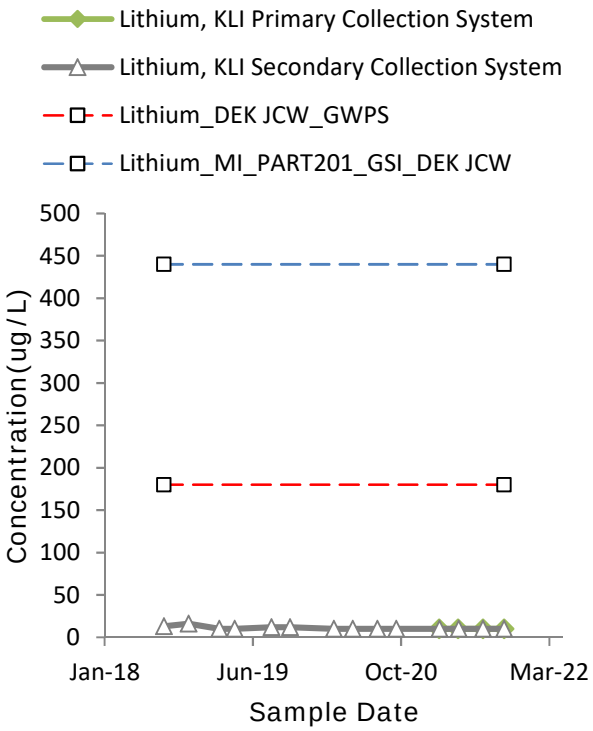


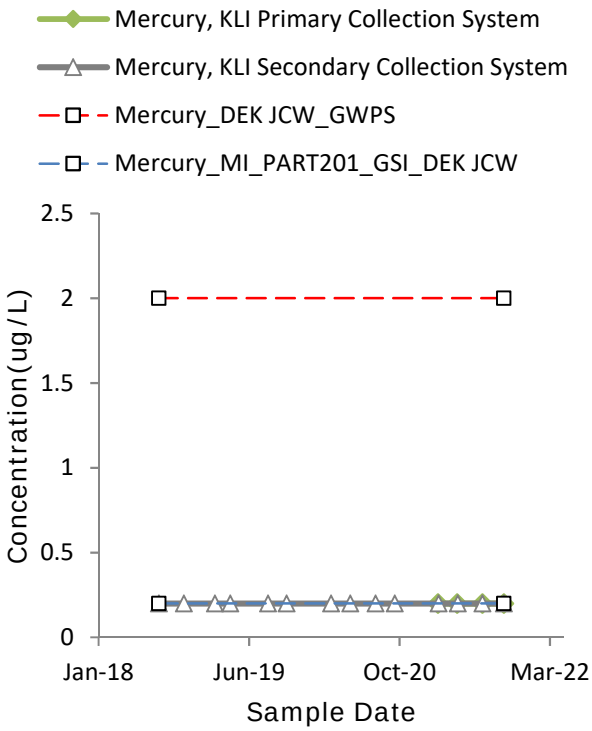


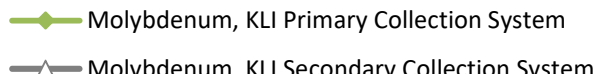
Water Quality Time Series

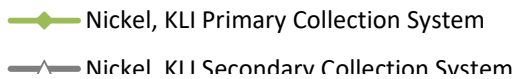




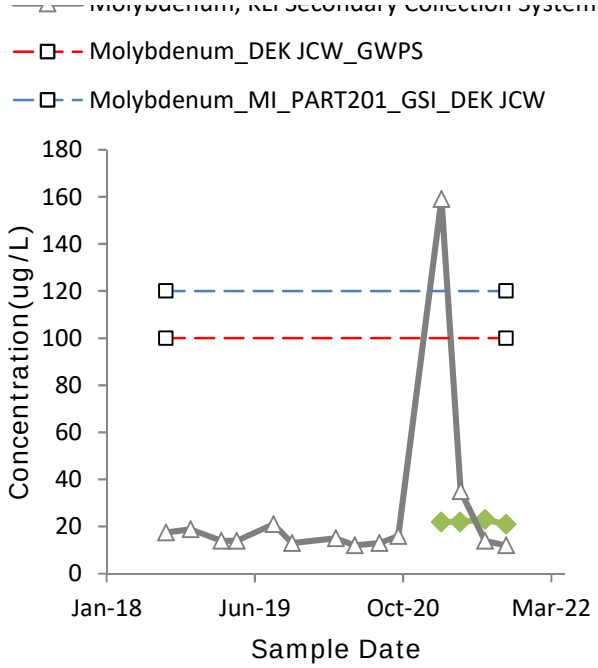


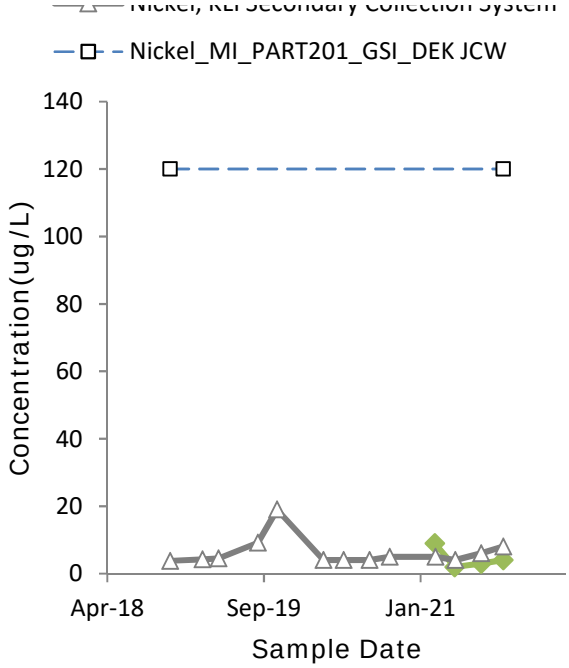


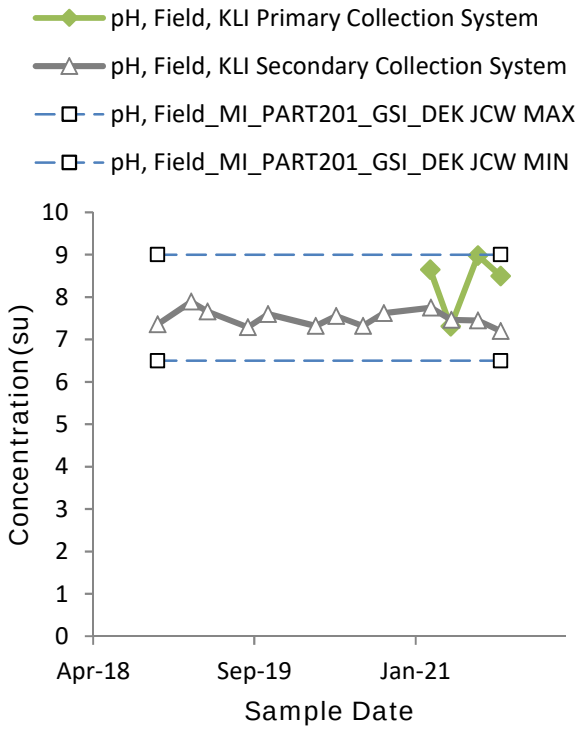


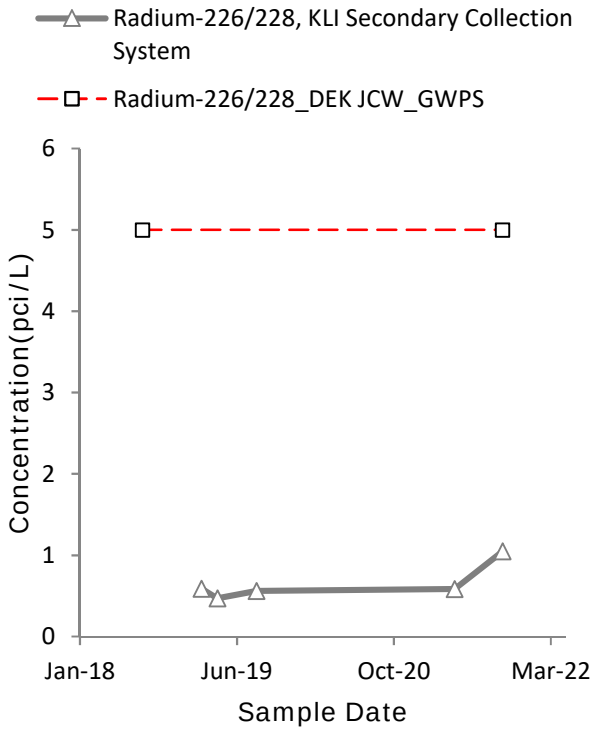


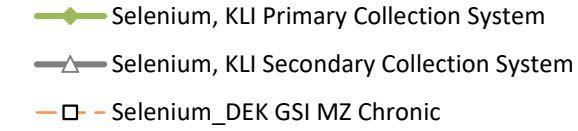
Water Quality Time Series

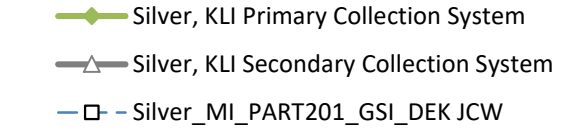




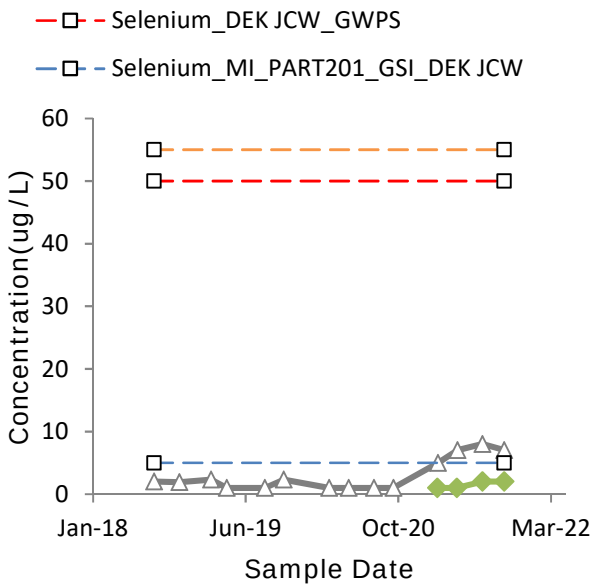


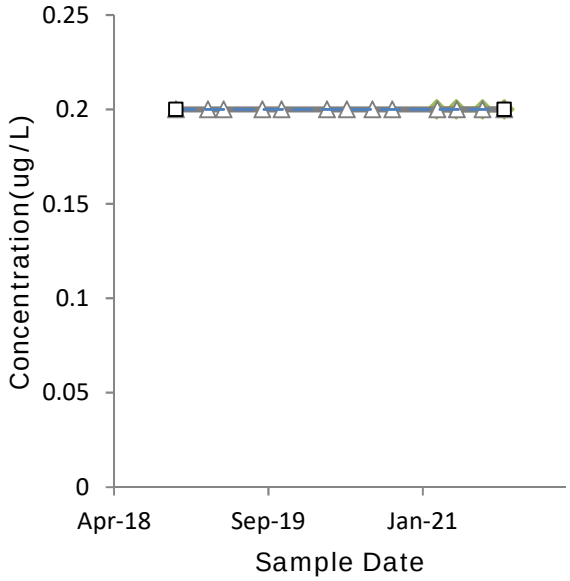


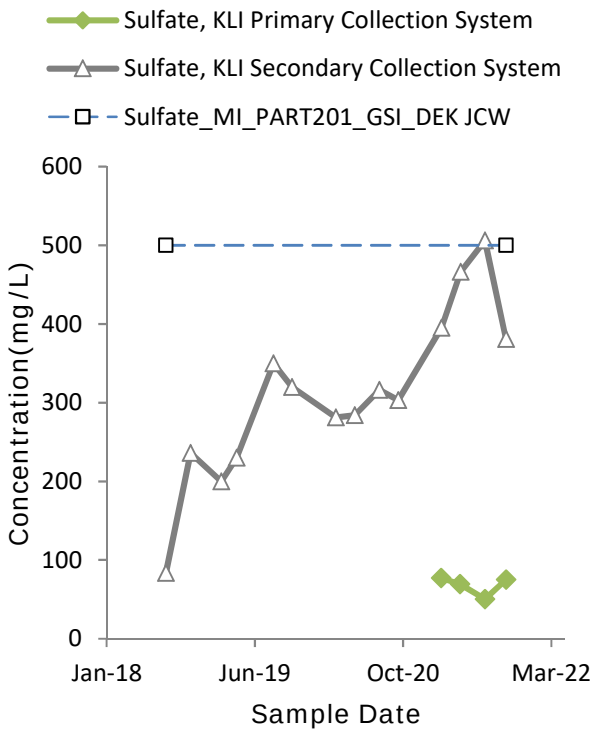


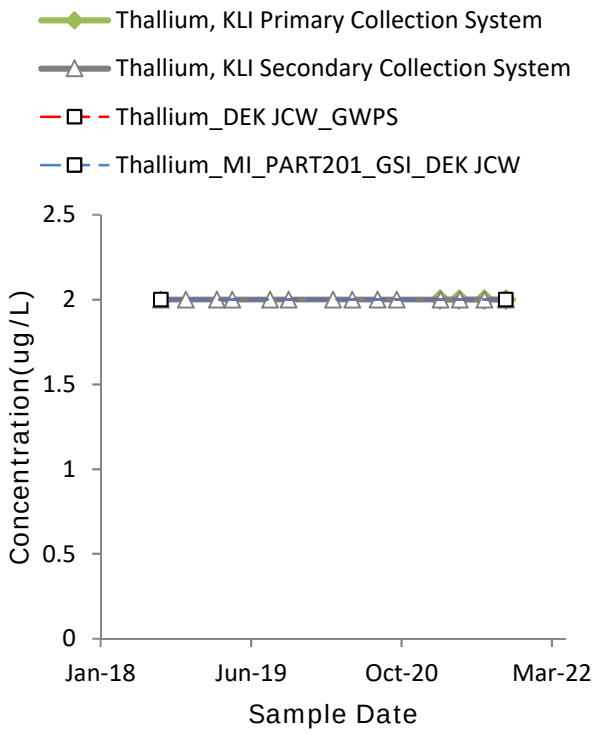


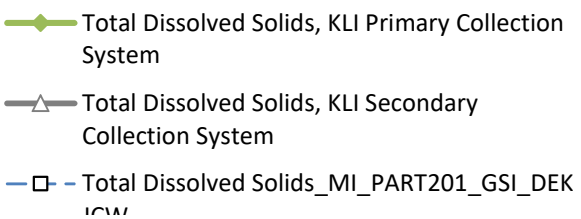
Water Quality Time Series

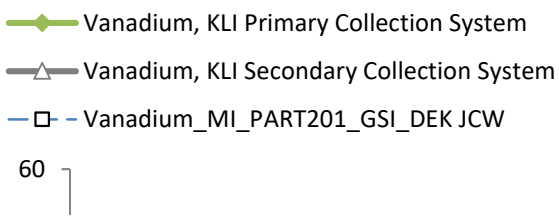












Water Quality Time Series